

BALANCING THE COSTS AND BENEFITS OF SLOWING THE SPREAD OF GYPSY MOTH

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ABSTRACT

The Slow the Spread of Gypsy Moth Project (STS) has successfully reduced the rate of spread of the gypsy moth (*Lymantria dispar* (L.)), by detecting and eradicating isolated populations that establish outside of the infected zone. The costs of slowing the spread have averaged \$11.2 million per year since 2000 (deflated to 2000). Do the benefits of the program justify this cost? The objectives of this study are (1) to estimate the incremental benefits of reducing the rate of spread during the full operational phase of STS, 2000–2006, and (2) to project and compare the benefits and costs of STS for the next 20 years, 2007–2026. Here, we focus on the categories and methods for quantifying the benefits, both ex post and ex ante.

The primary benefits of slowing the spread of gypsy moth accrue to areas immediately outside of the currently infested zone. The government and the private sector benefit from delay of (a) expenditures on aerial suppression, (b) imposition of the quarantine, and (c) costs associated with outbreaks. This benefit of delay is quantified by summing the discounted future costs under different scenarios for spread of gypsy moth and then comparing the present value of costs under spread scenarios with and without STS. Thus, the spread scenarios are critical to the assessment.

In the most recent period without any barrier zone policies, the gypsy moth spread at an average rate of 20.8 km/ year, although the spread has been much faster (up to 45 km/ year) in the northernmost portion of the range. This faster rate of spread is expected in the Upper Peninsula of Michigan, Wisconsin, and Minnesota east of the prairies. Under STS, the gypsy moth has been spreading at an average of 6 km/ year. If the STS project were suddenly cancelled, there would probably be a transition period, during which the rate of spread would

slowly increase. Based on these considerations, we developed two types of spread scenarios without STS: a flat spread of 20.8 km/ year and a dynamic spread increasing from actual to an expected maximum (20.8 or 45 km./ year) over a 7-year period. To project spread of gypsy moth under STS forward for the next 20 years, we considered spread rates of both 6 km/ year and 10 km/ year (the original goal of STS). See Figure 1 for an example of the additional area that would become infested with gypsy moth under a spread scenario without STS compared to spread at 6 km/ year with STS.

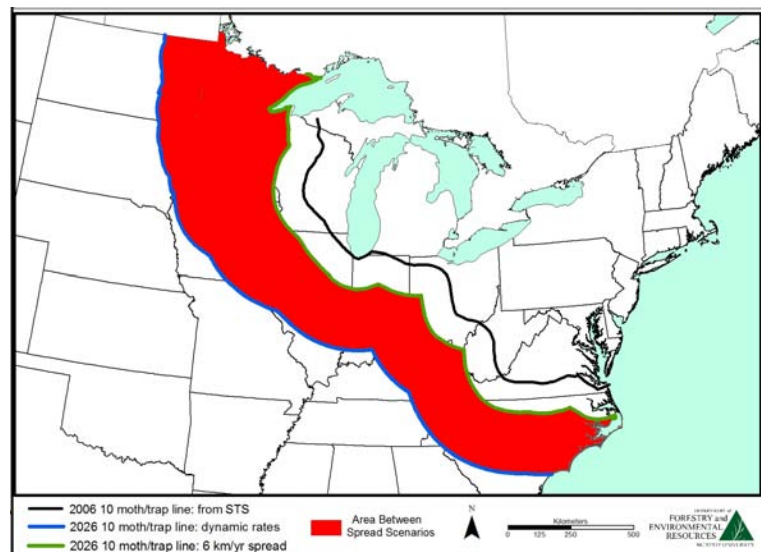


Figure 1.—Projected Spread of Gypsy Moth with STS (6 km/yr) and without STS (Dynamic Rates).

Preliminary estimates of the postponed costs include only expenditures on aerial suppression, and the nuisance, defoliation, and tree mortality impacts in residential zones, all discounted at a 4-percent rate. Quarantine costs have not yet been quantified, and the costs in rural forest zones (e.g., loss of timber and recreation) are

much more difficult to predict due to greater substitution possibilities (e.g., mortality of some trees benefits growth of remaining trees; recreationists can visit unaffected sites). All costs are projected based on the number of “susceptible hectares,” which are forested acres with more than 20 percent of basal area in species preferred by gypsy moth. Specific cost estimates are as follows:

Aerial suppression costs are \$1.80 per susceptible hectare, including:

- Cost share suppression costs \$86/ ha, plus 15 percent indirect costs for administration and outreach, applied to 1.6 percent of susceptible hectares
- Private suppression costs \$84/ ha, applied to 0.26 percent of susceptible hectares

Nuisance, defoliation, and tree mortality impacts in residential zones:

- \$955 (\$563) per urban (small town and rural) household occupying single family or duplex home in year facing 40 percent defoliation; 25 percent less for households facing 25 percent defoliation based on 1991 contingent valuation study by Paul Jakus
- Long-term average defoliation of 6 percent of susceptible hectares is assumed to be half 40-percent defoliation and half 25-percent defoliation

When these cost estimates are applied to reasonable combinations of spread scenarios for the next 20 years, the present value of the costs postponed by STS are roughly \$490 million. This compares favorably with a present value of estimated total program costs of \$195 million (all in 2007 dollars). Because this calculation relies heavily on a methodologically sound but 15-year old study of willingness to pay to avoid gypsy moth outbreaks, ongoing work is focusing on triangulation with alternative methods.