

EFFECTS OF HEIGHT AND LIVE CROWN RATIO IMPUTATION STRATEGIES ON STAND BIOMASS ESTIMATION

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Abstract—The effects of subsample design and imputation of total height (ht) and live crown ratio (cr) on the accuracy of stand-level estimates of component and total aboveground biomass are not well investigated in the current body of literature. To assess this gap in research, this study uses a data set of 3,454 Douglas-fir trees obtained from 102 stands in southwestern Oregon to simulate different combinations of subsample designs and imputation methods. The predictive ability of the regional ht and cr imputation methods on estimates of component and total aboveground biomass for a range of subsample sizes ($n = 0, \dots, 15$) and subsample designs (simple random selection, largest trees by diameter at breast height (d), smallest trees by d, trees grouped about the median by d, and several combinations of the latter three designs) is evaluated using the leave-one-out cross validation technique. The best methods for imputing ht and cr independently are identified which are then used to simultaneously impute ht and cr across the range of subsample sizes and designs. Methods to impute cr include the current methods used in the southern Oregon variant of the USFS Forest Vegetation Simulator (SO-FVS) and in the southwestern Oregon variant of the ORGANON growth and yield model (SWO-ORGANON) from Oregon State University as well as subsample-calibrated versions of both. Methods to impute ht include the current methods used in SO-FVS, SWO-ORGANON, and a collection of equations developed by Temesgen et al. (2008) as well as subsample-calibrated versions of each. The findings of this study should be beneficial in identifying the most accurate ht and cr imputation method to estimate component and total aboveground biomass for each subsample size and selection method.

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