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SELECTED EXAMPLES OF ADVANCED FIA DATA ANALYSIS

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Abstract. This short discussion introduces the new Special Section on Advanced FIA Data Analysis that has been recently created in the Mathematical and Computational Forestry & Natural-Resource Sciences (MCFNS) journal as a result of collaboration between the journal editors and scientists of the U.S. Forest Service, FIA (Forest Inventory Analysis) program. This section contains three papers, all of which originated from presentations at the 9th FIA Symposium held at Park City, Utah, on October 21-23, 2008. The papers passed two screening criteria and a peer-review process consistent with the MCFNS standards, and were assessed by the journal editors as consistent with the MCRNS scope and focus and valuable contributions to the journal's contents.

Keywords: Symposium Proceedings, FIA, Forest Inventory, Remote Sensing, GIS, Landsat.

1 Background

The Forest Inventory and Analysis (FIA) program of the U.S. Forest Service conducts the national forest inventory of the USA on an annual basis. The production function of the program focuses on acquiring and analyzing the ground data and reporting the results. The program also supports research efforts that focus on development of user tools for online data retrieval and specialized statistical analyses and reporting; development of technologies that promote greater efficiency and precision of estimates; extension of data uses; and collaboration with state, university, and private sector partners.

In support of the research and extension function, the FIA program has sponsored and organized a series of symposia held annually between 1999 and 2006 and thereafter held biannually. Topics addressed at the symposia include tool development, statistical analysis, remote sensing, GIS, and applications-related research in multiple disciplines including, but not limited to, climate change, wildfire, wildlife, and bio-energy.

Each symposium has included an optional, non-peer-reviewed proceedings that can be accessed at: http://fia.fs.fed.us/symposium/proceedings/. The peer reviewed papers in this Special Section are based on presentations at the 9th FIA Symposium held at Park City, Utah on October 21-23, 2008 (see McWilliams 2009).

Publication of collective works stemming from scientific meetings such as symposia, conferences, and workshops, is encouraged by the MCFNS editorial stuff. Collections of papers on related themes are likely more synergistic and influential than similar collections of unrelated individual submissions. Accordingly, the journal has a policy of creating Special Sections dedicated to such collections on related themes (e.g., McDill 2010, Bettinger and Hubbard 2010, and Bettinger et al. 2011).

This Special Section on Advanced FIA Data Analysis contains three papers (Huel-Jin et al. 2011, Nelson et al. 2011, and Patterson and Finco 2011) that discuss aspects of uncertainties in spatial and temporal estimation and prediction of vegetation and biomass based on available FIA data.

2 Contents of the Special Section

In general terms, the contents of this Special Section focuses on topics related to methods for constructing FIA data-related forest models in order to attain better estimates of forest resources and better assessment of the statistical uncertainty and confidence levels associated with the estimates.

The first paper by Huel-Jin et al. (2011) compares values of terrain variables observed on FIA plots and obtained from Digital Elevation Models (DEM) for exact plot locations to values obtained from DEMs for locations that had been altered to mask exact locations as a means of accommodating privacy issues. The results indicated little correspondence between values for exact plot locations and values for locations that had been altered. The conclusion was that in order to effectively

link FIA plot data with DEM-derived information, exact rather than altered plot locations are necessary.

The second paper by Nelson et al. (2011) analyzed the applicability of satellite image-based models of forest presence and biomass to images that differed in time and/or space. The modeling approach was based on the non-parametric Random Forests technique, and the geographic area of interest was southern Missouri, USA. The results suggest applicability of the models for image data that differed in both time and space than the image data used to calibrate the models.

The third paper by Patterson and Finco (2011) derives equations for calculating the upper confidence bounds on estimates of forest type for non-sampled plots using data for sampled plots. Examples demonstrate how the equations contribute to constructing vegetation maps by assisting in the selection of statistically defensible map units.

All three papers offer breadth and depth in identifying both opportunities and challenges associated with using FIA data.

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