Smith, Rick; Somers., Greg. 1998. A biologically-based individual tree model for managing the longleaf pine ecosystem. In: Moranz, R.A.; J. L. Hardesty; J. Maute. 1998. Research report, Eglin Air Force Base, 1998: A compilation of inventory, monitoring and research conducted in support of ecosystem management. The Nature Conservancy, Gainesville, FL. 33-34. Abstract.

A Biologically-based Individual Tree Model for Managing the Longleaf Pine Ecosystem

Rick Smith and Greg Somers

Duration: 1995-present

Objective: Develop a longleaf pine dynamics model and simulation system to define desirable ecosystem management practices in existing and future longleaf pine stands.

Methods: Naturally-regenerated longleaf pine trees are being destructively sampled to measure their recent growth and dynamics. Soils and climate data will be combined with the tree data to develop a biologically-based three-dimensional model of the growth of individual trees and stands. The trees will be taken from across the range of sandhills and coastal plain sites on Eglin. The data will be developed into a model which will three- dimensionally represent the crowns and bole of the trees and these components' dynamics. The model will include intertree competition for resources to incorporate stand dynamics into the model. In addition to simulating tree growth, the model will simulate the light environment below the tree crowns. Direct (photo-sensitive diodes) and indirect (hemispherical photographs) measurements of sunlight will be collected to estimate the light extinction through clumps of longleaf pine trees. Indirect measurements will also be collected in conjunction with Dr. Meldahl's Longleaf Stand Dynamics project at Eglin to incorporate seedling establishment, survival, and growth into the model as it relates to the light environment at the ground.

Progress: Forty-two trees have been measured ranging from 2 to 52 cm. Data collection consists of over 13,000 foliar points, over 700 radial growth disks, and over 500 foliage samples. The design of the model continues and design of model components will begin this year as sufficient data are now available. While the study is fully operational, efforts continue on the refinement and improvement of data collection methods. Data collection will continue through spring 2000.

Publication:

Smith, W. R. 1996. Shade: A software system for determining the shadow of a tree. Pages 402-403 in Proceedings of the IUFRO, Conference Modeling Early Growth and Regeneration, June 13-16, 1996. IUFRO, Copenhagen, Denmark.