

HAZARD RATING FOR GYPSY MOTH ON A MACINTOSH COMPUTER: A COMPONENT OF THE GYPSES SYSTEM

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ABSTRACT

As gypsy moth expands into a new region, the threat of damage from its infestation is increasing greatly. The potential economic damage from the pest is extensive, considerably compounding the already substantial aesthetic damage and urban nuisance problems. One way to help forest managers deal with this threat is by providing them with a computer program which can help them determine how to set priorities for their forest lands by relative risk from gypsy moth. The program being developed, called GypsES, will serve as a surrogate "expert" on gypsy moth treatment, so it is referred to as an "expert system". The hazard rating module described here is one of several components of an integrated system.

Acceptance of working definitions of basic terminology was essential for progress in development of the hazard rating module. A management unit is defined as the smallest area having uniform management objectives, and may be subject to uniform silvicultural treatment. Susceptibility is the probability that a management unit may be defoliated by gypsy moth. Vulnerability is the probability that a management unit will sustain damage if defoliated by gypsy moth. Some trees or stands may suffer repeated defoliation (high susceptibility) without serious damage (low vulnerability), while other stands may suffer severe damage (high vulnerability) with only occasional defoliation episodes (low susceptibility). Risk is the probability that damage from defoliation will affect management objectives. Hazard is the probability that the objectives for a management unit will be affected by defoliation within a specified time period.

Hazard rating incorporates information about insect populations as surrogates for predicted defoliation. In a stand-alone mode, the module will require estimates of gypsy moth populations. As a component of GypsES, population data are obtained from the monitoring and prediction module. Hazard assessment produces the probable impact on the management unit, its importance to the management objectives, and an estimate of the economic effects. These outputs are to be used in the treatment decision module of gypses or on their own by a forest manager. Data from the associated insect population monitoring/prediction module being developed concurrently will be integrated into the Hazard Rating module. Probability of infestation combined with vulnerability of a management unit will allow this module to assess the likely severity of damage with regard to the management objectives for the unit. This assessment will produce an output of probable impacts on the stand, their importance to the management objectives, an estimate of the reliability of the predictions, and an estimate of economic effects. This output will be able to be used on its own by a manager, or can be used as input data for the next module within the system, that designed to aid in treatment decision-making. Data themes to be incorporated include stand composition, elevation, soils, roads and hydrology, management compartments, and land use types, among others.