

INDIVIDUAL TREE MORTALITY PREDICTION FUNCTIONS FROM GYPSY MOTH DEFOLIATION AS WELL AS TREE, STAND, AND SITE VARIABLES

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Abstract—Stands from central Pennsylvania were followed for fifteen years to provide records of plot slope, position, aspect, site index, land capability class; tree species, diameter, crown class, vigor or health, as well as annual gypsy moth defoliation. These data are used to create individual tree mortality prediction models for species and species groups under various degrees of defoliation. These models are tested against independent data and compared to previously published models for predicting tree mortality in similar situations. These results are then compared to log-odds-ratio analysis of variance results for these same data to provide further understanding of utility of these

models and their precision for use in long term predictions of forest stand conditions. While analysis of variance provides a very useful characterization of mortality over these data, the difference in utility of the individual tree mortality models is demonstrated for predicting continuing impacts of defoliation over a wider range of defoliation histories and tree conditions. It is demonstrated how individual tree mortality models utilize defoliation history on individual trees and can account for the cumulative effects of defoliation over a number of years while other analytic procedures account for a effects associated with a prescribed pattern of defoliation over a fixed time interval.

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