EVALUATION OF FOREST SITE TYPES IN RHODE ISLAND

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Abstract

Increasing demands on Rhode Island forests necessitate their proper management. In order to advise landowners of forest management, productivity information of representative forest site types is needed.

Thirty unmanaged Rhode Island woodlots were sampled to represent a range of the productivity of various forest site types in an exploratory study. Standard point sampling procedures were used to inventory stands. Measures of species composition, stocking, volume, growth and productivity were determined. Regeneration within a .005 acre circular plot at each point sample was counted, identified and measured for height. Soil samples of the A, B and C horizons were collected at each point sample. Depths of each horizon and mottling were recorded. Representative A and B horizon samples were analyzed for percent moisture at field capacity and wilting point, amount of available water, hydrophobic nature, and pH. Slope was measured and degree of stoniness classified at each point sample.

Principal component analysis was utilized to combine numerous soil, site and stand characteristics into principal components describing each point sample. Five principal

components were chosen and subjected to cluster analysis. Eleven clusters resulted. Each was observed as a separate data set to be analyzed and representative of a specific forest site type in Rhode Island. Each was described according to mean values of the stand, regeneration, soil and site characteristics measured, and the principal components. Five of the eleven clusters were predominantly oak-mixed hardwood, one was white pine - oak-mixed hardwood, two were white pine and the remaining three were red maple forest site types.

Correlation and multiple regression analyses were performed on each forest site type. Soil and site characteristics were used to explain variability in basal area per acre, number of stems per acre, cords per acre and board feet per acre. The value of the regression models varied greatly. No trends were apparent in the predictive models developed for each measure within the oak-mixed hardwood, white pine and red maple forest site type groups. The addition of age and height to the soil and site characteristics contributed relatively little information.

The predictive equations for site index of oak and white pine also varied widely between forest site types and within groups based upon the soil and site characteristics studied. Height proved to be a good site quality estimator of the red maple forest site types. Other measures included rings per inch, mean annual increment and dbh. No characteristic appeared consistently in the models of any

forest site type group to indicate trends. Soil and site characteristics appeared to best explain the rings per inch variability of the red maple forest site types. Age was more important in explaining this variability in the oak-mixed hardwood forest site types. Various additions of basal area per acre, number of stems per acre, and age to the soil and site characteristics improved R^2 values for the majority of forest site types, particularly the oak-mixed hardwood forest site types. Soil and site characteristics did, however, strongly relate to the mean annual increment of the red maple forest site types. Dbh appeared to relate more to stocking level than to age or any soil or site characteristic for almost all of the forest site types.

Canonical correlation analysis of the stand, soil and site characteristics revealed five significant correlations. Only the first was strongly correlated. Red maple age, height and mean annual increment were highly correlated with the amount of available water in the B horizon.