The Effects of Hemlock Woolly Adelgid Infestation on Breeding Populations of Three Species of Eastern Hemlock-Dependent Songbirds in the Delaware Water Gap National Recreation Area

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ABSTRACT

The hemlock woolly adelgid (*Adelges tsugae*) is currently decimating eastern hemlock stands throughout the northeastern United States. Recent studies have demonstrated that several species of songbirds, including the black-throated green warbler (*Dendroica virens*), Blackburnian warbler (*Dendroica fusca*) and blue-headed vireo (*Vireo solitarius*), are hemlock-dependent species during the breeding season (Benzinger 1994, Howe and Mossman 1996, Tingley et al. 2002, Ross et al. 2004). In this study, line transect detection frequencies and resulting densities for these species were compared among hemlock stands differing in degree of infestation and hemlock condition in order to determine effects of infestation level on breeding populations. Correlation of several measures of infestation level with detection frequency and density estimates varied considerably and was, for the most part, not significant. Measures of infestation utilizing height of the lowest live branch and distance from first dead to first live branch (lower height and smaller distance, respectively, equate to better health as lower branches tend to die off first) were significantly correlated with blue-headed vireo detection frequency ($P < 0.05$) and with black-throated green warbler detection frequency and density estimation ($P < 0.05$) using Spearman's rho correlations. Results suggest a relationship between degree of infestation, hemlock condition, and the population levels of these two species, but not for Blackburnian warbler.

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