

## **Conversion and Restoration of Even-aged Slash Pine Plantation to Uneven-aged Slash Pine/Longleaf Pine Ecosystem in Florida Coastal Flatwoods**

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Restoration of longleaf pine ecosystems is currently the focus of significant restoration efforts in the southeastern U.S. These ecosystems which once dominated the southeastern U.S. Coastal Plain are now reduced to a small fraction of the original extent. They were characterized by a generally open, park-like stand structure typically as an uneven-aged mosaic of even-aged patches varying in size, structure, composition and density. Many prior such longleaf pine sites now exist as slash pine and other pine plantations. Restoration of such sites will involve gradually replacing slash pine or other pine with longleaf pine and managing these complex ecosystems (longleaf/slash) with uneven-aged approach (selection systems) to meet diverse objectives of production, biodiversity enhancement, habitat conservation, recreation and carbon sequestration. However, our knowledge base to practice such a conversion and multifunctional management is inadequate. Additionally, selection system has been practiced little and studied less in shade-intolerant to moderately tolerant forest types, because of the perceived difficulties of regenerating these species beneath residual trees left from the cutting treatments.

The current study is aimed to model the conversion and restoration of even-aged slash pine plantation to an uneven-aged slashpine/longleaf pine ecosystem in order to achieve a sustainable multifunctional longleaf pine ecosystem in the coastal flatwoods. We will evaluate different uneven-aged forest reproduction methods (single-tree selection, group selection and irregular shelterwood) and a control (no tree cutting) with two fire frequencies (burning every 1 year and 2 years) through simulation modeling. The experimental set up has been established for these treatments with three replications at Tate's Hell State Forest, Carrabelle, FL. The preliminary preharvest stand structure data has been collected that will be used to develop tree marking guide using residual basal area, gap size and /or diameter classes to guide and regulate stand conversion. The reproduction cuttings are scheduled to be carried out in August 2009. Thereafter, longleaf pine seedlings will be planted in the gaps created and their survival and growth dynamics will be observed over time. We will also assess regeneration, growth, understory response and carbon sequestration. The initial structural conditions, regeneration and growth responses resulting from field trials will be used to initiate a spatially-explicit stand model that predicts timber production, forest and understory structure over multiple cutting cycles in an uneven-aged slash/longleaf pine ecosystem. The model will be used to evaluate the parameters (gap size, residual basal area, cutting cycle, fire frequency) of the reproduction methods that optimize and sustain values in a multifunctional management system. The sustainable multifunctional uneven aged method will be one providing sustained values over multiple cutting cycles during the simulation period. The study will help forest managers and practitioners to make informed decisions when manipulating stand structure through partial cutting treatments.

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