FOREST INGROWTH PREDICTION MODEL FOR THE NORTHEASTERN UNITED STATES

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Abstract: In the last 20 years, there has been a revival of interest in the use of uneven-aged forest management techniques in the production of timber and forest amenity values. Uneven-aged management is coming into renewed favor especially among non-industrial private landowners in the northeastern United States. The practice allows periodic timber removals on relatively small tracts and, in addition, has been suggested as an aesthetic alternative to clearcutting.

Most of the forest growth and yield simulators available for use in the Northeast were developed with even-aged silvicultural systems in mind; therefore, they make little or no provision for the ingrowth of trees into the smallest inventoried diameter class. In addition, the few ingrowth models that have been developed have largely ignored species composition due to the complexity of the eastern deciduous forest types and the modeling effort required. Existing simulators are consequently of very limited value in the prediction of the growth and yield of stands managed by uneven-aged selection methods.

This paper describes a new forest ingrowth model developed for the northeastern United States. The model has been calibrated using data from 3,159 USDA FS Forest Inventory and Analysis (FIA) plots located in 14 northeastern states. The data set includes measurements of all trees over a 5" diameter threshold and, since the plots were remeasured on a 7-year cycle, a record of ingrowth between measurements.

The model was developed in two stages. First, a non-linear equation was developed to predict ingrowth trees per acre. Independent variables included number of trees per acre, average diameter of the trees, and a generalized stocking percent. Multivariate logistic modeling then was used to determine the species composition of the in-growth. A unique approach, based on individual species' tolerance of shading, was used in simultaneously fitting a set of logistic models to the data. The models have been validated using independent data sets from a wide range of northeastern forest types.

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