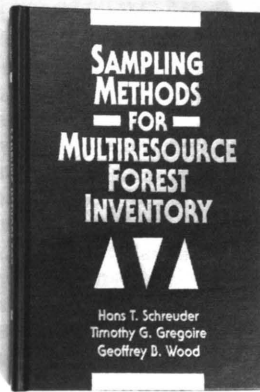


## Book Review



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Hans T. Schreuder, Timothy G. Gregoire & Geoffrey B. Wood: *Sampling Methods for Multiresource Forest Inventory*. John Wiley & Sons. xv + 446 p. ISBN 0-471-55245-3.

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Another new book on forest inventories? With this thought I began to read 'Sampling Methods for Multiresource Forest Inventory' by H.T. Schreuder, T.G. Gregoire and G.B. Wood. The book joins a wealth of other standard works covering methods for forest inventories, some published quite recently. An attempt, therefore, to write a completely new or different book on the same subject is not only challenging but also risky. The three authors have, however, bravely met the challenge and have confidently exposed a new area previously missing from standard works.

The foreword and acknowledgements refer to the many leading inventory experts who contributed to the book through reviews and suggestions and hence contributed to the quality of the book. An extensive glossary follows giving short and precise explanations for the most important concepts of forest inventories. Readers whose native language is not English will find the glossary particularly helpful.

The introduction gives an overview of the methods for collecting information, as well as a synopsis on the history of statistical surveys and of the usage of statistical methods in forest inventories. Because many authors unfortunately regard book introductions as an unpleasant formality, they are too often written without much ardor. This book, however, is an exception. The authors have successfully written an exemplary and stimulating introduction to rather dry material. Instead of merely finding confirmation of what they already know, inventory experts can actually learn from the introduction. Attention is elegantly drawn to the importance of certain developments of inventory statistics, which helps to correctly arrange the methods described later on.

In the following five chapters the authors focus on the main emphasis of the book, namely estimation and analysis within the framework of statistical survey sampling. Discussed is both the drawing of samples from finite populations and the combining of information collected into meaningful statistical estimates of parameters of the sampled population. The second chapter focuses on fundamental concepts and the statistical theory of sample surveys. General definitions are followed by definitions dealing with probabilistic sampling, probabilistic estimation and super-populations. Clear definitions are given priority over complicated proofs hence increasing understandability. The second chapter ends by discussing important discrete and continuous distributions, laws of large numbers and by giving a rather generalized description of models.

The third chapter covers probabilistic sampling strategies. First it is presumed that an a priori list of all elements of the population is available. Then, using the simplest probabilistic sampling design – the simple random sampling – as an example, discussion focuses on sample selection, estimation variance, expectation, bias, mean square error and asymptotic unbiasedness. The discussion is then extended to include other related sampling designs which also rely on having a list of the elements before sampling. Finally, sampling designs are presented which do not rely on a priori lists of all the elements of the population. The chapter ends with discussion on

the estimation with covariates and the Jackknife and Bootstrap variance estimation.

The theoretical observations of the third chapter are applied in the fourth chapter to single level forest sampling. Besides designs which are established in practical use (fixed area plot sampling, variable radius plot sampling, line intersect sampling) other younger developments are presented such as importance sampling and ranked set sampling. The comparison between different sampling strategies clearly illustrates the advantages and disadvantages of individual designs. I personally find the section on growth estimation to be misplaced – it would be more appropriate under the presentation of the method of monitoring over time.

In the fifth chapter observations are extended to multi-information sources for sampling. Multi-stage and multiphase designs are described in detail, but too little consideration is given to practical problems which can occur while using these designs. This is unfortunate particularly because in the following section, covering monitoring over time, the advantages and disadvantages of using sampling with partial replacement (SPR) in practice are clearly laid out. Although combining estimates from several surveys is an important and common problem, in other literature it receives little or no attention. The authors of this book not only address the subject but also present it in a very clear and comprehensive form. The chapter is rounded off by examples on the practical use of multilevel sampling for forest inventories.

The real highlight of the book is the sixth chapter which covers model-based inference. This subject is rarely dealt with in standard literature. A clear introduction is followed by an extensive comparison between the model-based and the design-based inference whereby discussion focuses especially on practical aspects. Examples of the model-based inference related to forestry and suggestions also allow a novice to judge whether he can use model-based inference as a useful alternative.

After the reader has worked his way through the complex material presented in chapters two to six the seventh chapter offers a relaxing lecture. Here the mensurational aspects of forest inventories are covered. However, because this

over ninety-page-long chapter only has one figure it is somewhat difficult to follow. Although site assessment, low vegetation and forest health are discussed, discussion on the non-production functions of the forest is rather limited.

The ninth and tenth chapters cover related sampling and estimation topics. Here there are several areas which up to now have received only little or no attention in books on forest sampling inventories. These include small area estimation, sampling rare populations, missing data analysis and Bayes statistics. The last chapter discusses future developments in multiresource sampling in forestry. Doctoral candidates searching for an interesting subject will be particularly fond of this chapter.

This short overview of the subject areas mentioned reveals that this is not an average book on forest inventories. The authors have, in an exemplary manner, been successful at combining the sampling theory and the requirements of forest sampling surveys. They did not succumb to the urge to deal only with mathematical-statistical theory. The book finally offers those interested in forest inventories with the “missing link” between forest sample surveys and the sampling theory.

Readers searching for a do-it-yourself guide to performing forest inventories are warned – you will not find what you are looking for in this book. Readers with a basic knowledge of statistics as well as inventory experts, on the other hand, are strongly recommended to read the book. It goes far beyond what is found in classical books on forest inventories while fulfilling all requirements for becoming a classic itself. The book deserves respect far beyond the area of forest inventory. With this book Hans Schreuder, Tim Gregoire and Jeff Wood have made their own special niche – congratulations.

Dr. Michael Köhl

Swiss Federal Institute for Forest,  
Snow and Landscape Research

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(Smith 1977, 1980, Allen 1978, Jones 1979)\*

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- Smith, C. 1977. Aspen. Timber 77(4): 369-384.  
 — 1978. Silver birch. Timber 78(1): 17-23.

- & Harris, B. 1976a. Scots pine. *Forest Management* 15(1): 5–9.
- & Harris, B. 1976b. Norway spruce. *Forest Management* 15(2): 135–143.
- , Harris, B. & Allen, A. 1969. Sawn goods. *Timber* 69(2): 131–140.

#### Article in a journal

- Repo, T. 1988. Physical and physiological aspects of impedance measurements in plants. *Silva Fennica* 22(3): 181–193.

#### Article in a book

- Jarvis, P.G., Edwards, W.E. & Talbot, H. 1981. Models of plant and crop water use. In: Rose, D.A. & Charles-Edwards, D.A. (eds.). *Mathematics and plant physiology*. Academic Press, London. p. 151–194.

#### Monograph

- Cochran, W.G. 1977. *Sampling techniques*. 3rd edition. John Wiley & Sons, New York. 428 p.

#### Congress proceedings

- Cooper, R.W. 1971. Current use and place of prescribed burning. *Proc. Prescribed Burning Symposium*, Charleston, South Carolina, April 14–16, 1971. USDA Forest Service, Southeastern Forest Experiment Station, Asheville, N. C. p. 21–27.

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