GYPSY MOTH SEX IN THE CITY: ESTIMATING COSTS AND LOSSES

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ABSTRACT

Although the gypsy moth (Lymantria dispar (L.)), is one of the best studied and best known invasive forest pests, there has been limited research on its impact in urban and suburban environments. This lack of research is surprising because these impacts contribute significantly both to public interest in suppression programs and to economic justification of the Slow the Spread of Gypsy Moth (STS) Project (e.g., more than two-thirds of the benefits in a 1996 cost-benefit analysis). Therefore, we focused on the impacts of gypsy moth in urban and suburban forests, first developing a framework for categorizing and modeling these impacts and then identifying alternative methods for quantifying them.

We developed a three-stage conceptual framework, starting with the first stage, outbreak level (determined by gypsy moth population dynamics, statewide suppression efforts, and conditions for entomopathogens), which in turn led to the second stage, physical impacts, and the third stage, costs and losses imposed on residents. We combined the first and second stages into low and high outbreak scenarios of 3-year duration, with percent defoliation and tree mortality varying by species susceptibility. We can estimate the number of trees in different land uses and size classes that will be defoliated and die under each scenario in specific cities for which UFORE and/or FIA urban data are available (e.g., Baltimore).

The third stage was comprised of (1) out-of-pocket costs and (2) losses associated with reduced utility and increases in other costs. Out-of-pocket costs include averting expenditures for local suppression efforts (e.g., ground spraying of trees), mitigation of nuisance impacts (e.g., treatment of rash, more frequent car washing), and costs of tree removal and replacement. Losses are due to nuisance (e.g., inability to recreate and enjoy the outdoors) and tree defoliation and mortality (e.g., reduced aesthetics, increased energy consumption), conditional on assumptions about tree replacement. Estimates of out-of-pocket costs provide a lower bound for total impacts. Contingent valuation studies that elicit willingness to pay for avoiding outbreaks provide an upper bound.

Other methods for estimating the losses specifically from tree defoliation and mortality include appraisal (compensatory value), percentage reductions in urban forest benefits as calculated by UFORE and STRATUM, and hedonic valuation.