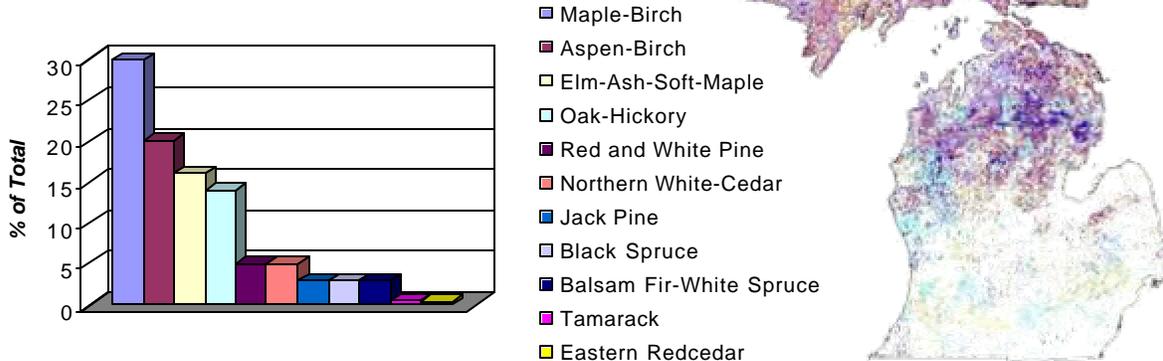




Forests comprise 53% of the land area of the state, or about 19.3 million acres. These forests are a critical component of Michigan's environment and economy for the recreational opportunities and the products they provide. Forestry related industries and manufacturing employ 150,000 people statewide and annually contribute \$9 billion to the state's economy. Additionally, forest-based tourism and recreation support 50,000 jobs and add \$3 billion to Michigan's economy. Michigan's forests contribute to clean air, water, and reduce soil erosion.

Major Forest Types Of Michigan



The **Emerald Ash Borer** quarantine has been extended to 20 quarantined counties in the southeast corner of Michigan's Lower Peninsula (LP). Nineteen other counties have quarantined townships buffering EAB eradication sites. Five other LP counties where EAB life stages were detected in firewood only are being monitored. In summary, EAB has been detected in 44 of 68 LP counties including the three northern most counties. The Northern Lower Peninsula (NLP) detections are the result of a two trap tree per township trap tree survey by the Michigan Department of Agriculture. This equates to one trap tree for every 18 square miles or 11,520 acres, or a survey of 5% of the forest resource assuming each tree draws beetles within 1/2 mile. Plans for a higher density NLP survey in 2005 will provide a better picture of EAB distribution.

State and federal agencies continue to battle this exotic threat to our ash resources. Plans for 2005 include a repeat of a cooperative US Forest Service, Michigan Technological University, and Michigan DNR statewide detection survey. In 2004 Trap trees were deployed in 116 high risk state and federal parks and campgrounds throughout the state to detect new EAB populations introduced through the movement

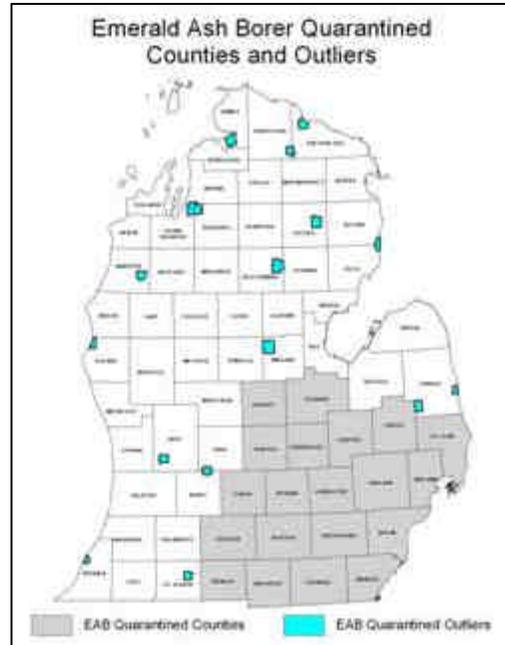


of firewood. Risk was defined using maps of the state's ash resources and State Park databases showing park visits from residents of EAB infested counties. The survey effort included visual inspections of firewood and ash trees in these and adjacent areas. EAB was detected in firewood in three new counties.

The Michigan Department of Agriculture covered the state with a net of 10,000 trap trees in 2004. With most trap trees peeled to check for larvae, 137 trees were positive for EAB. Fifty-eight of these trees had only larvae, with no adults in the sticky bands. Without trap trees to attract adult EAB and peeling of trees to detect larvae, these sites would not have been detected.

The regulatory removal of ash on state and national forest lands to eradicate or contain EAB outlier populations (e.g. populations detected outside of quarantined areas) is currently being discussed. Topics of discussion include: harvest strategies; utilization opportunities versus disposal costs of wood products; meeting best management practice standards; working in natural areas, wilderness areas, old growth areas, and /natural scenic river corridors; protecting the residual forest resource.

The Forest, Mineral & Fire Management Division of the Michigan DNR conducted a firewood sweep in December, 2004 to remove all hardwood firewood left at State Forest Campgrounds. Collected wood was burned to prevent the possible emergence of EAB adults in the spring. Beginning In 2005 ash firewood is banned from state lands, parks and campgrounds.



The Division is also developing ash management guidelines for use on state lands. Challenges include determining the long-term management goals in areas where ash regeneration is poor or non-existent.

The U.S. Forest Service Forest Health Technology Enterprise Team, Fort Collins, CO in cooperation with the Michigan DNR, MDA & APHIS PPQ is evaluating the placement of a Reduce Ash Zone (RAZ) to stop the natural spread of EAB. The placement of this zone requires good information on current areas of infestation and the number and size of ash trees to be removed over time. Removals would primarily be non-regulatory. Incentives calling for the conversion of ash resources to other tree species would be offered to manage urban trees, woodlots and forest lands.

Regulating the movement of firewood by the general public from infested areas remains the most difficult of tasks. Much is being done to get the message out:

DON'T MOVE FIREWOOD!

Visit the following websites for updates on EAB management, surveys and research:

US Forest Service: <http://www.na.fs.fed.us/spfo/eab/mgmt/mgmt.htm>



MI Department of Agriculture EAB Site (Quarantine): <http://www.michigan.gov/mda>

Michigan State University EAB Site (Homeowner info): <http://www.emeraldashborer.info>

Michigan Technological University EAB Site (Survey): <http://www.emeraldashborer.org>

Black Ash Decline and Mortality was common in many parts of the state. This is related to past drought conditions. Trees growing in wet soils, such as black ash, often suffer during droughts. Wetland trees tend to develop shallow root systems that cannot cope with a prolonged drop in soil moisture. Rising water tables after a prolonged drought may also drown deeper roots developed as the tree sought moisture during the drought years.

An unidentified **White Ash Root Rot** is causing extensive wind throw of mature ash in high quality northern hardwood stands in Northern Lower Michigan. Affected stands appear to carry high basal areas (≥ 140 ft²). Stresses from overstocking may be involved. This condition has since been reported in Ontario and Wisconsin.

A **Hemlock Woolly Adelgid** quarantine continues to restrict movement of eastern hemlock into Michigan from infested counties of other states. All eastern hemlock shipments require a phytosanitary certificate. This follows the interception of the insect at two Michigan nurseries in 2000.



Hemlock woolly adelgid, which is dispersed by wind and by movement of infested firewood, feeds on tree sap, killing needles, twigs and branches. Infested tree eventually die:

<http://www.fs.fed.us/na/morgantown/fhp/palerts/hemlock/hemlock.htm>

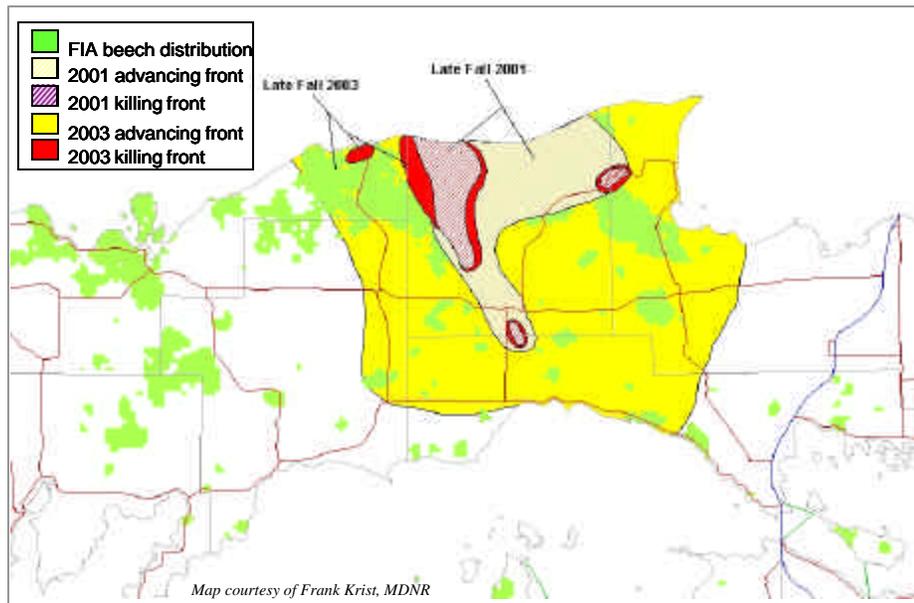
Rapid early detection surveys for the adelgid were conducted statewide for the third straight year in hemlock stands and in areas adjacent to nurseries. This is part of a Forest Health Monitoring Evaluation Monitoring project funded in 2002. No hemlock woolly adelgids were found in 2004.

Beech Bark Disease (BBD) threatens Michigan's 7.2 million acres of Maple-Beech-Birch type. This represents 138 million beech in all size classes. Of these, 15 million larger beech (greater than 9-inch diameter) are highly vulnerable to damage. BBD is presently killing beech trees in areas infested with beech scale for 10 years or more (Figure 1). Several thousand acres of beech forests have been salvaged in forests and recreation areas in the eastern Upper Peninsula.

The USDA Forest Service Research Facility in Delaware, Ohio is using trees from Ludington State Park, Ludington, Michigan and Michigan's Upper Peninsula to study **Beech Bark Disease Resistance**. Crosses between the resistant and susceptible tree produced 23% resistant individuals while crosses between two resistant parents produced 44% resistant individuals. Preliminary data provide the first genetic evidence that resistance is a

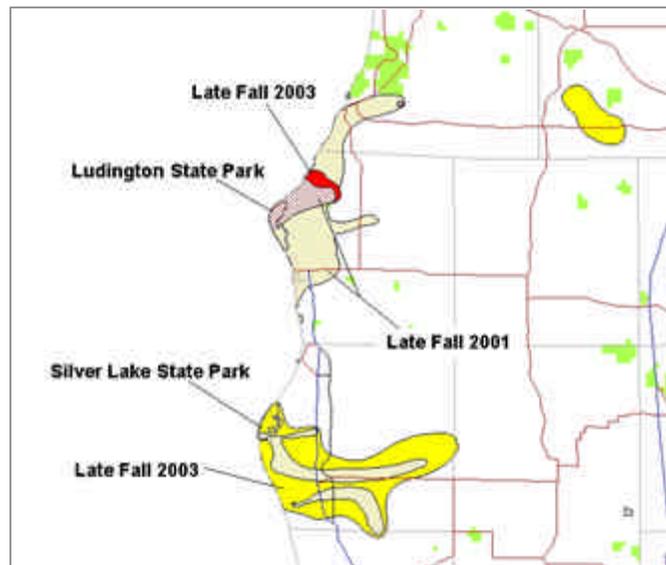


heritable trait. The ratios of resistant to susceptible individuals do not fit the ratio expected for a single gene trait, indicating that two or more genes may be involved.



In the western Lower Peninsula, where beech bark disease was first discovered in 2000 in Ludington State Park, the spread of the disease is slower than in the Upper Peninsula, due to the fragmented nature of the forests in the region, which has reduced the number of beech trees on the landscape.

In addition, spot infestations of beech scale have been detected in Emmet County at the tip of the Lower Peninsula, and on the west end of Bois Blanc Island near the Mackinaw Bridge.



Michigan State University began a study in 2004 called **Current and Projected Spread of Beech Bark Disease in Michigan**. Their goal is to develop a model based on empirical data to predict how rapidly beech scale and beech bark disease will spread through Michigan and to determine if spread rates in Michigan are consistent with estimates from other regions of North America.



The University of Michigan continues to expand the **Beech Bark Disease Monitoring & Impact Analysis System** plot network. Findings to date include:

- Beech scale abundance is affected by tree age, diameter, bark texture, bark chemicals, temperature fluctuations and genetics.
- Spatial pattern of beech within and between stands, wind and animals affect rate of development of beech scale populations and the rate of mortality
- In addition to affecting tree crown condition, infected trees have reduced radial wood growth.

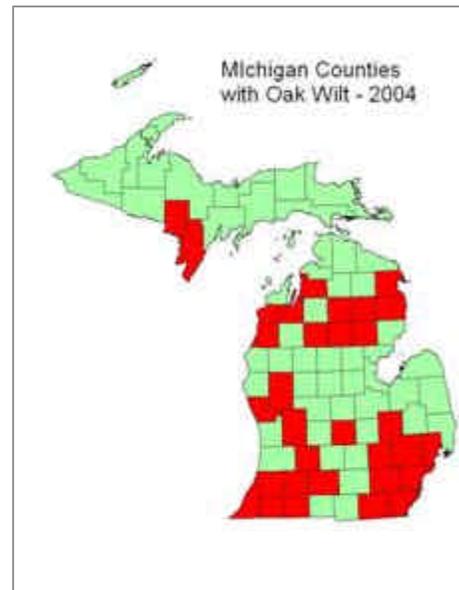
More information about beech bark disease in Michigan can be found under the *Forest Health* section at:

<http://www.forestry.msu.edu/msaf/ForestInfo/1-MainInfo.htm>

Incidence of the vascular disease **oak wilt** continues to increase from 2003 levels in several areas around the Upper Peninsula and the northern Lower Peninsula of Michigan.

To slow the overland spread of oak wilt, harvesting restrictions are being observed on state land. Harvesting activities in forests where red oak trees are being left cannot be cut between April 15 and July 15. **Sap-feeding beetles** responsible for spreading oak wilt are most active during this time. These small (1/4-inch long) beetles can pick up spores from diseased trees and transmit them to oak trees that have been damaged during logging operations.

US Forest Service Oak Wilt Suppression funds were used to detect and treat oak wilt epicenters in Michigan's Upper Peninsula in 2004. A total 78 epicenters were detected and treated. Fifty-six thousand feet of root-graft barrier were placed using a vibratory plow in Menominee and Dickinson counties. Oak removals will occur within epicenters prior to the end of April, 2005 to remove threat of overland disease spread and to protect in integrity of the root-graft barriers.



For information about identifying and preventing oak wilt, visit:

<http://cecommerce.uwex.edu/pdfs/G3590.PDF>

<http://extension.bpp.msu.edu/gerardadams/>

Michigan State University and the Michigan Department of Natural Resources cooperated with the USDA Forest service to survey thirty nine oak sites for **Sudden Oak Death** (*Phytophthora ramorum* [SOD]). After SOD was confirmed in Monrovia Nursery (LA County, CA) in 2004, plants from the infected nurseries were traced to sites in Michigan. Michigan cooperated with a national initiative by the USDA Forest Service, APHIS-PPQ and State Departments of Agriculture to survey nurseries and the surrounding oak resources for SOD. APHIS and the Michigan Department of Agriculture conducted the nursery surveys. No SOD was detected in Michigan nurseries or oak resources.



The Department of Natural Resources cooperated in a USDA Forest Service **Background Survey of Phytophthora Species** in Oak Forests of Michigan. Four declining and four non-declining oak stands were selected in representative oak forest types in different areas of the state. Samples were sent to the USDA Forest Service Research Laboratory in St. Paul, Minnesota for processing.

Eastern Larch Beetle, *Dendroctonus simplex*, populations in Eastern and the South Central Upper Peninsula declined in 2003. This bark beetle became epidemic in tamarack (*Larix laricina*) stressed trees from the drought of 2000-2001 and repeated defoliation by the larch casebearer (*Coleophora laricella*).



Spruce Budworm was active in several counties in Michigan's Upper and Lower Peninsulas. Areas of light budworm defoliation have been visible for the last few years.



The **Michigan Invasive Plant Council** formally adopted an assessment system to categorize and evaluate the invasive potential of plants. The objectives of this assessment are: 1) To identify relevant biological, ecological, management and economic information for evaluating potential impacts on Michigan ecosystems; and, 2) To provide the foundation of Michigan Invasive Plant Council recommended plans of action.

Garlic Mustard (*Alliaria petiolata*) monitoring, management and eradication projects are gaining momentum in Northern Michigan. Public and private organizations are cooperating in efforts to keep garlic mustard from establishing in new areas of Upper Michigan.



APHIS: 2004 Exotic Forest Pest
Workshop for Midwest States
St. Louis, MO



Ironwood, Michigan in the western portion of Michigan's Upper Peninsula is the center of a **Giant hogweed** (*Heracleum mantegazzianum*) infestation. First discovered in 2001, there are now approximately 20 known sites in the Upper Peninsula. To date 37 sites have been reported in Michigan.

Michigan is experiencing the end of a 4-5 year **Forest Tent Caterpillar** (FTC) (*Malacosoma disstria*) epidemic. FTC defoliated 11.5 million acres in its peak year, 2001. Only scattered pockets of defoliation were detected in 2004.

After two years of drought in 2002-2003, the spring and early summer of 2004 saw record rainfall and cool weather. This delayed tree growth and leaf development resulting in widespread **Anthracnose** of hardwoods and **basswood thrips** (*Thrips calcaratus*) leaf damage due to prolonged feeding on immature leaf tissue. Although a wet 2004, **oak and hardwood declines** from the previous year's droughts were still evident where trees were off-site. Stresses from severely reduced starch reserves and resulting attacks by secondary pests (e.g. two-lined chestnut borer, *Agilus bilineatus*) contributed to declines on sites which were either too dry or too wet.

The **Red-Headed Pine Sawfly** (*Neodiprion lecontei*) periodically defoliates young red and jack pines. Building sawfly populations were detected in many areas of the eastern Upper Peninsula in 2002 and in the northern Lower Peninsula in 2003. Dimlin 4L was aerially applied to 333 acres of infested plantation red pine in 2004. This pesticide is an insect growth regulator, which prevents sawfly larvae from completing their development.

For information about identifying and controlling redheaded pine sawfly, visit:

http://www.na.fs.fed.us/spfo/pubs/fidls/pine_sawfly/pinesawfly.htm

Gypsy moth (*Lymantria dispar*) populations continue on an upward trend statewide. This follows a long period of population decline that began in the early 1990's and culminated in 2001 when, for the first time in over a decade aerial surveys detected no defoliation in the state. Since then, egg mass numbers have been increasing steadily and defoliation was locally heavy in some northern Lower Peninsula and Upper Peninsula counties. A total of 45,244 acres were defoliated statewide in 2004, up from 38,119 acres in 2003.

Gypsy moth defoliated 3098 acres of oak forests in southern Iron and Dickinson Counties in the Upper Peninsula. This is the first year that defoliation was extensive enough to be included on aerial sketch map surveys. Abundance of egg masses in this area and in nearby Menominee County forecast a rapidly



growing population.

The **Jack pine budworm** (*Choristoneura pinus pinus*) is considered the most significant pest of jack pine. Stands older than 45 years that are growing on very sandy sites and suffering from drought or other stresses are very vulnerable to damage. Tree mortality and top-kill resulting from budworm defoliation creates fuel for intense wildfires. Harvesting and other management activities can minimize budworm-caused tree mortality and reduce the threat of damaging wildfires, and create suitable conditions for jack pine regeneration.



The jack pine budworm epidemic has spread to most jack pine areas of the Upper Peninsula (UP) in 2004. 141,646 acres of jack pine were moderately to heavily defoliated. Heavily defoliated areas in the Central U.P. included young plantations with 50-80% reduction in total foliage. Most of these younger trees have viable buds on terminal branches, giving hope for survival in 2005.

In the Lower Peninsula, jack pine budworm numbers declined slightly in 2004 following an upswing that began in 2001. Approximately 171,798 acres were defoliated, down from 196,000 acres in 2003. High-risk jack pine stands – those over 60 years of age that have been recently defoliated – are being evaluated to determine harvest priorities. Chemical treatment of jack pine budworm infestations is rarely cost-effective.

The **North Central Region Risk Mapping Project** expanded in 2004 to include states in the Northeastern and Southern Regions. This effort, begun in 2000 in cooperation with USFS State & Private Forestry and, beginning this year, the USFS Forest Health Technology Enterprise Team, brings together forest health and Geographic Information System (GIS) resources to design and produce forest insect and disease risk models. **Multi-criterion modeling (MCM)** is used to predict the risk of major forest types becoming infested by (susceptibility) and dying from (vulnerability) various native and exotic forest pests. MCM combines a variety of GIS data (criteria), including soil, tree, climate and forest health information, into detailed maps that will assist resource professionals in planning and conducting forest health management activities.

For additional information about his project, see:

<http://www.fs.fed.us/foresthealth/mcm/>

The **MDNR On-Line Pest Mapping Website** is a convenient source of information about pest infestations in Michigan. In addition to the defoliation maps from the annual MDNR forest health aerial surveys, the site depicts the history of gypsy moth defoliation in Michigan since the 1980's. Check it out at:

www.mcgi.state.mi.us/forestHealth

