

Biodiversity Response to Fire and Herbicide in Intensively-managed Pine Stands of Mississippi

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Abstract: Common mid-rotation forest management practices in intensively-managed pine (*Pinus* spp.) stands include thinning, fertilization, herbicide use, and prescribed burning. However, greater herbicide use and less prescribed fire have generated questions regarding treatment effects on biological diversity within these systems. Therefore, we determined biodiversity response (songbirds, rodents, reptiles, amphibians, carabid beetles, understory vegetation) to factorial combinations of dormant season prescribed fire and imazapyr herbicide in thinned and fertilized, mid-rotation intensively managed pine stands in Kemper County, Mississippi. We used a randomized complete block design with six pine stands (blocks) divided into four 10-ha experimental units to which we applied randomly one of four treatments (burn only, herbicide only, burn + herbicide, control). Within each experimental unit, we subsampled select floral and faunal groups using common techniques (e.g., plant clipping, point transects, pitfall traps) to extrapolate species-specific biomass (kg/ha) and relative abundances, respectively. We also determined group-specific species richness and diversity. Of 387 plant, 63 bird, 15 amphibian, 17 reptile, 11 rodent, and 41 carabid species, we observed greatest treatment responses by vegetation and bird communities. Combining fire and imazapyr influenced wildlife communities most, but independent treatment applications also expressed capabilities of influencing landscape-level diversity. Minimal responses of other sampled wildlife communities were most likely caused by lesser detection rates, not negative treatment effects. Considering positive influences of fire and imazapyr on biodiversity and preponderance of intensively-managed pine stands in the southeastern United States, integrating these treatments into current forest management plans would likely support greater regional biodiversity.

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