PROJECT OVERVIEW
NCSSF Research Project C.1 II (2)

Biodiversity and Intensive Even-Aged Forest Management (Extension, Phase 2)

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Longleaf pine forests that prevailed historically across the coastal plain of the southeastern United States were biologically diverse, but today most of them have been replaced by monoculture pine plantations of loblolly, slash, or longleaf.

Key Issue

Silvicultural practices designed to optimize and maximize plantation production are often perceived to be at odds with sustaining biodiversity. There is increased pressure on managers of privately managed forestlands in the U.S. Southeast to integrate other values such as wildlife habitat and biodiversity with the goal of maximizing the yield of forest products.

Project Objective

The primary purpose of this study was to enhance understanding of how species diversity changes with time as a result of dynamic stand development.

The specific objectives were to:

- provide quantitative data about species composition and abundance from six stands in the stem exclusion or canopy closure stage of development, in which the canopy is so dense that new saplings cannot grow into it
- determine the composition of the soil seed bank (viable seed reservoir present in the soil) of these six stands
- provide baseline data from these results for future post-thinning studies.

Approach

Six plots that were established for a 1995 study were located, re-established, and re-measured in late 2005. As a result of their land-use history as former agriculture fields or cutover forests, the stands had different understory characteristics (referred to as benchmark or non-benchmark) in 1995, but in 2005 their herbaceous understory conditions were similar. The benchmark condition referred to stands that resembled the understory vegetation occurring in stands that experienced a frequent low-intensity fire regime.

The investigators collected soil seed bank samples from the six plots in December 2005 and early January 2006. In early February, the samples were placed in inserts lined with a sterilized soilless potting medium. Fourteen control inserts were set up containing only potting media. All samples and controls

were placed randomly in a greenhouse and monitored weekly. Monitoring ended when new germinants ceased to appear in late May, and the study was terminated in late June.

Seedlings were removed after they were positively identified or were transplanted for later identification. A representative of each species was photographed and pressed at several different stages for documentation of ontogenesis (the development of the individual plant) and for use as a reference guide to distinguish between species. All data were entered into an electronic database.

Key Findings

Seed bank samples yielded 2885 germinants representing 56 unique species. Approximately 50% of the total individual germinants were two species of Gnaphalium (cudweed); 28% were *G. falcatum* and 22% *G. pensilvanicum*. Nearly 45% of the remaining germinates were from 14 species with a minimum of 1% representation.

These findings should improve understanding of the potential role of the seed bank in stand development. If thinning to reduce basal area increases the potential for biodiversity, as the modeling effort suggests, these results will contribute to understanding whether the vegetative response is primarily from the seed bank or some other source.

Deliverables

The following manuscripts will be submitted for publication:

- A seed bank study manuscript probably will be submitted to *Southeastern Naturalist*.
- A vegetation re-measurement manuscript will be submitted to *Forest Ecology & Management* as a 10-year follow-up to the original study.
- A seedling development pictorial guide will be submitted for publication through the University of Florida's Electronic Document Information System (EDIS) and will be available online for download.