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OVERSTORY STRUCTURE AND REGENERATION PROCESSES IN LONGLEAF PINE-WIREGRASS FORESTS

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ABSTRACT: Silvicultural methods used to meet objectives of ecosystem management often include green tree retention, or a reserve shelterwood, in order to maintain components of mature stand structure. The competitive environments and mechanisms that influence regeneration in such systems differ substantially from those under even-aged management. We initiated a study in a 65-year-old longleaf pine forest to address the effects of residual overstory structure and competing herbaceous vegetation on survival and growth of longleaf pine seedlings. Stands were harvested to similar residual basal areas using single-tree selection, small group (~0.25 ac) selection, and large group (~0.5 ac) selection. An uncut control stand was used as a reference. Twenty-five subplots encompassing the range of overstory abundance index (OAI) were installed. Ten one-year-old containerized longleaf pine seedlings were planted at 2 quadrats (2 by 2-ft spacing) per subplot, one side receiving a glyphosate application to remove the understory. Soil resources and light availability were quantified over a two-year period, as well as seedling survival, size, and growth. Trench plots were also installed across a range of OAI.

The overstory and understory facilitated survival of longleaf pine seedlings but competed with them relative to seedling growth. Seedling survival increased positively with OAI and in the presence of understory. Microclimate changes, i.e., lower soil temperature and relative humidity, in the shade appeared to result in facilitation rather than increased soil moisture during a severe drought. Seedling growth was negatively influenced by OAI largely through attenuation of light by the understory. Soil N was increased at low OAI but only when the understory was absent. Root gaps created through overstory removal appear to be filled quickly by understory plant communities. Finally, trenched subplots preventing overstory root encroachment resulted in a substantial hardwood response which negatively affected growth and survival of longleaf pine seedlings.