2008 Michigan Forest Health Highlights

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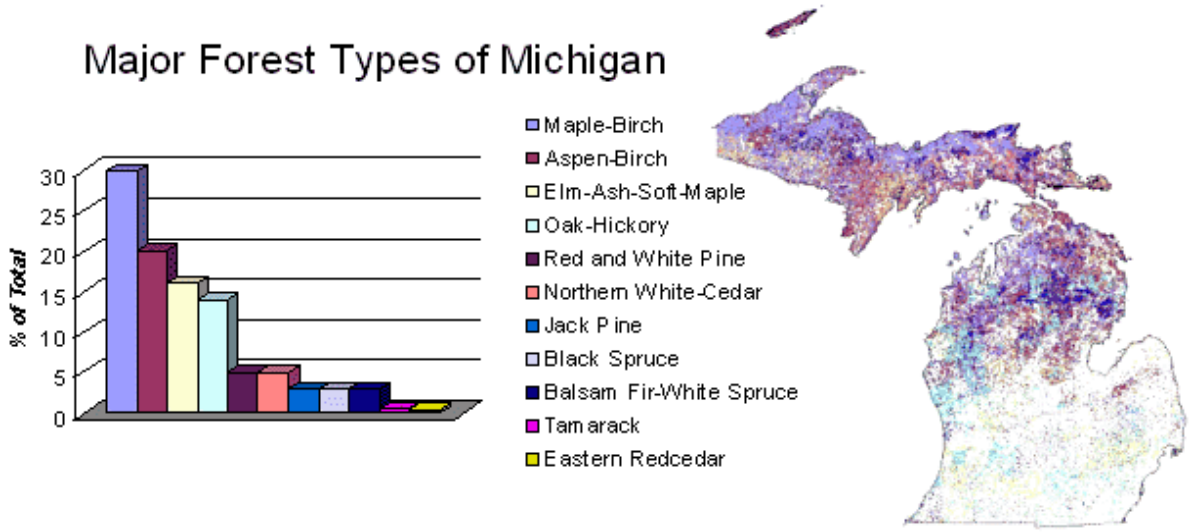
Resource Overview

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 and water and reduce soil erosion.

Prepared by MDNR, Forest, Mineral & Fire Management



Drought – Although 2008 began with a wet spring and wet early summer in most areas of the state, areas of the south central and western UP again experienced a moderate to severe drought by mid-summer (See Figure 1.). All areas of the state impacted by the drought of the last few years continue to display drought symptoms. It can take several years of normal or higher amounts of precipitation for trees to recover starch reserves and return to normal growth patterns. Those areas affected by drought again in 2008 will have a longer road to recovery. These areas experienced scattered tree mortality where other factors such as poor soils, insects, pathogens and/or other environmental stresses compounded drought stress. Major stressors such as drought initiate declines in many tree species including aspen, black ash, sugar maple, paper birch, oak, balsam fir, hemlock, spruce and yellow birch. Wood borers and bark beetles thrive in drought stressed trees. Armillaria fungi are a common component of forest soils, invading drought weakened trees. Many epidemics of defoliating caterpillars such as the forest tent caterpillar, gypsy moth, jack pine budworm and cankerworms coincide with drought periods. In recent years, drought periods have caused an alarming increase in Diplodia shoot blight and canker of seedling and sapling red and jack pine growing on droughty sites. Drought related pest impacts on balsam fir on lighter, sandier soils had another bad summer in 2008. Fir trees on poorer sites are suffering high levels of mortality as trees succumb to *Armillaria* root rot.

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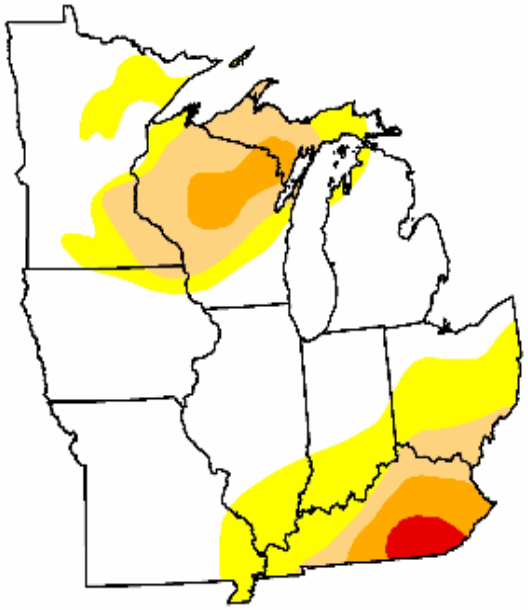
U.S. Drought Monitor

Midwest

December 2, 2008
Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	60.7	39.3	19.2	6.9	1.3	0.0
Last Week (11/25/2008 map)	67.0	33.0	18.7	6.9	1.2	0.0
3 Months Ago (09/09/2008 map)	58.3	41.7	15.7	0.2	0.0	0.0
Start of Calendar Year (01/01/2008 map)	76.0	24.0	6.6	0.8	0.4	0.0
Start of Water Year (10/07/2008 map)	54.9	45.1	22.7	3.4	0.0	0.0
One Year Ago (12/04/2007 map)	64.4	35.6	11.8	1.6	0.4	0.0



Intensity:

- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements

http://drought.unl.edu/dm

Released Thursday, December 4, 2008
Author: M. Brewer/L. Love-Brotak, NOAA/NESDIS/NCDC

Figure 1. Broadscale indicator of drought stress.

Aspen decline is being reported in many areas throughout the Lake States. There are two problems: 1) Thin crowns with small leaves; and 2) Increased rates of top kill and tree mortality. These problems occur in pockets, likely corresponding to aspen clones. Site features such as soil type and drainage are likely contributing factors. Most commonly observed are pockets of aspen with sparsely foliated crowns containing many abnormally small leaves. There are also pockets of tree mortality. These sites are mostly comprised of large trees and are often associated with hypoxylon canker. Both problems are likely responses to the extreme droughts of the past decade, most notably in 2002-03 and 2006-07, and some areas of the UP in 2008. We also have had significant defoliation by the forest tent caterpillar and the large aspen tortrix in the last decade. Drought alone causes significant stress in many tree species. This stress is compounded when combined with other stressors such as repeated defoliation and growing on less than optimum sites. *Hypoxylon* canker is a common aspen mortality factor which can more readily invade weakened trees. A similar decline in aspen was observed after the extreme 1976-77 drought.

Other observed pests included the bronze poplar borer, leaf spot, and leaf blight. The conditions in early June were ripe for fungal leaf disease development.

Diplodia Shoot Blight Young red and jack pine plantations growing on the light, sandy soils on the Baraga Plains, Baraga County, were heavily impacted by Diplodia shoot blight. Two to three year old jack pine and 10 year old and younger red pine plantings experienced areas of whole tree morality.

Branch flagging and tree mortality of understory white pine has been a common site along the AuSable River in Crawford County for the last three years. The size of the problem area expanded each year along both the Manistee and AuSable River corridors, also spreading to some inland areas. Susan Thiel, Michigan Department of Natural Resources (MDNR) Unit Forest Manager, estimates that this problem has caused about 70-90% mortality in the young white pine at the worst locations and has significantly reduced the amount of white pine in other sites. She also reports seeing flagging starting to occur on some bigger canopy white pine. Dr. Gerry Adams, Michigan State University (MSU), has identified the causal agent as *Diplodia scrobiculata.* This pathogen has been reported on E. white pine in Connecticut, but this association is unknown in the Lake States. Large branch cankers, under brown lichen cankers, small twig cankers, Diplodia exists as a latent pathogen within a healthy host tree. It is a drought stress or hail damage triggered pathogen. It's likely that drought stress and, possibly, competition stress, have been the triggers that have allowed the fungi to get a foothold. *D. scrobiculata* has been noted as a weak pathogen of jack pine and red pine. The MDNR is cooperating with MSU and the USDA, Forest Service to study how this disease affects white pine in north central Lower Michigan.

Roadside trees already stressed by salt and desiccating winds associated with travel corridors, were especially impacted by the continued drought in the south-central and western UP. Impacted trees included balsam fir, spruce and pine. Attacks by secondary pests like bark beetles and *Armillaria* root rot which invade stressed trees caused pockets of tree mortality in some areas.

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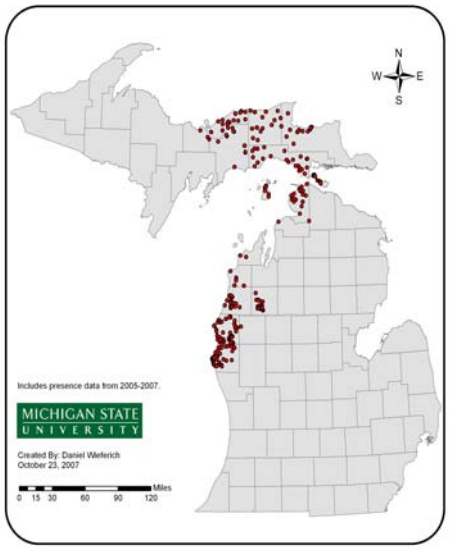
Beech Bark Disease

Confirmed beech scale sites
Created by Daniel Wieferich, MSU



The MDNR, in cooperation with MSU, the University of Michigan and Michigan Technological University, continue to monitor the movement of beech scale and the development and impacts of **Beech Bark Disease** (BBD). The BBD advancing front (e.g. areas infested with scale before fungal infection) continues to spread east and west in the UP and to new areas in the North Lower Peninsula (NLP) (See map). Ludington State Park in Mason County was the first area in the state with BBD. Beech trees of all sizes are scale covered. Beech snap is extensive throughout the park with beech mortality reaching the 75% mark. Isolated, satellite populations of beech scale occur well ahead of the advancing front in both the Western UP and NLP. These outliers are being studied by MSU to better understand scale movement to new areas, and colonization rates within stands after arrival.

The USDA Forest Service Research Facility in Delaware, Ohio continues to collect scions from Michigan's resistant trees to study **Beech Bark Disease Resistance**. These trees resist scale establishment. Without the scale, beech are not susceptible to infection by *Nectria* species which cause beech bark disease. Scions from resistant American beech have been collected from infested areas of both the UP and LP. Beginning in the fall of 2009, Michigan will establish the first seed orchard with BBE resistant stock. The seed from these orchards will be used to restore an American beech component in BBD impacted hardwood forests. The long-term objective of this research is to develop regional repositories of resistant beech germplasm and establish seed orchards and seed production areas that consist of

Grafted scion producing nuts
Photo by Jennifer Koch

Prepared by MDNR, Forest, Mineral & Fire Management

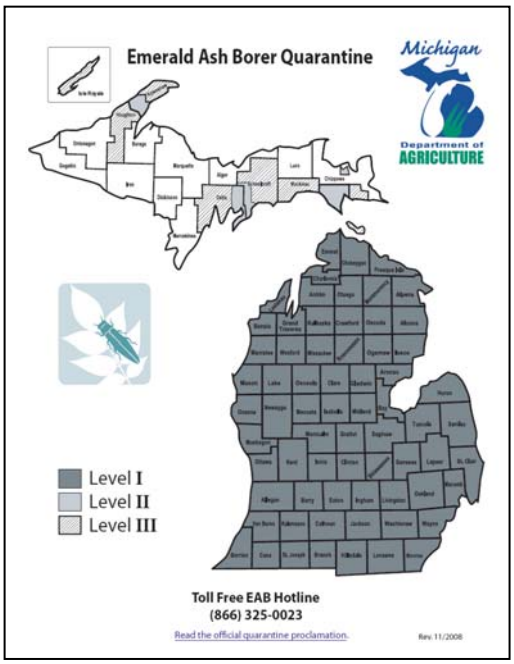
genetically diverse populations of resistant beech. The MDNR continues efforts to detect and protect BBD resistant trees. To date, 19 families of resistant beech from the UP and 9 families from the NLP have been confirmed resistant at the USDA Forest Service Lab in Delaware. Scions will again be collected from some of these trees in the winter of 2009.

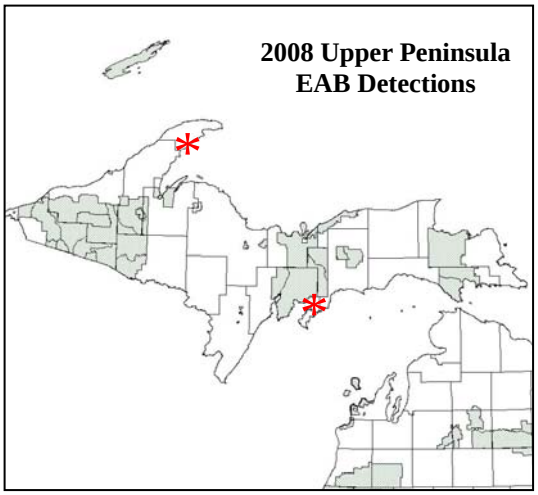
Management plans for beech containing stands anywhere in Michigan should now consider BBD vulnerability. Management goals are twofold: 1) To reduce BBD impacts ahead of the BBD killing front by decreasing the beech component such that a fully stocked stand remains to sustain production of both commodity and non-commodity forest resource values, and 2) To increase tree species diversity thereby decreasing stand susceptibility and vulnerability to BBD. Tree species diversity also protects a stand from future pests which may target a single tree species or genera. A beech component is maintained even in heavily BBD impacted areas. Keeping a minor beech component minimally affects sustained forest productivity, and offers an extended period of mast production. In BBD advancing front areas of the UP, it is a real challenge to stay ahead of beech mortality and beech snap in scale infested stands. Often times, the beech component of a timber sale has a significantly reduced value e.g. salvage value) due to volume losses from beech snap and tree mortality between the time a stand is cruised for sale and when it's actually harvested. Heavily scale infested American beech are considered hazard trees in recreation and other high use areas. Once infected, these trees will break off or "snap" unexpectedly. Thus, scale infested beech are removed from areas where they pose a threat to human safety and/or property.

The **Emerald Ash Borer (EAB)** was detected in two new locations in the western and south-central portions of Michigan's UP in 2008 (See Map). The current **EAB Quarantine** now encompasses five of the fifteen UP Counties (See Map Below). For detailed information on the EAB quarantine, visit the MDA website at:

http://www.michigan.gov/mda

Michigan Technological University (MTU) in Houghton, MI continued its EAB survey efforts sponsored by the USDA Forest Service in cooperation with the MDNR. MTU. Areas of high EAB risk were identified using maps of the state's ash resources and state park databases showing visits from residents of EAB infested counties. Trap trees were deployed in state and federal parks and campgrounds throughout Michigan and Wisconsin. The survey effort also included visual inspections of firewood and ash trees in these and adjacent areas (Storer, MTU).

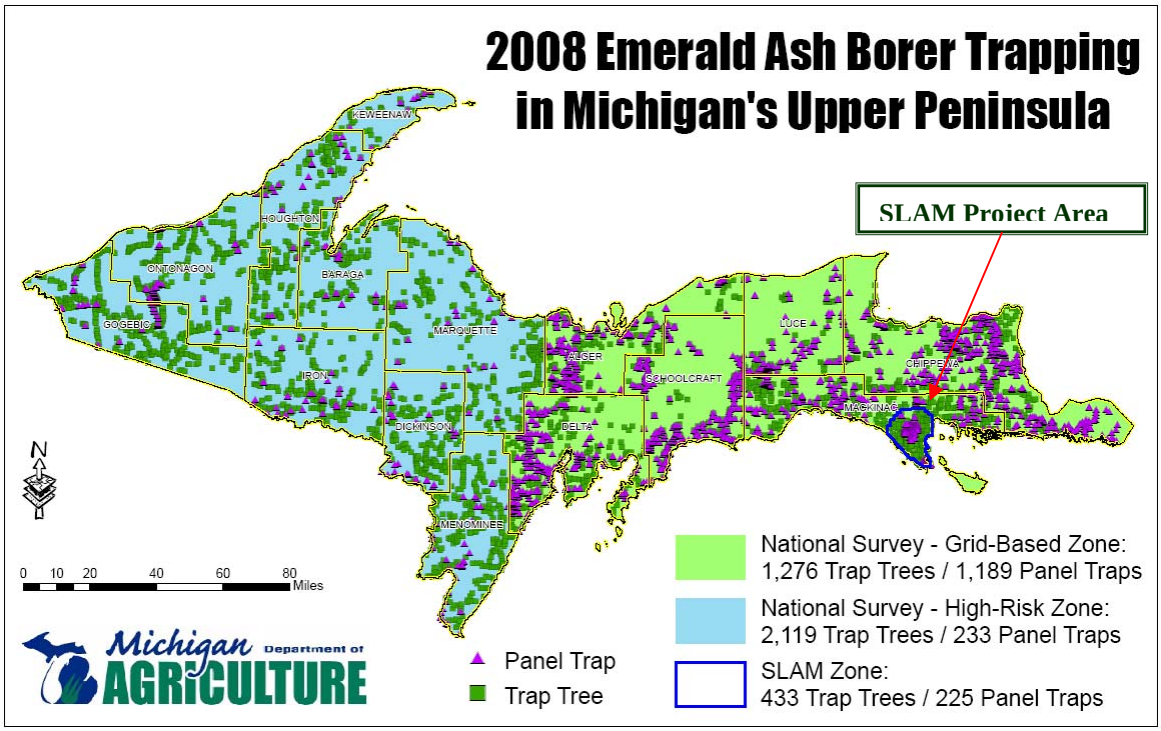




Researchers at MSU are assessing the influence of clusters of girdled trees on the spread of EAB in forested areas of the NLP. Four strategies utilizing girdled trap trees as sinks for EAB are: 1) girdle and remove trees annually; 2) apply systemic insecticide, girdle and remove some trees each year; 3) harvest (possibly only large ash or thin to 10-120 ft2/ac basal area) and create islands of attraction (clusters of girdled trees); and 4) harvest and create islands of attraction with lethal trap trees (trees treated with a systemic insecticide and girdled). The EAB spread and population densities in treated and untreated areas are

compared annually. Preliminary results suggested that clusters of girdled trees were more attractive to EAB than nearby clusters of non-girdled trees. Also found that at low EAB densities, girdled trees were much more attractive to pioneering adult beetles compared to non-girdled trees within the same cluster of girdled trees. At low EAB densities, there was little "spill-over" effect leading to EAB infestation of ash trees near or adjacent to girdled trees (Siegert & McCullough, MSU).

The Michigan Department of Agriculture's (MDA) EAB surveys where more extensive, covering the entire UP and the northern tip of the NLP. The MDA deployed both girdled detection trees and artificial traps (e.g. purple traps) containing an aromatic lure (See Map below).



A pilot project was initiated in 2008 to test the latest research concepts for managing EAB outlier populations. The area selected for this study contains the UP St. Ignace and Moran outlier infestations. The project is called **'SL.A.M'** to stand for **Slow Ash Mortality.** The goal

is to employ and carefully monitor and measure the impact of multiple strategies to slow the rate at which EAB disperses and impacts ash trees. The primary facets of the project include:

This work plan was developed with the following objectives:

- Reduce EAB population growth in the core areas.
- Limit the expansion (size) of the core areas.
- Prevent satellite populations from expanding and becoming core populations.
- Protect high value trees where possible.
- Outside of the core areas, focus on phloem reduction which should limit future EAB population buildup due to reduced food availability.
- Locate and disrupt any corridors of ash that may exist within the project area, especially any corridors that would extend outside the project area. The most likely locations that would support ash along a corridor would include riparian corridors (streams, lake sides), road, railroad and trail corridors.
- Develop and maintain regular communications and consistent messages with the local landowners in and around the project area.
- Assist local woodland owners and homeowners in making environmentally and fiscally responsible decisions in regards to their ash trees and woodlands.

The MDA conducted intense surveys in the SLAM area to determine the density and distribution of EAB. They deployed 433 girdled detection trees and 225 panel traps. They also worked with the MDNR to survey the ash resources in the Moran Area. Survey data will help locate proposed management activities on the site in 2009 and, over time, will be used to evaluate the impact of management activities.

The MDNR conducts annual **Firewood** sweeps in December after closure of the firearm deer hunting season. All hardwood firewood left at State Forest Campgrounds and State

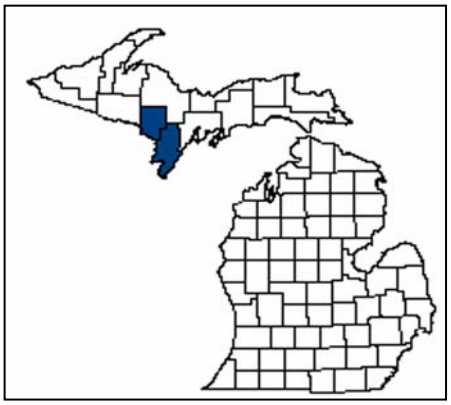
Parks is burned. This eliminates the risk of EAB emerging from infested firewood the following spring. During the camping season, Parks and Recreation employees inspect all campers entering state parks. State forest staff conducts random inspections of state forest campgrounds. When found, firewood which is not in compliance with the EAB quarantine and the MDNR Director's Order is seized and burned. The Director's Order prohibits moving ash wood onto state lands, unless that ash is without bark attached.

Guidelines to manage ash are influenced by the distance from EAB populations and the abundance and size of ash trees. The general goal is to decrease forest vulnerability by reducing the number of ash trees where abundant, and increasing tree species diversity either by promoting the regeneration and establishment of existing tree species, or by planting suitable, new tree species. An objective is to create a stand that will recover rapidly in the event that all ash is lost to the EAB. Increasing tree species diversity where needed protects a stand from future pests which target a single tree species or genera. If possible, no more than 10% of any stand should remain in ash species. If confidence is high that a stand is greater than 10 miles EAB infested trees, a greater ash component can be retained. This is especially important if ash are needed to maintain a fully stocked stand for optimum utilization of a site. Vigorous pole size and smaller ash are targeted for retention. Removing one large ash has a much greater effect on reducing EAB population potential than does removing many saplings or a few pole size trees.

A new pesticide, **Tree-äge™** (active ingredient: emamectin benzoate) is now registered for use in Michigan. Its primary use will be protecting valuable landscape ash trees from EAB. Tree-age can be purchased and applied only by trained, certified arborists and landscapers. The product is applied as a trunk injection at the base of an ash tree. Like any systemic insecticide, this product must be transported through the trunk and into the canopy. Therefore, it will usually be more effective in a tree that is reasonably healthy than in a tree that has already been severely injured by EAB larvae.

Oak Wilt continues to spread naturally and artificially through much of the Lower Peninsula. Overland spread of oak wilt through firewood movement and the wounding of oak by activities such as branch pruning continue to plague efforts to slow the spread of this fatal disease. To slow the overland spread of oak wilt, harvesting restrictions are observed on state land. Forests where red oak trees remain after harvest cannot be cut between April 15 and July 15. Michigan currently has three oak wilt initiatives:

1. Beginning in 2004, USDA Forest Service **Oak Wilt Suppression** funds have supported a joint MSU Extension and MDNR effort to rid the UP of this threat to its oak resources. Oak wilt has been detected in two counties, Menominee and Dickinson. The objectives of this program are to: 1) Remove oak wilt from the UP by detecting and treating all infection centers; 2) Educate affected communities to prevent the reintroduction of oak wilt; and 3) Demonstrate an approach for detecting and effectively treating oak wilt infection centers throughout Michigan. To date, 20 miles of root-graft barriers have been established, and approximately 150 oak wilt epicenters removed. Unfortunately, the 2008 federal funding for this project was withdrawn to help cover the costs of western fires. This funding has now been restored and is available for 2009 suppression activities.



Upper Peninsula Counties with Oak Wilt

2. In cooperation with USDA Forest Service, State & Private Unit pathologists, the MDNR Forest Health Program continues to evaluate the effectiveness of **stump extraction for stopping the underground**

spread of oak wilt. The method is being tested at two infection centers in the NLP. Root graft barriers were created in 2007 and 2008 by severing symptomatic trees and extracting stumps using backhoes and excavating equipment. Extracted stumps were inverted, placed back into the hole and covered with dirt to prevent sap beetles from feeding on any pressure pads that might form. Only symptomatic trees were treated. Wood from infected trees was burned to prevent development of spore-producing pressure pads. Additional treatments scheduled this fall will include applications of herbicides to cut stumps of perimeter trees. It appears that this method can be a cost-effective alternative to traditional root graft barrier methods when used to treat new infection centers, i.e. areas where symptoms appeared within one year of treatment. Treatment of older infection centers is not recommended since the fungus has likely already traveled through the roots beyond the immediate vicinity of the extracted stumps. Cost analyses indicate that this method is significantly cheaper than traditional root graft barrier installation using a vibratory plow. Also, the method can be used in soils too rocky for vibratory blades to penetrate.

3. Michigan, Minnesota, Wisconsin and Texas are working with the USDA Forest Service, Forest Health Technology Enterprise Team, Fort Collins, CO, to create a **national oak wilt database.** The database is being designed to meet both state and national forest health program needs for reporting and mapping oak wilt occurrence, measuring resource impacts, evaluating resource risk, and tracking management efforts.

Spruce Budworm is in several counties in Michigan's UP. Isolated areas of mature to over mature spruce/fir in the south central and north central UP have top kill and tree mortality caused by repeated defoliations. The spruce budworm is one of the most destructive native insects in the northern spruce and fir forests of the Eastern United States and Canada. Periodic outbreaks of the spruce budworm are a part of the natural cycle of events associated with the maturing of balsam fir. Balsam fir is the species most severely damaged by the bud-worm in the Lake States. White and black spruces are also hosts with some feeding on tamarack, pine, and hemlock. Spruce mixed with balsam fir is more likely to suffer budworm damage than spruce in pure stands.

Areas of **Eastern Larch** (tamarack) predisposed by **Larch Casebearer** defoliation and drought continue to be impacted by the **Eastern Larch Beetle**. Larch beetle populations which build in stressed trees can successfully attack neighboring healthy larch. Signs of larch beetle activity include: 1) yellowing of foliage in the lower portion of the tree in late July and early August; 2) Small round (2 mm in diameter) adult beetle entrance holes in the bark; 3) brownish boring dust below the entrance holes; 4) bark beetle galleries etched in the sapwood beneath the bark; 5) woodpeckers feeding on the main stem; and 6) loose bark on seemingly health trees in late summer. It takes a few years of recovery before larch beetle populations subside. If the current drought affecting the south central and western UP extends into the 2009 growing season, we can expect continued eastern larch beetle activity in affected areas. There was little casebearer activity reported in 2008.

Forest tent caterpillar (FTC) populations were heavy over a large area of the northwestern Lower Peninsula for the first time is several years. Over 43,904 acres were moderately to heavily defoliated, with sugar maple and basswood most commonly affected. As with most early-season hardwood defoliators, 3 or more years of consecutive heavy defoliation can cause dieback and mortality, particularly if trees have been previously stressed by drought or other factors. Fortunately, FTC is a pest native to Michigan, and an effective natural enemy complex made up of insect parasites, predators and fungal pathogens usually bring high populations under control within 2 years.

Left - Aerial view of FTC defoliation in Northern Lower Peninsula.

Prepared by MDNR, Forest, Mineral & Fire Management

Gypsy moth populations were down again slightly in Michigan in 2008 with 18,689 acres defoliated, compared with 19,146 acres in 2007 and 31,995 acres in 2006. Rainfall levels were normal or above normal in many parts of the state in the spring, and temperatures were cool in May and early June. This weather was favorable to development of the fungal pathogen Entomophoga maimaiga and likely contributed to the statewide decline in gypsy moth numbers.

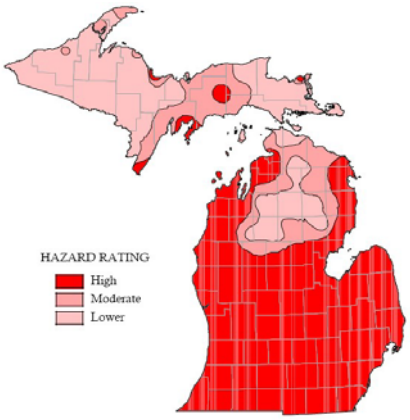
The MDA no longer sponsors the Cooperative Gypsy Moth Suppression Program, which provided communities cost-share assistance for aerial pesticide applications. A handful of communities conducted locally-funded programs around Michigan in 2008.

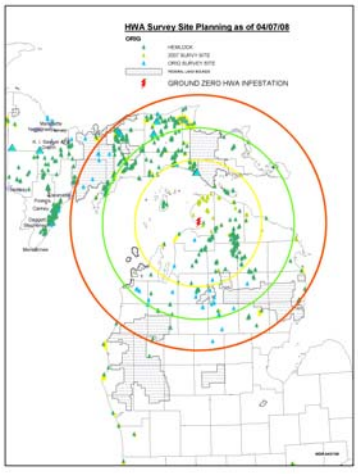
Gypsy Moth Larva

The MDNR continues to cooperate with the MDA and MSU in efforts to prevent the **Hemlock Woolly Adelgid** (**HWA**) from becoming established in the NLP and the UP. The **HWA** is an exotic invasive insect that feeds on tree sap, killing needles, twigs and branches. Infested trees eventually die. The **HWA** was detected on eastern hemlock landscape trees in the Harbor Springs Area in 2006. In 20 years of **HWA** survey activities,

this is the third time the pest has been detected in Michigan. The previous two findings in 2001 were restricted to nursery stock that was quickly destroyed. The 2006 detection marks the first time that **HWA** has been found on out-planted and native trees. All imported hemlock and adjoining native trees were removed and destroyed. The MDA also treated a perimeter of hemlock with a systemic insecticide to eradicate difficult to detect **HWA**. Treatments were repeated in the spring of 2007. The MDA continues to look at other hemlock in the area to determine whether additional infested nursery stock have been planted in Michigan.

The MDA established a **HWA** Quarantine in December 2000. The quarantine prohibits the movement of hemlock seedlings and nursery stock, logs, lumber with bark, uncomposted chips with bark and uncomposted bark from infested counties of eastern states and from California, Oregon, Washington and British Columbia. The MDNR Forest Health, Inventory and Monitoring Program continued **HWA** and Beech Scale Rapid Early Detection Surveys for the fifth straight year. Areas throughout the state with abundant hemlock, particularly those within or adjacent to high hazard zones (see map), were surveyed for **HWA**. These zones, developed by MSU,





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identify areas where higher minimum winter temperatures reduce overwintering mortality of **HWA**.

The **HWA** monitor trees were established in several hemlock stands near the initial **HWA** detection area. The assumption is that bird feeders hung at these plots increase the likelihood of detecting bird-vectored **HWA** crawlers on these trees.

American beech growing near **HWA** survey areas that were outside of known beech scale areas were examined for beech scale. No **HWA** or new beech scale areas were found in 2008.

The **Jack Pine Budworm** defoliated 14,569 acres statewide in 2008, down significantly from 158,500 acres in 2007 and 150645 acres in 2006. This follows a historical trend for budworm in Michigan, where populations typically decline significantly after 2 years of moderate to heavy defoliation. Egg and larval parasites and overwintering mortality typically account for this drop in insect numbers.

The budworm is the most important pest of jack pine in North America. Stands older than 50 years are most susceptible to damage. Jack pine over 50 years old that has suffered 2 or more defoliations during the past 3 years is at highest risk of top kill or mortality. The MDNR management objective is to reduce jack pine rotations on state land to 50 to 60 years, significantly reducing the risk of budworm-triggered mortality.

Locally, heavy budworm defoliation occurred for the second year in the Yellow Dog Plains in Marquette County. In the Baraga Plains, defoliation occurred for the first time in this outbreak cycle. In addition to older, high-risk stands, defoliation is occurring in young sapling- and pole-sized jack pine stands.

Ground and aerial views of JPBW Damage.

Prepared by MDNR, Forest, Mineral & Fire Management

Since its detection in New York State in 2004, the European wood wasp, **Sirex noctilio,** has been confirmed at trap sites throughout the eastern Great Lakes region of Ontario, Canada. This exotic wood wasp (commonly referred to as horntail wasp) is native to Europe, Asia and northern Africa and was collected in Fulton, New York in September 2004. The New York find is the first time the insect has been documented in North American forests. The EWW is rarely a pest in its native areas where it confines its attacks to dead or dying trees. In areas where it has been introduced, however, it is a major pest of pine plantations, where it attacks living trees and can cause up to 80% mortality. Outbreaks often build up in stressed trees and then spread to more vigorous trees. Widespread outbreaks have occurred in Australia, New Zealand, South Africa and South America.

Female **Sirex** are attracted to stressed trees where they insert their sword-like ovipositors into the outer sapwood, deposit their eggs and introduce a toxic mucus and fungus (*Amylostereum areolatum*). Larvae feed only on the fungus, which, together with the mucus, kills infested trees.

Symptoms of **Sirex** infestation include:

- Exit holes approximately 1/8 to 3/8 inches in diameter;
- Tree crowns turning light green then yellow to reddish brown in the late spring or early summer;
- Larval galleries (tunnels) in the wood, packed with a fine powdery frass (insect-produced sawdust);
- Beads of resin or streams of resin on the bark, exuding from holes created during egg-laying.

Pitch or resin will often weep from the tiny puncture wounds made by the adult females when they lay their eggs. The damage can be very subtle or quite obvious and care must

be taken in using this symptom as a feature of fresh attacks. In Michigan, most 2- and 3-needle pines are considered susceptible, including Scotch, jack, red and Austrian pines.

The Eastern Regional office of the USDA Animal Plant Health Inspection Service's Plant Protection & Quarantine (PPQ) conducted a Sirex survey in 17 uninfested counties in southeastern Michigan to continue delimiting the spread of Sirex.

Traps were placed in Scotch, red, jack and Austrian pine and baited with 70% alpha-pinene/30% Beta-pinene blend.

New detections of **Sirex** were made in Huron and St. Clair counties. A single female was caught in St. Clair County and 4 females were caught in Huron County at two different sites (see map). All catches were made in mature Scotch pine and were either single trees or Scotch pine mixed with hardwoods. No detections were made in dense overstocked stands of host material. Positive catches were made between early August and mid September.

Trapping data from across the region indicates that **Sirex** populations are spreading naturally along the shoreline of Lake Huron to the north after spreading into Michigan from Ontario, Canada.

MTU continues to work on a USDA Forest Service-funded **Sirex** detection survey. Sites were established in 2007 using groups of 3 to 5 herbicided pine trees. The herbicides cause stress that increases the trees' attractiveness to the wood wasp. Traps are

hung from these trees and a subset is cut in the spring to look for larvae of the wood wasp. In addition, funnel traps baited with alpha and beta pinene are placed in the trees.

For more information about **Sirex**, link to:

http://na.fs.fed.us/spfo/pubs/pest_al/sirex_woodwasp/sirex_woodwasp.htm

http://www.aphis.usda.gov/plant_health/plant_pest_info/sirex/index.shtml

http://www.treesearch.fs.fed.us/pubs/12997.

To determine whether an insect that you have collected is **Sirex noctilio**, contact the MSU Plant Pest Diagnostic Clinic at 517-355-4536, or your local county MSU Extension office.

Isolated areas of hardwoods including mostly sugar maple and American beech were defoliated by caterpillars known as loopers or cankerworms in 2008. Hardwood defoliators included the **Spring Cankerworm**, **Bruce Spanworm, Linden Looper**, and **Fall Cankerworm**. Many caterpillar outbreaks coincide with drought periods. Drought stressed trees are less able to produce chemicals used to defend against defoliators. Periods of warm, dry weather also reduce mortality from insect pathogens which are favored by cool, wet weather; and, decrease larval predation and parasitism due to the quicker transition from egg to larvae to pupae. Areas in the western UP reported heavy moth flights of fall cankerworm in October. These areas can expect some level of hardwood defoliation early in the growing 2009 growing season.

Eastern Hemlock Looper larvae can be extremely destructive to hemlock, balsam fir, and white spruce. Hemlocks may die after one year of severe defoliation, fir in one or two years. Loopers have been epidemic in isolated areas of the state in the last few years. Populations moved areas of the central UP to the western UP in 2008. Unfortunately,

because loopers first feed on lower branches, it is impossible to detect feeding damage with aerial surveys until trees are heavily damaged. Areas first defoliated in 2008 should be monitored in 2009. Two years defoliation can result in top kill and tree mortality. Hemlock should not be harvested in stands where defoliation is expected because: 1) Insects are concentrated on residual hemlock after cutting; 2) New openings can reduce moisture availability by increasing amount of sunlight reaching the forest floor.

Oak Kermes Scale was reported on red oaks in the Northern Lower Peninsula in 2008. Both Kermes and Lecanium scales are common on oak and both are native to North America. Mature scales are tan, globular and hard. They are easily mistaken for galls or buds. Oak is the only host. Kermes scales are sucking insects which feed on oak sap. Feeding can result in branch dieback, reduced tree growth rates, and the production of sooty mold which grows on the honeydew secreted by the scales. Tree mortality may occur during heavy infestations, especially in an oak resource stressed by other factors such as severe drought and repeated defoliation.

Kermes Scale on Oak
Whitney Cranshaw, Colorado State Univ.

This was the 5th year of an effort to eradicate **Garlic Mustard** from an eighty acre northern hardwoods site in the Eastern UP. This is a seven year prescribed burn project which includes follow-up use of glyphosate herbicide to treat plants missed by the spring burns. Treatments are designed to stop the spread of the plant and eventually eliminate garlic mustard. Garlic mustard populations have been greatly reduced. The burn just did not carry well in 2008 with only about 30-40% burn coverage. Only a few small clumps of second year stalks remain on this 80 acre parcel with none closer than a chain from the perimeter. The entire area was surveyed for residual plants which

were subsequently sprayed with Glyphosate. Additional treatments and monitoring of plant community responses to burning and herbicide treatments are planned for 2009. The MDOT is aggressively treating garlic mustard at the Cut River Bridge Scenic Area in Mackinac County on highway US-2. This was the 3rd consecutive year that MDOT applied Garlon 3A in spring and fall at the bridge site.