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

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On page two, you are asked to fill in your abstract in the format and font size indicated. Please remember to include author's 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:		Using National Forest Inventory Data to Model Changes in Tree Species Diversity in the Southern United States
Take-home message:		*Factors influencing tree species diversity vary with spatial scale. Anthropogenic factors can have positive and negative effects on diversity, often in confounding ways. The establishment of pine plantations in the southern U.S. has increased species richness and decreased species evenness.*
Presenter name:		Dr. Andrew J. Hartsell
Presenter contact info:		Research Forester United States Forest Service Forest Inventory and Analysis – Southern Research Station
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.		

Using National Forest Inventory Data to Model Changes in Tree Species Diversity in the Southern United States

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Introduction: A common belief today is that global biodiversity is threatened by anthropogenic sources. The main factors mentioned for biodiversity loss include: land use change; habitat change such as forest fragmentation and conversion; invasive alien species; overexploitation; global climate change; and pollution. A key anthropogenic component in species composition changes the southern U.S. is pine plantation forestry. Any investigation involving species diversity needs to not only include human-driven forces, but natural factors such as climate and site. Understanding the role of spatial scale and how varying the size of the area of interest impacts variable selection is vital.

Materials and methods: This study investigates three measures of tree species diversity: species richness, Shannon-Wiener index and Simpson's index over varying spatial scales. These diversity indices were calculated using the U.S. Forest Service's Inventory and Analysis (FIA) forest inventory dataset (Bechtold et al. 2005). The impacts of varying spatial scale on possible predictors were investigated by nested watersheds from the Watershed Boundary Dataset. Techniques used included: Getis-Ord Gi* analysis, Local Moran's I, non-metric multidimensional scaling, multiple response permutation procedures and spatial lag, spatial error and geographically weighted regression. The 100-meter resolution elevation raster data from the U.S. Geological Survey provided elevational data, while the 2011 30-meter national land cover data (Homer et al. 2015) and FIA plot data were used to derive land use patterns and forest productivity estimates. The 1981-2010 parameter regressions on independent slopes model (PRISM) provided climatic data. All raster data were averaged to watershed basin.

Results: Global and regional variables are more important for larger scale studies. Factors such as forest area, elevation, and major land uses are key for this level of investigation. As spatial scale decreases, elevation becomes insignificant. The models tend to become more complex as variables relating to local factors such as plantation forestry become more significant. Also: 1) forest area, productivity, and elevation are positively correlated to most diversity measures; 2) the southern U.S. pine belt has been repeatedly disturbed due to anthropogenic activity and tree species diversity is impacted both negatively and positively by these disturbances; 3) plantations increase species richness, perhaps due to edge effects; and 5) increasing plantation area has a negative impact on both Shannon's and Simpson's diversity indices.

Conclusion: Factors that influence tree species diversity are dependent upon spatial scale. Climatic and regional variables have more impact at larger scales, while anthropogenic factors are more significant at smaller scales. This study concludes that tree species diversity in southern U.S. forests has changed over the last 40 years. Increases in southern pine plantation area seems to have a positive effect on species richness, and a negative effect on measures that incorporate species evenness.

References:

Homer, C.G., Dewitz, J.A., Yang, L., Jin, S., Danielson, P., Xian, G., Coulston, J., Herold, N.D., Wickham, J.D., and Megown, K., 2015, Completion of the 2011 National Land Cover Database for the conterminous United States-Representing a decade of land cover change information. Photogrammetric Engineering and Remote Sensing, v. 81, no. 5, p. 345-354

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