USING FIA DATA TO ASSESS CURRENT AND POTENTIAL FUTURE TREE SPECIES IMPORTANCE VALUES IN THE EASTERN UNITED STATES

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ABSTRACT.—FIA data are extremely valuable for evaluating regional variation in forest distribution. We have processed and summarized FIA data to show four patterns across the Eastern United States: 1) the number and density of FIA forested plots by state, 2) current importance values and frequencies for several species within 20 x 20 km blocks, 3) tree diversity by block, and 4) the potential future suitable habitat and migration of several species under two climate change scenarios.

FOREST INVENTORY ANALYSIS BY STATE

The latest FIA plot and tree data were downloaded from http://srsfia/fia.srs.fs.fed.us. Nearly 3 million tree records were aggregated to about 110,000 plots in 37 Eastern States. These plot-level data were summarized to give statewide statistics. Percent forest estimates were highest for Maine (89% forested), New Hampshire (87%), West Virginia (79%), and Vermont (77%). The highest numbers of plots assessed by FIA crews per state were in Minnesota (12,141 plots), Michigan (10,274), Georgia (9,134), and Wisconsin (6,872). The same states obviously had the highest number of trees measured, including more than 400,000 in Minnesota, 365,000 in Michigan, 259,000 in Georgia, and 157,000 in Wisconsin. For states with >20 percent forest, the forest area represented by each forest plot ranged from 557 ha in Minnesota to 2,959 ha in Louisianna. Other states with high forest plot densities included Michigan with 719 ha of forest represented per plot, Indiana with 848 ha, Wisconsin with 914 ha, and Illinois with 932 ha per plot.

CURRENT SPECIES IMPORTANCE

Species importance values (IV) and relative frequency of occurrence were derived for all species present within all FIA plots. Importance values were calculated based on the relative density and relative basal area for both the overstory and the understory and scales from 0 to 200. Relative frequency was calculated as the number of plots with the species present vs. the total number of plots in each 20-km grid cell. Frequency and IV were aggregated to a 20 x 20 km grid and mapped. Maps show distribution, abundance, and relative frequency of each of several species in 20-km cells. IV data for 80 species in the Eastern United States (mapped by county rather than 20-km cell) can be found on our Web site: http://www.fs.fed.us/ne/delaware/4153/4153.html (global change tree atlas).

BIODIVERSITY OF TREES

For each 20-km grid cell, all species as well as several groups of species were counted. Tree diversity was greatest in the southern Appalachians and the southern tier national forests (e.g., the Shawnee, Hoosier, Wayne, and Monongahela), with up to 50 species represented in a 20 x 20 km cell. Conifer diversity was concentrated primarily in the north (up to 11 species) and secondarily in the southeast (up to 8 species). Other patterns emerged for the distribution of pines, oaks, maples, and hickories. The higher diversity locations for pines were in the Southeast States and the northern Lake States. Oaks were more diverse in the southern half of the region. The richest locations for maples were in New England, the Appalachians, and the northern Lake States, while the hickories were most diverse in the Ozarks of Missouri.

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MAPPING FUTURE POTENTIAL SPECIES IMPORTANCE

Potential future suitable habitats were evaluated for the Hadley and Canadian Climate Center (CCC) climate change scenarios via the empirical model, DISTRIB, which uses a regression tree analysis approach. Migration potential over the next 100 years was then evaluated via the stochastic model, SHIFT, which accounts for historical migration rates and fragmented habitats. Merging of the two models provides a reasonable tool to predict possible species migration into suitable, but fragmented habitats. For southern U.S. species, potential suitable habitat expands much more with the CCC scenario than the Hadley scenario. The outputs of DISTRIB for 80 species can be found on our Web site listed on previous page (as can citations on this work). For species analyzed with SHIFT, high probabilities of migration occur primarily within 10 km of the current distribution boundary, with a low probability (<2% probability of colonization) of long-distance dispersal out to as far as 500 km from the current boundary. The model suggests that migration rates will be limited by fragmented landscapes and low abundance near the boundary. Migration rates may also be limited by unsuitable habitat northward (e.g., edaphic or climatic conditions).

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