

## **Effects of Basal Area Factor and Plot Size on Precision and Accuracy of Forest Inventory Estimates**

Peter Becker and Tom Nichols

ABSTRACT: We tested the effects of plot size (0.05-0.30 ac) and basal area factor (BAF) (5-30) on the accuracy and precision of per-acre estimates of tree number, basal area, biomass (all for trees ,4.5 in. dbh), and sawtimber volume (for trees ,11.6 in. dbh). Field sampling errors, such as missing in-trees, did not affect our tests. Virtual, variable- and fixed-radius plots were randomly located within an artificial matrix of 130 real plots in well stocked, upland hardwood forests of sawtimber-sized trees in the Missouri Ozarks. Inventory parameters were essentially independent of plot size and BAF, while their coefficients of variation decreased with plot size and increased with BAF. Thus, our results for random plots agreed with sampling theory, unlike a previous study using concentric virtual plots in West Virginia forests. A very concentrated zone of high tree density around some plot centers apparently caused the biased estimates by concentric plots. Compared with the entire composite forest, inventory means were accurately estimated (to within 5%) and size class distributions were well represented for plots ,0.1 ac or 7 15 BAF. Our procedures provide a basis for selecting an efficient and cost-effective sampling design suited to forest characteristics and the inventory's purpose.

[http://eofc.club.officelive.com/Documents/Forest%20inventory%20design%20\(1.0\).pdf](http://eofc.club.officelive.com/Documents/Forest%20inventory%20design%20(1.0).pdf)