Abstract template for the conference "A century of national forest inventories – informing past, present and future decisions"

Dear author. This is a two-page template that in the first page will ask for information on presenter name, topic, and preferred presentation form.

On page two, you are asked to fill in your abstract in the format and font size indicated. Please remember to include authors affiliation information in the footer section of page two. The length of the abstract may not be more than one page including references.

Abstract title:		A primer on model-based inference for remote sensing-assisted forestry applications
Take-home message:		Model-based inference can produce valid inferences for small areas with insufficient sample sizes for design-based inference and for remote areas when probability sampling is not feasible.
Presenter name:		Ronald E. McRoberts
Presenter contact info:		Northern Research Station U.S. Forest Service St. Paul, Minnesota 55108 USA e-mail: rmcroberts@fs.fed.us
General topic, see website: (please double click on the check box and activate the relevant one)	☐	Improving future NFIs by learning from the past
	☐	NFIs today and in the future
	☒	Cutting edge and futuristic inventory techniques and technologies
Preferred presentation form:	☒	Oral presentation
	☐	Poster
Abstracts will be reviewed by members of our scientific committee and you will be given information on decisions in due time after the submission deadline has passed.		

A primer on model-based inference for remote sensing-assisted forestry applications

Ronald E. McRoberts

Introduction: The assumptions underlying model-based inference differ substantially from the assumptions underlying the more familiar design-based (probability-based) inference. As a result of these differences, important advantages as well as important challenges accrue to model-based inference. For example, model-based inference can be used for small areas for which sample sizes for design-based inference are too small and for remote areas for which probability sampling is not feasible. The objective is to highlight key features of model-based inference that require special attention and additional research.

Materials and methods: The key features will be explained and illustrated using a combination of NFI data, airborne laser scanning auxiliary data, and regression models.

Results: The primary result is that curvature in the nonlinear model estimation space produces non-elliptical confidence regions for model parameter estimates which, in turn, can produce serious under-estimation of the uncertainty for large area estimates of parameters such as mean biomass per unit area.

Conclusion: The effects of curvature in the nonlinear model the estimation space can be circumvented using bootstrap techniques.

Northern Research Station, U.S. Forest Service, Saint Paul, Minnesota 55108 USA.
rmcroberts@fs.fed.us