ABSTRACT OF THE THESIS

Tree Species Diversity and Forest Island Size on the Piedmont of New Jersey

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Species diversity, in terms of the total number of species present, was derived for each of three forest islands within ten size classes, 0.01, 0.2, 0.8, 1.2, 2.0, 3.0, 4.0, 7.5, 10.0 and 24.0 hectares in size. The species-area curve shows a high rate of increase in species number with increasing size up to about 1.2 hectares, thereafter, a low rate of increase. The common species are responsible for the majority of the initial increase in diversity, while the rare and uncommon species are mainly responsible for the increase in the 1.2 to 10.0 ha forests. Rare species are found in forest islands of all sizes. The number of closed canopy species increases at approximately twice the rate of the edge species as forest size increases past the 1.2 ha size. Forest soil moisture ranges increase erratically from 0.01 to 3.0 hectares with only a gradual increase in large forests with no direct correlation to diversity. Community coefficients indicate the smaller islands are significantly different from one another while the larger stands are the most similar, and the greatest differences are between the smallest and largest islands. No correlation between the forest soil types and species diversity is indicated. No species were restricted to either the edge or the forest

center, unless they were represented by a single plant or a few plants. Of the species found to be edge species, 52% are rare while 40% of the closed canopy species are rare. The relative abundance of species considered exotic decrease with increasing size with Hutcheson Memorial Forest (24.0 ha), an exception.