

TEMPORAL VARIATION IN WOODY SPECIES COMPOSITION FROM 1922 TO 1996

IN A SECOND-GROWTH APPALACHIAN FOREST

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Abstract: *The National Forest Management Act*, in part, instructs the Forest Service to maintain the diversity of tree species that are present on federal lands before the onset of management. Further, this act directs the Forest Service to preserve and enhance diversity of tree species within each management area so that diversity is equal to or greater than that of an unmanaged forest. In spite of this directive, it is often difficult to know if management activities are enhancing diversity, maintaining the status quo, or diminishing it. Part of the dilemma is due to the dynamic nature of species composition and the lack of long-term data documenting species abundance with respect to both time and management efforts.

Recently, a forest inventory conducted in 1922 was discovered that permitted an examination of long-term trends in woody species composition. The original inventory was conducted in an area that later became part of the Fernow Experimental Forest in north-central West Virginia. The inventory recorded overstory and understory characteristics that had both second-generation and old-growth components resulting from past harvesting activity (*circa* 1907). Species richness, species diversity, and the actual species present are analyzed with respect to temporal variation. While these mixed mesophytic hardwood stands remain diverse compared with other temperate forests, species richness and species diversity have declined. The virtual loss of American chestnut (*Castanea dentata* (Marsh.) Borkh.) is the most dramatic change in species composition. Less dramatic but significant reductions are also noted for black walnut (*Juglans nigra* L.), butternut (*Juglans cinerea* L.), and American elm (*Ulmus americana* L.). Shifts in species abundance from mid-successional species to both early and late successional species are apparent. A comparison of species diversity related to differing silvicultural methods over the past 50 years in conjunction with management implications is also presented.

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