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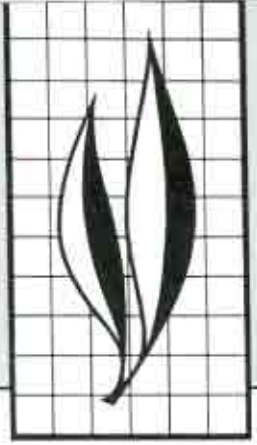

Tree Taper Model Volume Equations

I. Bark Taper Equations for California Conifers

II. Tree Taper Models for Major Commerical California Conifers

III. Tip Length Models for Major Commercial California Conifers

IV. Tree Volume Equations for Major California Conifers

Lee C. Wensel and Craig M. Olson

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UNIVERSITY OF CALIFORNIA DIVISION OF AGRICULTURE AND NATURAL RESOURCES

ABSTRACT

Upper-stem tree diameters are usually measured outside the bark with the only bark thickness measurements being made at breast height. The current study presents equations and coefficients for estimating the bark thickness in both the upper stem and at the stumps based upon the bark thickness at breast height, the size of the tree (DBH and total height), and the height to the measurement in question.

The upper-stem model presented is an extension of a previously published general hyperbolic ratio model. The model for bark ratio below breast height, a simple power function, is estimated as well. Both equations contain coefficients that account for the more rapid taper on trees with thicker bark.

The data used for fitting and testing the taper models consisted of measurements on over 3,000 conifer trees measured by members of the Northern California Forest Yield Cooperative and the USDA Forest Service. The data were split into two halves, one half for fitting and the other half for testing. The best upper-stem and below-DBH equations obtained from this analysis are discussed here; the remainder are listed in the Appendix.

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Tree Taper Models for Major Commercial California Conifers

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ABSTRACT

Equations are developed for eight conifer species to estimate the stem taper of inside-bark diameters from breast height to the tip of the tree. Separate equations are developed to estimate the diameter inside bark at the stump. Equations are fitted and tested on separate halves of a data set composed of tree taper data from previous studies, both from the forest industry and USDA Forest Service surveys. This composite data set extends from Southern California to the National Forests of southern Oregon.

After an extensive examination of existing taper equations, two taper equations were selected for further analysis, one by Biging and the other by Wensel and Krumland. Coefficients for both equations are given for the eight conifer species examined. Because of a lower residual sum of squares, and a lack of correlation of the residual with the available predictors, the Wensel and Krumland equation is recommended for use.

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Tip Length Models for Major Commercial California Conifers

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ABSTRACT

Several models for predicting the length from the merchantable top to the tip of a tree are evaluated for major California conifers. A model reported by Wensel and Krumland (1983) was found to be the most useful because of its ability to predict for both total height or merchantable height. Coefficients are reported for eight commercially important conifers of California.

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Tree Volume Equations for Major California Conifers

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ABSTRACT

Equations and tables are given to estimate total tree board foot and cubic foot volume for eight major California conifer species. Using taper equations developed in another study, log dimensions were estimated for the trees used in the stem taper study; then coefficients for whole-tree volume equations were fitted to the resulting set. This produced Scribner and International $\frac{1}{4}$-inch board volume, and cubic volume equations for the eight important commercial conifer species in California. For board-foot volumes, separate equations are given for both total and merchantable heights to various merchantable tops.

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