

NORTHERN RESEARCH STATION

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ALBERT 1.0: Supporting Eradication of Asian Longhorned Beetle

Invasive wood-boring insects pose a major threat to forestry, recreation, and timber industries in the United States, and species such as the emerald ash borer (*Agrilus planipennis*) and redbay ambrosia beetle (*Xyleborus glabratus*) are already radically altering North American landscapes. The Asian longhorned beetle (ALB) (*Anoplophora glabripennis*) arrived in the United States via solid wood packing materials and continues to pose a massive threat to North American forests.

Native to China and the Korean peninsula, ALB attacks more than 22 genera of trees, including maples, elms, poplars, and willows. Larvae weaken trees by boring through phloem, xylem, and heartwood and increasing susceptibility to pests and pathogens, which often results in structural failure. Multiple infestations have been found in the United States and, if not eradicated, economic damages are expected to exceed \$600 billion. Eradication efforts have been successful in some locations, but eradication depends heavily on visual surveys, felling, and destruction of infested hosts, making eradication labor intensive and costly.

Development of ALBERT 1.0

Ecologist R. Talbot Trotter III from the Forest Service's Northern Research Station worked with colleagues from the USDA Animal and Plant Health Inspection Service (APHIS) to develop Asian Longhorned Beetle Eradication and Risk Tracking (ALBERT) 1.0 as a toolkit to support invasive insect eradication programs. ALBERT 1.0, which includes the ALB Risk tool and the ALB Hazard Management and Monitoring 1.0 tool, supports eradication by linking the biology and behavior of the beetle with management activities on the ground.

KEY MANAGEMENT IMPLICATIONS

Using the ALBERT 1.0 toolkit benefits management efforts in four key ways:

1. It **enables risk-based prioritization** of survey and eradication activities.
2. It **improves tracking** of eradication progress using consistent spatial metrics.
3. It **compares effectiveness** of multiple strategies to identify cost-effective options.
4. It **reduces long-term management costs** by improving detection and targeted removal.

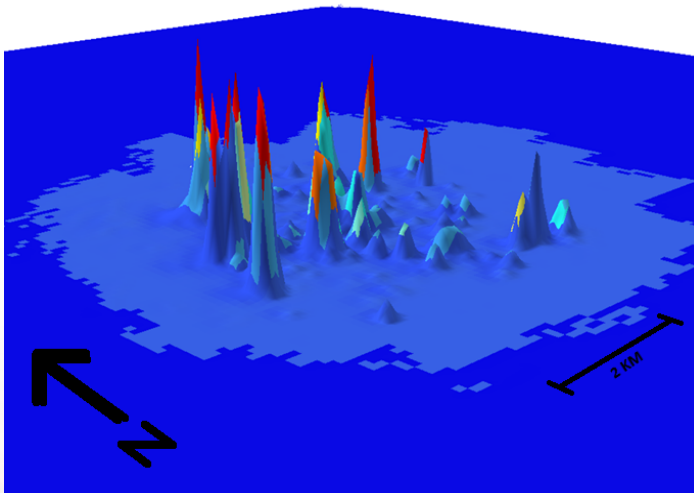


Oviposition pits chewed into bark by female Asian longhorned beetles. The pits allow the female to insert individual eggs into the cambium, where the larvae hatch and feed before moving further into the xylem. Note the presence of exit holes. Forest Service photo by Dennis Haugen/Bugwood.org.

PUBLIC BENEFITS

ALBERT 1.0 improves the efficiency of public resource use by targeting high-risk areas, reducing eradication costs, and protecting forests that provide ecological, economic, and recreational benefits.

ALB Risk estimates local beetle dispersal and generates hectare-scale spatial risk maps. ALB Hazard Management and Monitoring 1.0—an ArcGIS- and Python-based tool—tracks changes in infestation risk over time as surveys and host removals occur. Together, these tools within ALBERT 1.0 support managers by estimating infestation risk, tracking changes over time, and evaluating management strategies. These tools help optimize survey efforts and improve eradication outcomes.



Analysis of ALB infestation and management on the landscape using the tools in ALBERT provides managers with a way to track and visualize the distribution of risk on the landscape. Here, the risk of infestation is shown by the color and height of the surface on the landscape.



Cutaway view of an adult Asian longhorned beetle in a pupal chamber preparing to chew an exit tunnel. When larvae are ready to pupate, they chew horizontally to create a chamber. After pupation, the adult emerges in the chamber, where it sclerotizes. Forest Service photo by Michael Bohne/
Bugwood.org

Summary of ALBERT 1.0 Capabilities

- Provides managers with hectare-by-hectare maps of estimated risk based on local beetle dispersal.
- Uses known infested tree locations and infestation severity to model dispersal.
- Generates hectare-scale dispersal and infestation risk maps of ALB to guide prioritization of field surveys.
- Estimates hectare-scale risk reductions or increases as surveys occur, additional infested trees are detected, and infested trees are removed.
- Incorporates changes in the detectability of ALB as eradication progresses.
- Helps define regulatory boundaries and anticipate resource needs to manage infestations.
- Evaluates efficacy of future strategies to manage infestations of ALB, including survey method, sequence, and timing.

FURTHER READING

Trotter, R.T., III; Warden, M.L.; Vazquez, R.J.; Ryan, J.K.; Pfister, S. 2024. **ALB Hazard Management and Monitoring Version 1.0: an assessment and tracking tool for Asian longhorned beetle eradications in the United States.** Gen. Tech. Rep. NRS-222. Madison, WI: U.S. Department of Agriculture, Forest Service, Northern Research Station. 24 p. <https://doi.org/10.2737/NRS-GTR-222>.

ONLINE RESOURCE

ALBERT 1.0 is available at: <https://research.fs.usda.gov/nrs/products/dataandtools/albert-10-tool-tracking-asian-longhorned-beetle-risk-and-spread>.

PROJECT LEADS

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Forest Service Research and Development works with partners to deliver the knowledge and tools that land managers need to sustain the health, diversity, and productivity of our Nation's forests and grasslands for present and future generations. The Northern Research Station (NRS), one of seven Forest Service R&D units, is rooted in the geography of the Northeast and Midwest. NRS science supports a sustainable future.

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