

Southern Pine Beetle

Dendroctonus frontalis Zimmermann

Coleoptera: Scolytidae

Lih, M. P.; Stephen, F. M. 1987. Arkansas SPBMODEL - a computer simulation model. Protection Report R8-PR 5. Atlanta: U. S. Department of Agriculture, Forest Service, Southern Research Station; 2 p.

Objective: To provide a model useful at predicting *D. frontalis* spot growth for either research or management purposes.

Abstract: The southern pine beetle, *Dendroctonus frontalis* Zimmermann, is the most damaging bark beetle in the southeastern USA. All species of indigenous pines are susceptible to attack except longleaf pine, *Pinus palustris* Mill., presumably due to its high resin flow. Mature, over-stocked stands of loblolly, *P. taeda* L., and shortleaf, *P. echinata* Mill, pines on poorly drained sites are most susceptible to infestation. During beetle epidemics, groups of host trees are typically killed, and termed "spots" to delineate from other infestations in close proximity.

The Arkansas SPBMODEL predicts *D. frontalis* spot growth in currently infested stands over a three month period. This model estimates the number of infested trees, the cumulative number of dead trees, and the associated timber volume and dollar losses, in loblolly and shortleaf pine stands. The model uses data collected from 70 infested stands in Arkansas, Georgia, Louisiana and Mississippi, and had a mean absolute error of 13.3% for predicting the number of dead trees over a 92-d period.

Sampling Procedure:

Required inputs:

1. Spot identification (for user's future reference)
2. State in which infestation is located
3. Date ground checked
4. Desired number of days of prediction
5. Percentage of shortleaf and loblolly pines in stand
6. Mean d.b.h. of stand
7. Mean pine and hardwood basal areas (BA)
8. Number of trees currently infested with SPB
9. Number of trees previously infested with SPB
10. Data measurement units (standard or metric)

Optional inputs:

1. General d.b.h. distribution of the stand
2. Predominant SPB lifestages (attacking beetles, eggs, larvae, pupae, and brood adults) present in trees at breast height

3. Mean age of all pines
4. Average radial tree growth over the last 5 years
5. Desired temperature modification (°F)
6. Local stumpage prices for salvaged pine sawtimber and pulpwood.

The program predicts daily and weekly spot growth for the requested period of time including confidence intervals on the number of currently infested trees and cumulative number of dead trees. Options also allow the user to estimate volume and economic losses for the period of simulation based on the diameter distribution of infested trees.

Notes: The model assumes that spots will continue to grow. A personal computer (PC) version runs on any IBM-compatible computer (>286 with math coprocessor) with a minimum of 256K of memory, and MS-DOS 2.0. The model may also be accessed through the USDA Forest Service Data General computing system. Diskettes for the PC version and copies of the User's Guide are available from the USDA Forest Service, Forest Pest Management, 2500 Shreveport Hwy., Pineville, LA 71360. A newer version of this model is being developed.