

FIA DATA AND SPECIES DIVERSITY - SUCCESSES AND FAILURES USING MULTIVARIATE ANALYSIS TECHNIQUES, SPATIAL LAG AND ERROR MODELS AND HOT-SPOT ANALYSIS

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Abstract—This study will investigate how global and local predictors differ with varying spatial scale in relation to species evenness and richness in the gulf coastal plain. Particularly, all-live trees \geq one-inch d.b.h. Forest Inventory and Analysis (FIA) data was used as the basis for the study. Watersheds are defined by the USGS 12 digit hydrologic units. The dataset includes various environmental data such as temperature, rainfall, frost free days, soil productivity, stand age, latitude, longitude, average elevation, and land use fragmentation or disturbance indicators. Multivariate analysis techniques such as nonmetric multidimensional scaling (NMS) and multi-response permutation procedures (MRPP) were performed using the software package PC-ORD to identify patterns within the data. Spatial lag and error models were created using the freeware GeaDa. These models reveal how various predictors of tree diversity (Shannon's, Simpson's and species richness) differ not only from each other, but change as spatial scale varies.

Preliminary results indicate that global variables such as climate and productivity have a greater impact on diversity indicators than more local variables such as disturbance and land use. However, this changes as spatial scale decreases, where land-use and disturbance play a larger role in predicting tree diversity in southern forests. Additionally, the presence of southern pine plantations has a profound impact on diversity indicators at certain scales. However, the impact varies depending on the indicator. At certain scales, the presence of plantations has a negative effect on evenness indicators and a positive effect on species richness. MRPP analysis proved to be futile, while only one watershed size yielded a solution of greater than one axis using NMS. NMS on HUC10 watersheds yielded a three axis solution that proved to be insightful.

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