ABSTRACT

THE INFLUENCE OF PAST AND PRESENT LAND USE ON NON-NATIVE PLANT INVASION IN THE SOUTHERN APPALACHIANS

Timothy R. Kuhman

Under the supervision of Professor Monica G. Turner

At the University of Wisconsin-Madison

Some non-native invasive plants are well adapted for spread in forested landscapes. Such species pose a threat to forest communities in the southern Appalachians. Both contemporary and historic land use can affect invasion by non-native plants. Factors related to land use, the biotic community, and the abiotic template were investigated at local to regional scales in western North Carolina to determine their roles in shaping the distributions of forest invaders. The influence of agricultural land-use history and roads was evaluated in a forested watershed where cultivated areas had been abandoned a century earlier. A field seeding experiment with non-native Oriental bittersweet (*Celastrus orbiculatus*) was implemented to elucidate the specific factors related to land-use history that might be facilitating invasion. Finally, roadside surveys were conducted throughout a four-county region to determine the distribution of a suite of non-native forest invaders, and the factors explaining their distributions were examined at local and regional scales using linear and generalized linear models. Land-use history was an important determinant of invasion, particularly at local scales. Areas with agricultural land-use histories often had overstory communities with high tulip poplar (*Liriodendron tulipifera*) dominance. Such areas had more invasive plants than comparable sites that were never cultivated and typically dominated by oaks (*Quercus* spp). Field experiment results indicated that higher invasibility in tulip poplar stands could be attributed to thinner leaf litter layers and moister soil conditions. Results from the broader-scale survey showed that the factors explaining distributions of forest invaders throughout the region varied among species and between scales of analysis. At the regional scale, many species were more common closer to the city center (Asheville, NC), at lower elevations, and in watersheds with less forest cover. At the local scale, species responded more strongly to land use and land cover; many were more common in areas with greater forest regrowth and less total forest cover. Overall, results emphasize the important role of land-use history and provide insights regarding the interactions between historic land use and the contemporary landscape that influence non-native plant invasion in the forest-dominated southern Appalachians.