

FIRE MANAGEMENT PLANNING IN A CROWN FIRE ECOSYSTEM: ASSESSING THE EFFECTS OF FIRE SEVERITY AND STAND STRUCTURE ON SAND PINE SCRUB PLANT COMMUNITIES

Johanna E. Freeman and Leda N. Kobziar

University of Florida, School of Forest Resources and Conservation, Gainesville, FL

ABSTRACT

In designing fire-use strategies to meet management objectives, it is critical to understand how fire severity affects vegetative species composition across stand development stages. We studied the effects of varying degrees of fire severity on plant communities following an 11,382-acre (4,606 ha) prescribed fire-turned-wildfire that occurred in Ocala National Forest's Juniper Prairie Wilderness Area, one of Florida's largest tracts of protected Ocala sand pine (*Pinus clausa* var. *clausa*) scrub. Post-fire surveys identified four fire severities (control/unburned, low, moderate, and high), and three pre-burn stand conditions with adequate replication (sapling class, pole class, and hurricane-damaged pole class). Long-term research plots were established in each severity/stand class combination, and were sampled at 1 and 2 years post-fire. Nonmetric multidimensional scaling (NMS) analysis proved useful for identifying trends in these plant communities, about which we have limited specific information on fire effects. The most salient relationships to emerge were those between the dominant understory shrubs (*Quercus myrtifolia*, *Quercus geminata*, and *Sabal etonia*) and overstory basal area, fire severity, and post-fire open space. From a conservation standpoint, post-fire open space is central to the perpetuation of endemic herbaceous gap specialists in scrub ecosystems. *Q. myrtifolia* cover showed a strong negative correlation with sand pine basal area in unburned stands, while *Q. geminata* showed an equally strong positive correlation, indicating a shift in dominance between the two oaks as a sand pine canopy matures. *Q. myrtifolia* was a more aggressive colonizer of post-fire open space than *Q. geminata* or *S. etonia*. The results of our study suggest that in sand pine scrub, factors that limit *Q. myrtifolia* cover—including high pre-fire overstory basal area and high-severity fire—will also promote post-fire open space. The highest and lowest rates of sand pine seedling regeneration were found in the most severely burned mature stands and the least severely burned sapling stands, respectively. These results suggest that high-severity fire in mature stands may best meet conservation objectives for this ecosystem, while severe fire in immature stands may prevent recovery to the sand pine scrub ecotype.

Keywords: disturbance, fire severity, NMS, *Pinus clausa*, sand pine scrub, seedlings, understory.

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