

ALTITUDINAL GRADIENTS OF BRYOPHYTE DIVERSITY AND COMMUNITY ASSEMBLAGE IN SOUTHERN APPALACHIAN SPRUCE-FIR FORESTS

Sarah E. Stehn, Christopher R. Webster, Janice M. Glime, and Michael A. Jenkins¹

Ground-layer plant communities in spruce-fir forests of the southern Appalachians have likely undergone significant change since the widespread death of canopy Fraser fir (*Abies fraseri*) caused by the exotic balsam woolly adelgid (*Adelges piceae*). Bryophytes comprise an important part of the ground-layer flora in the spruce-fir zone, with an average cover of 26 percent and richness and diversity values rivaling those of the herbaceous layer, yet few contemporary studies have given them significant attention. In attempts to quantify post-adelgid bryophyte community composition, structure, and distribution, we randomly selected 60 plots within spruce-fir forests on the high peaks of Great Smoky Mountains National Park. At each plot, we quantified ground-layer bryophytes by recording species and cover by the line-intercept method along every other meter of three 20 m transects, for a total sampling distance of 1,800 m.

A nonmetric multi-dimensional scaling ordination revealed that, of the environmental variables measured, elevation, deciduous basal area, and cover of ground-layer vegetation had the greatest influence on bryophyte community composition. We attribute altitudinal gradients of bryophyte diversity and community composition to variation in deciduous basal area and thus litter quality, the prevalence of herbaceous plants, and the degree of canopy balsam woolly adelgid infestation. Bryophyte species groups (acrocarpus mosses, pleurocarpus mosses, and liverworts) respond differently to deciduous litter accumulation and competition from ground-layer vegetation based on substrate preference and growth characteristics of the individual species within those groups. We conclude that although disturbance caused by the balsam woolly adelgid creates valuable substrate for bryophyte colonization, it also may contribute to an increase in light availability and deciduous basal area due to the decline of conifers and thus has the potential to have a profound effect on bryophyte diversity and community assemblage.

¹ Sarah E. Stehn, Christopher R. Webster, and Janice M. Glime, Michigan Technological University and Michael A. Jenkins, Purdue University. Corresponding author: Sarah Stehn, School of Forest Resources & Environmental Science, Michigan Technological University, 1400 Townsend Drive, Houghton MI 49931-1295; 906-370-7327; Email: sestehn@mtu.edu