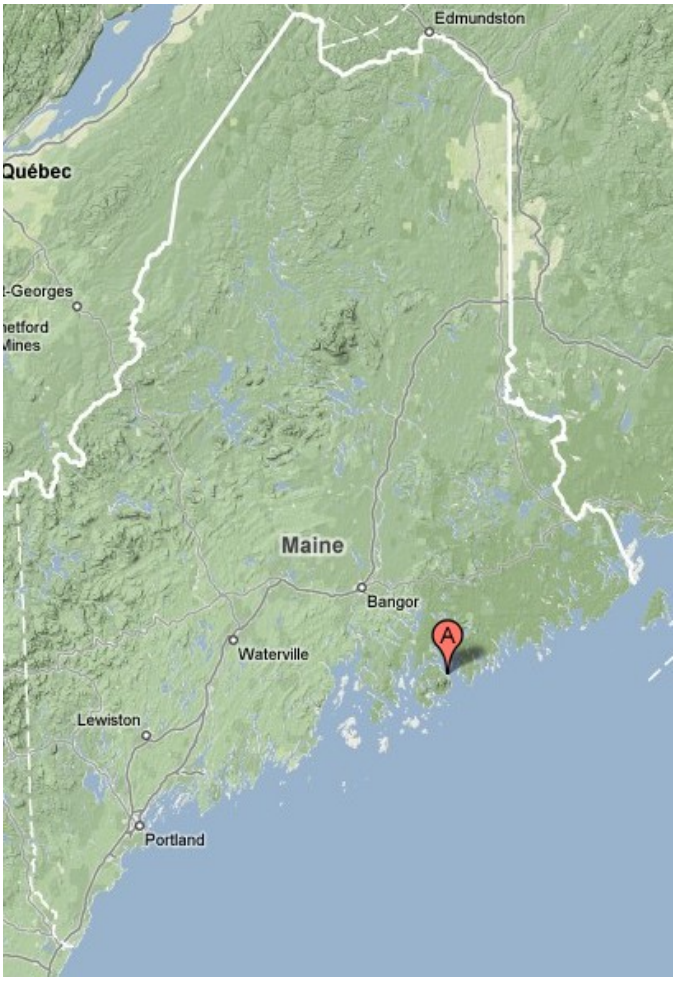
Northeastern Mensuration Organization (NEMO)

12th Annual Meeting

Bar Harbor Hotel ~ Bluenose Inn
Bar Harbor, Maine
October 8-9, 2008



NEMO Philosophy

NEMO was organized by foresters with an interest in quantitative methods to provide a place where, once a year, we could get together and share some of the important research, policy, and practical concerns in the northeast. The guiding principle has been that the meetings should be casual, yet professional and open to all with an interest. To that end, we have encouraged holding meetings at locations where it would be within the reach of all, including graduate students. Our success rate in meeting these goals is pretty close to 100%. In addition, the level of presentation is encouraged to be gentle and accessible to all, while not sacrificing content. Graduate students are especially encouraged to think of NEMO as a friendly place to get feedback on their proposed research work.

Though we founded NEMO to provide a place to share information of regional interest (the northeastern U.S. and Canadian Maritime provinces), anyone is welcome to come and join in the discussions or offer a contributed talk, as many topics transcend regional boundaries. As the agendas for previous years will attest, we have had attendees from other parts of the country, with the 2000 meeting being a joint meeting in cooperation with the Midwest Mensurationist Organization, and 2003 with the Southern Mensurationist Organization.

NEMO Over The Years

2008	Bar Harbor Hotel; Bar Harbor, ME	October 8-9
2007	Crowne Plaza Resort; Lake Placid, NY	October 17-18
2006	Grey Towers; Milford, PA	October 31 – November 1
2005	Stone House; Freeport, ME	November 2-3
2004	Yale Myers Forest, CT	October 28-29
2003	Hotel Roanoke; Roanoke, VA (joint)	October 5-7
2002	St. Andrews By The Sea; New Brunswick, Canada	September 18-20
2001	Fox State Forest; Hillsboro, NH	August 22-23
2000	Spruce Point Inn; Boothbay Harbor, ME	October 4-6
1999	The Harvard Forest; Petersham, MA	August 25-26
1998	The Atlantic Oaks; Bar Harbor, ME	August 27-28
1997	The Urban Forestry Center; Portsmouth, NH	August 20-21

Wednesday, October 8, 2008

10:00 – 10:30 Sign In & Coffee

10:30 – 10:45 Welcome and Opening Remarks

Tom Brann, Arrangements Chair
Professor of Forest Resources
University of Maine
Orono, ME

Larry Gering, Program Chair
Associate Professor of Forest Biometrics
Clemson University
Clemson, SC

10:45 – 11:15 A solution to the nearest-tree sampling method, and a geometric insight into the k-nearest tree method

For years, ecologists have been trying to calculate the number of objects in an area based on the distance to the nearest object from a random point. So far, they seem to have failed. There is a simple solution to this problem, based on ideas familiar to foresters. In addition, this geometry can be extended to the 5th nearest neighbor or other neighbors. The geometry of the process makes the bias of these other methods clear, as well as their problems with edge effects.

Kim Iles, Forest Biometrician
Kim Iles & Associates Ltd.
Nanaimo, BC, Canada

11:15 – 11:45 50 years of equipment

The progression of cruising equipment over my 50 year career. Including recent development of an instrument that includes a three-axis compass that provides a X, Y, Z coordinate for the tree top and base and automatically solves for the tree length.

Bill Carr, Forestry & Mapping Consultant
Laser Technology, Inc
Missoula, MT

12:00 – 1:00 Lunch

1:15 – 1:45 Efficiency of some sampling alternatives to estimate tree- and stand-level foliage biomass

Sampling individual crowns and canopies is becoming more common for a variety of reasons such as determining leaf area index, canopy bulk density, and carbon sequestration. High within- and between-tree crown variations have contributed to the difficulty of tree crown sampling and tree- and stand-level foliage biomass estimation. A variety of sampling schemes have been proposed for estimating tree crown attributes. In this presentation, we examine the performance of selected sampling techniques and their efficiency under extremely high variation across the landscape; the impact of sampling a different number of branches and trees within a stand; and the influence of species type and composition on the type of the selected sampling design.

Aaron Weiskittel, Assistant Professor of Forest Resources
University of Maine
Orono, ME

1:45 – 2:15 Bitterlich's Angle count Sampling and pictures of the key players in the development of Angle Count Sampling (Variable Plot Sampling)

The major stages and the key players for the development of Bitterlich Sampling (Variable Plot Sampling) are presented. These stages are: basal area per hectare (Walter Bitterlich), volume per acre (Lew Grosenbaugh), breakdown of volume per acre into its two component parts (Don Bruce), and the most efficient balance of sample size for tree count and sample size for the volume-basal area ratio (V-BAR).

John F. Bell, Professor Emeritus
Oregon State University
President, John Bell & Associates
Corvallis, OR

2:15 – 2:45 Stereology and radial line sampling

Line intercept sampling and several other forest inventory techniques are related to the field of stereology which frequently uses one-dimensional probes or two-dimensional slices to make inferences regarding the properties of three-dimensional objects. A general description of stereology concerns estimation of the properties of a body or region based on samples that have a lower dimension; for example properties of a three dimensional body may be inferred on the basis of two-dimensional slices. This is similar to many forest inventory techniques.

Thomas Lynch, Professor of Forest Biometrics
Oklahoma State University
Stillwater, OK

2:45 – 3:15 Afternoon Break

3:15 – 3:45 Imputation of missing observations in forest inventories

Imputation techniques are widely used in studies that contain missing data; however, they may produce biased parameter estimates and inappropriate variance estimates. In addition, if the imputation technique used does not accurately represent the variability in the data, the resulting confidence intervals will be incorrect. This research evaluates numerous imputation methods and tests their ability to predict missing individual total stem height given existing diameter at breast height data. Imputation techniques that were compared include: case deletion, mean imputation, EM algorithm, multiple imputation, and Bayesian multiple imputation. Analysis of the various imputation procedures showed that the two multiple imputation techniques maintain the variability in the data without biasing estimates. The EM algorithm produced confidence intervals that most closely simulated the actual dataset, however the technique overestimated the mean and underestimated the standard deviation. The EM algorithm, multiple imputation and Bayesian multiple imputation overestimated the volume loss by 32, 55, and 6 cuft., respectively.

Aimeé Rockhill, Graduate Research Assistant
North Carolina State University
Raleigh, NC

3:45 – 4:15 The Stand Structure Generator - further explorations into the joy of copula

Last year I presented the concepts of copulae and their applications in forestry, including an idea for developing a stand structure generator. Thanks to some proding my Jeff Gove and others, I have developed the application in R and will present the details and some live demos

John Kershaw, Professor of Forest Biometrics
University of New Brunswick
Fredericton, NB, Canada

4:45 – 5:15 Randomized graph sampling: concepts and applications

Not every attribute of interest occurs as trees located in the interior of polygons. Many key attributes are associated with networks of linear features. These issues include boundary maintenance, road and trail conditions, logging damage, and exotic species invasions. I introduce randomized graph sampling (RGS) as a design-unbiased approach to sampling these attributes. RGS includes randomized branch sampling and guided transect sampling as special cases. Variance estimation, use of covariates, and the optimal allocation of sampling effort will be discussed.

Mark Ducey, Professor of Forest Biometrics
University of New Hampshire
Durham, NH

5:30 – 6:00 Reception – cash bar

6:00 - Dinner

Thursday, October 9, 2009

7:30 - Coffee & krumpets

8:25 - Welcome and Update

Tom Brann and Larry Gering

8:30 – 9:00 NIMAC and the intensification of FIA

The National Inventory and Monitoring Applications Center (NIMAC) develops forest monitoring methods and software tools to help Forest Inventory and Analysis (FIA) and others, resulting in compatible results across the landscape. NIMAC has helped six States and several National Forests design and implement intensified inventories focusing on specific areas of interest. A Design Tool for Inventory and Monitoring (DTIM) has been developed to lead the survey planners through a questions-driven process. Also, Portable Data Recorder, compilation, and analysis tools have been or are being developed.

Chip Scott, Program Manager
USDA Forest Service, FIA
Newtown Square, PA

9:00 – 9:30 Development and evaluation of regional taper and volume equations for the primary conifer species in the Acadian Region

We investigated the performance of seven commonly used taper equations on balsam fir and red spruce in this study. The taper equations included: a segmented polynomial taper equation; 3 different variable-exponent taper equations; a trigonometric variable-form taper equation; a mathematically tractable stem profile model by; and a switching taper model. The taper database used in this study was compiled from various locations in the Acadian. Generalized non-linear models (GNLS) and mixed effects models (NLME) were both fitted to predict the diameter inside bark of each tree, while numerical integration was used to estimates stem volume. The average absolute bias, root mean square error (RMSE), and mean percent bias of diameter inside bark and stem volume were used as criteria to compare the performance of different taper equations. Consistent results were obtained for both species as the Kozak (2002) model and Sharma & Zhang (2004) model were superior to the other equations in predicting diameter inside bark. As for the stem volume estimation, the switching taper model by Valentine & Gregoire (2001) as well as Kozak (2002) and Sharma &

Zhang (2004) models provided relatively accurate estimates that were performed better than the original Honer (1963) volume equations.

Rongxia Li, Post Doctoral Research Associate
University of Maine
Orono, ME

9:30 – 10:00

Developing a diameter-distribution based, whole stand growth prediction system for Pinus occidentalis stands in La Sierra, Dominican Republic

Pinus occidentalis is a major economic tree species in the Dominican Republic, contributing close to 97% of the volume harvested. To model growth of P. occidentalis forest stands in three different ecological zones within La Sierra region in the Dominican Republic, a diameter-distribution model was employed. Characterization of these stands will allow to predict the number of trees by diameter class at future points in time, allowing forest managers to define the optimum economic rotation for particular sites in the region, detect the excess or lack of specific wood products and take multiple and valuable decisions regarding the management of P. occidentalis in the region. We chose to model the diameter-distribution using the three-parameter Weibull function based of its flexibility and creditability of its diameter predictions. Weibull parameters were estimated for each of 25 stands from three ecological zones. Estimated Weibull parameters were then directly predicted using nonlinear mixed regression functions with age, site quality and density as predictor variables. Results indicated that separate equations are required for each ecological zone. The predictions equations were employed to predict Weibull distributions and derive yield per hectare estimates for each stand, which were compared to observed yields. Estimated yields from Weibull parameters had 20, 18 and 3% bias as compared field measurements for the Intermediate, Humid and Dry ecological zones, respectively. Root mean squared errors were 41.4, 63.6 and 17.1 for the same three ecological zones, respectively.

Santiago W. Bueno, Graduate Research Assistant
Department of Forest and Natural Resource Management
SUNY_ESF
Syracuse, N.Y.

10:00 – 10:30 Morning Break

10:30 – 11:00 Does bandwidth selection really matter in application of geographically weighted regression

Our results indicated (1) the GWR models with smaller bandwidths fitted the data better, yielded smaller model residuals across tree sizes, significantly reduced spatial autocorrelation and heterogeneity for model residuals, and generated better spatial patterns for model residuals. However, smaller bandwidth sizes produced high levels of coefficient variability; (2) the GWR models based the fixed spatial kernel function produced smoother spatial distributions for the model coefficients than those based on the adaptive kernel function; and (3) the GWR cross-validation or AIC optimization process may not produce an "optimal" bandwidth for model fitting and performance

Zhihai Ma, Graduate Research Assistant
Department of Forest and Natural Resource Management
SUNY_ESF
Syracuse, N.Y.

11:00 – 11:30 The great systematic sampling controversy of 2008

A conclusion drawn from the 'great controversy' is that a need exists for a more thorough treatment of the connection between restrictions on systematic selection and unbiased estimation. Several recent sampling texts describe restricted selection from discrete populations and continuums. One text briefly covers unrestricted and restricted selection in discrete populations, and another covers restricted selection in discrete populations and unrestricted selection in continuous populations. No text, so far as we know, covers restricted and unrestricted selection of systematic samples from both discrete and continuous populations. Thus, we start 1-in-a sampling of discrete populations and extend this to the systematic sampling of linear and areal continuums. Our prime objective is to demonstrate that how the restrictions on randomization in systematic sampling determines which estimators are unbiased.

Harry Valentine, Chief Research Forester
USDA Forest Service
Durham, NH

11:30 – 12:00 Business Meeting