



Case Study | Ecological Analysis

Development of GIS-Based Pest Detection Strategies and Mapping Subsequent Risk

The gypsy moth, *Lymantria dispar*, was accidentally introduced to North America by an amateur entomologist in either 1868 or 1869 and has spread across much of the Northeastern United States and Midwest. The defoliation caused by outbreaks of the gypsy moth leads to significant ecological and economic damage and the loss of forest resources. In addition, the large number of caterpillars associated with an outbreak is a general nuisance to people living in the area.

Clark Labs and the United States Department of Agriculture / Animal and Plant Health Inspection Service (APHIS) are constructing maps of potential gypsy moth establishment and damage in uninfested areas of the United States. The current gypsy moth management program strongly relies on survey data acquired from their 350,000 pheromone-based traps that are deployed annually. The main risk factor considered in the trap distribution formula is the proximity of humans and suitable gypsy moth hosts. Although this survey program has been successful in detecting introduction of the gypsy moth in uninfested areas, there remains an opportunity to locate traps more effectively by incorporating other identified risk factors, such as climatic conditions, host plant quality and the degree of human activity. Using the predictive spatial modeling techniques found IDRISI, a risk-based model of current gypsy moth distribution in the United States will be constructed along with scenarios of future dispersal, allowing APHIS to optimize their gypsy moth program resources. The development of a GIS strategy will also potentially assist in the surveys of other invasive species.



Female gypsy moths clustered on a tree during an outbreak. The burlap band is a common sampling tool. Egg bearing females tend to lay their eggs under or near the burlap. Reprinted with permission by USDA-ARS.



Severe defoliation in Hickory Run State Park (PA). Photo taken in June of 1972. Reprinted with permission by USDA-ARS



Female gypsy moth ovipositing. Reprinted with permission by USDA-ARS.