IOWA'S FOREST HEALTH REPORT, 2009

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Introduction

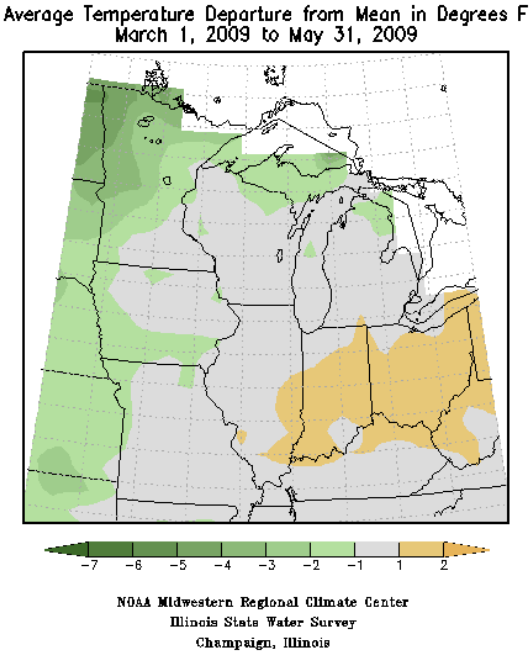
Each year the Iowa DNR Bureau of Forestry cooperates with numerous agencies to protect Iowa's forests from insects, diseases, and other damaging agents. These programs involve ground and aerial surveys, setting up sentinel trees, setting up pheromone traps, following transects for sampling, collecting samples for laboratory analysis, and directing treatments for specific problems during the growing season. After each growing season, the Forestry Bureau issues a summary report regarding the health of Iowa's forests.

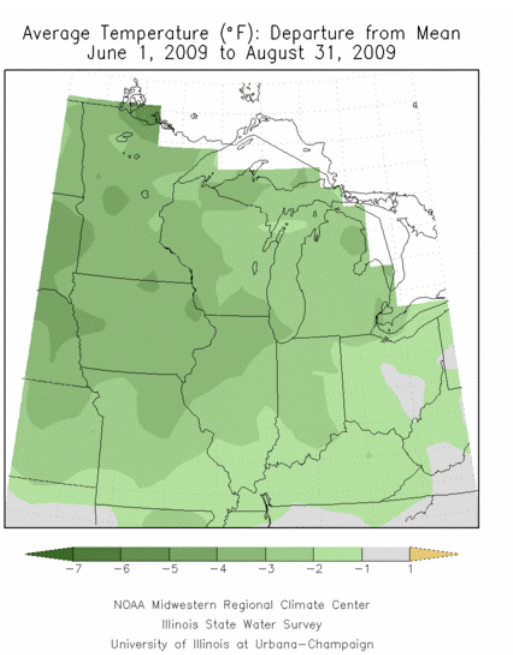
This year's report begins with a brief summary of weather events, followed by a summary of Forest Service Inventory data for Iowa's forests, and several survey summaries for insects and diseases that have the potential to impact Iowa's forests. The 2009 surveys for exotics insects and diseases were Emerald Ash Borer, Bur Oak Blight, and Gypsy Moth survey. Oak tatters research describes some new intriguing information discovered in 2009. This report finishes up by describing forest insects and diseases already present, and concludes with invasive plant species in our forests.

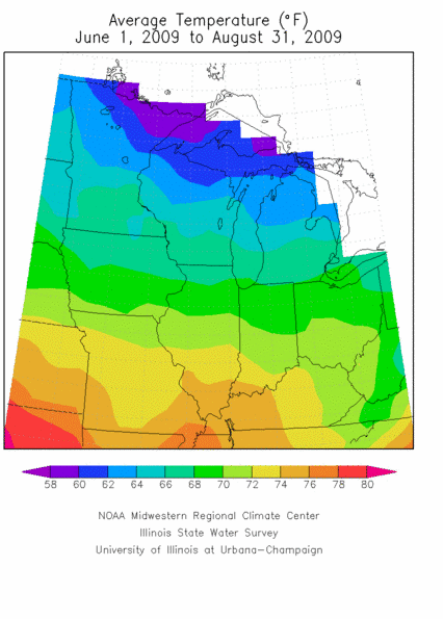
Weather

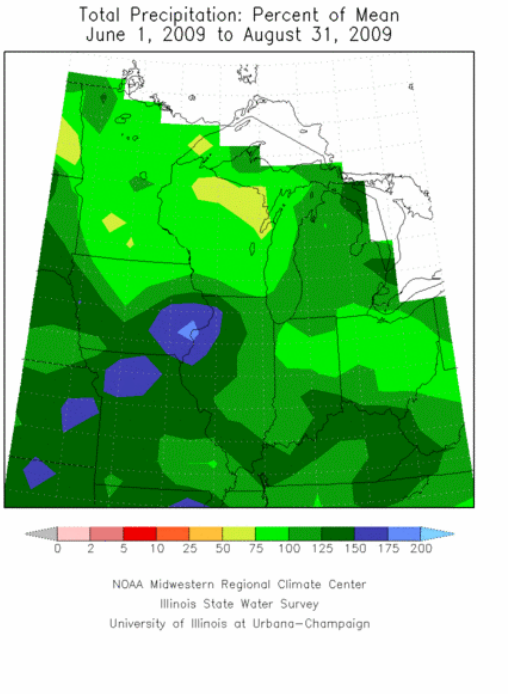
This winter did not bring about many changes for Iowa with a normal snow load. However, February was unseasonable warm. The entire state experienced a much cooler than normal spring and summer; with Eastern Iowa having heavier than expected rainfall events (see Figures below). The heavy rainfall events

brought about chlorosis in many species. The species hit the hardest included: silver maple, river birch, hackberry, hickory, and some oaks. The heavy rainfall events, combined with the cool wet spring, resulted in leaf drop in hackberry and a higher than normal amount of Anthracnose (a fungal leaf disease) on sycamore and maple throughout the state. Hackberry, maple, and sycamore trees produced a new flush of leaves within a few weeks as expected.





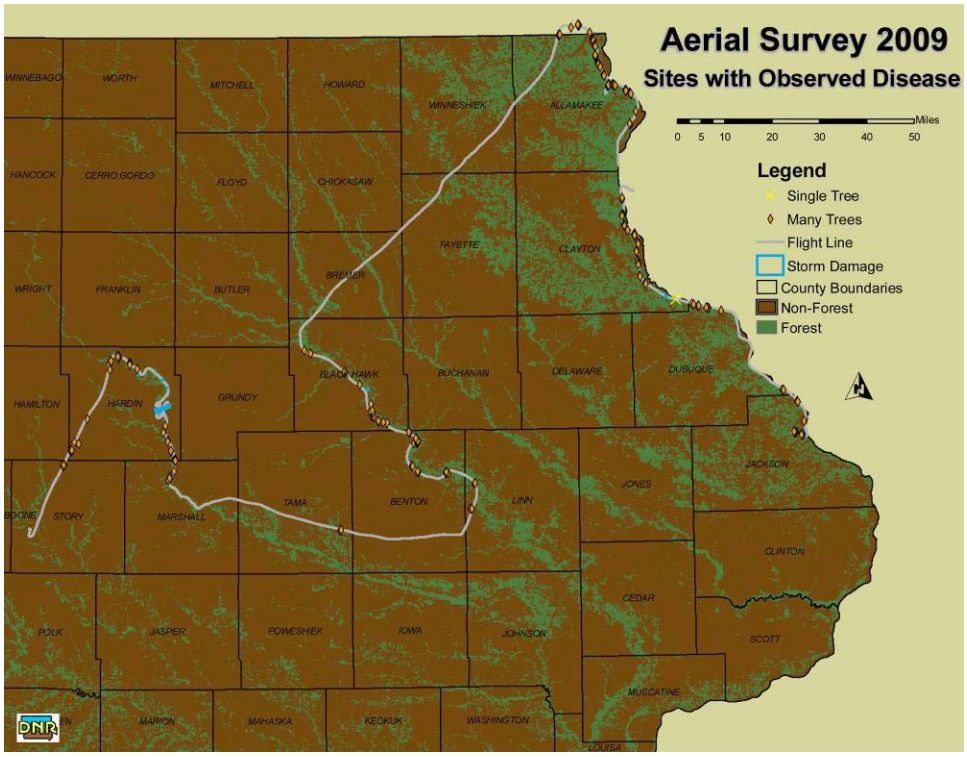




Aerial Survey

Iowa forests surveyed by plane in 2009 were found to be in generally good condition. On September 2, the surveying crew started above Ames, IA and flew south along the Iowa River, then flew north along the Cedar River, then went north to Yellow River State Forest following the Mississippi River south to Dubuque, IA. A total of 559,946 acres were surveyed. Observance along this route showed tremendous damage (95% damage) from the hail and straight line winds in Hardin County. Silver maple and cottonwood trees throughout the state showed chlorotic leaves from their water saturated soils.

Most counties along the route also showed signs of Dutch elm disease (DED). A large population of lace bugs caused oak leaves to look discolored in late August. Scattered trees with lace bug damage were noticed throughout the state, with most of the damaged trees occurring in Eastern Iowa. The aerial flights found the same levels of Pine Wilt and Oak wilt that was noted in the 2008 aerial survey. In addition, the aerial flight found large pockets of aspen continuing to decline in NE Iowa.

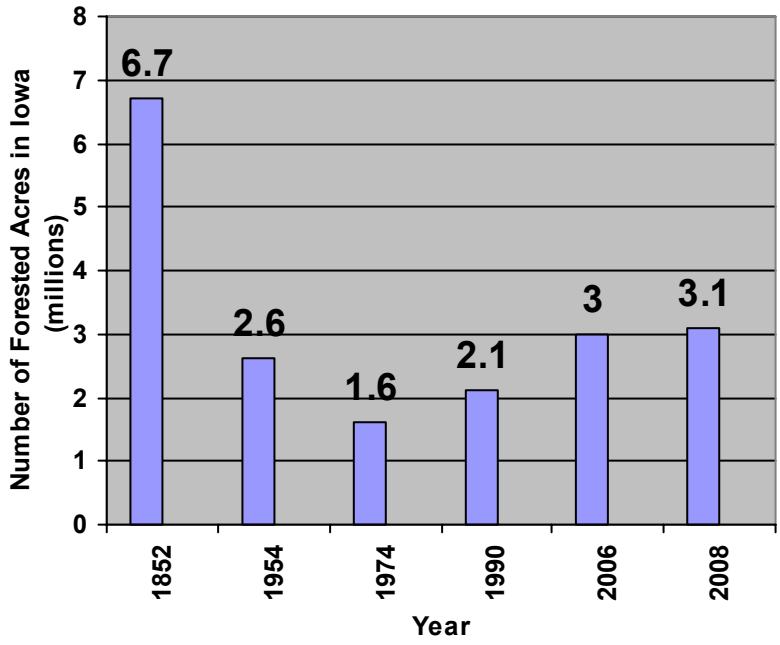


THE SIZE AND CHARACTER OF IOWA'S FORESTED LAND

Iowa's forests are generally healthy and are increasing in the number of acres. A forest resource that is healthy contributes immensely to our state's goals of clean water, abundant wildlife habitat, lumber and veneer production, outdoor recreation and aesthetics that enhances the quality of life in Iowa for the citizen of Iowa.

Iowa has approximately 3.1 million acres of forested land representing a steady increase over the past few decades as shown in Figure 1 below. However, with the current economy and increasing corn and soybean prices we are seeing many of the newly planted area shift back in the croplands and fewer applications for cost share programs. Most of Iowa's forests are native hardwood with oak, hickory, maple, basswood, walnut, ash, elm, cottonwood and many other hardwood species. Less than 3% of Iowa forests are conifer forests.

Figure 1. History of Iowa's Land Covered in Forest since Settlement.



Even though Iowa's forests are increasing in acreage, the oak component is decreasing in some areas of the state, as forest succession drifts toward more shade-tolerant species such as maple in the absence of forest disturbance. There are currently 927,200 acres of oak-forest in Iowa. Iowa has lost an average of 4,500 acres of oak forest annually since 1990. At the current rate of decline, oak forests will disappear from the Iowa landscape in 160 years without

proper land management. It is important for landowners to work with DNR Foresters to use silvicultural systems to counter this trend to regenerate oak. A breakdown of the different forest communities in Iowa is shown in Figure 2 below.

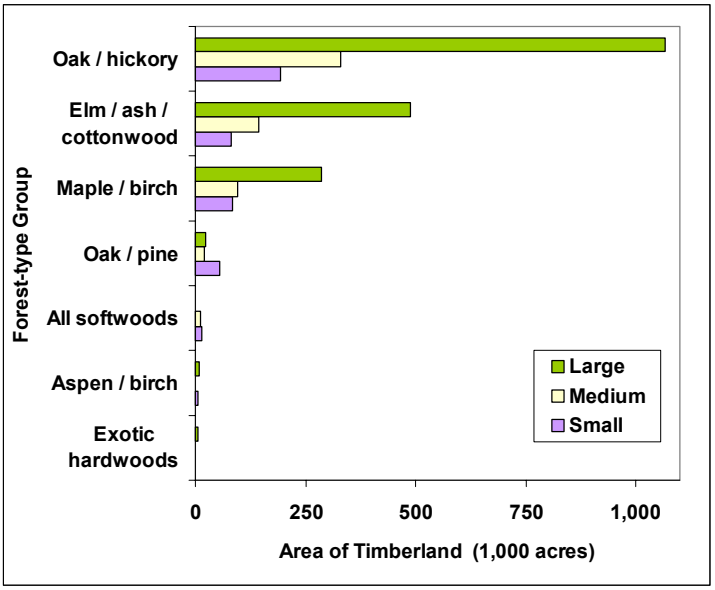


Figure 2.—Area of timberland by top seven forest-type groups and stand-size class, Iowa, 2007.

Note: Large diameter trees are at least 11.0 inches diameter for hardwoods and at least 9.0 inches diameter for softwoods. Medium diameter trees are at least 5.0 inches diameter but smaller than large diameter trees. Small diameter trees are less than 5.0 inches diameter. Additional details are available in USDA Forest Service (2005).

Succession to shade tolerant hardwoods eventually replaces shade intolerant hardwoods, like oak, in the absence of disturbance. Most of Iowa's oak stands are in the mature or over-mature age. Prior to settlement periodic prairie fires swept into the woodlands and eliminated mid-story layers, thus giving the thicker barked oak a competitive advantage over other species. That is largely why we have oak today. However, many of these stands are now 150+ years old. These stands may be reaching the twilight of their life span. Without fire or disturbance, oak seedlings cannot get the light they need to survive. When the fire eco-system is eliminated shade tolerant species like sugar maple are in a position to fill the void.

Iowa's oak forests within the white oak group has a sporadic seed production, exception bur oak, only producing good seed crops once every five years on average. This makes the timing of silvicultural treatments or harvesting very important to the regeneration of oak stands. Another challenge for maintaining oak forests is localized heavy deer populations that eat oak seedlings and keep them browsed to a point where other less palatable species out compete the oak.

Fragmentation of forest land into smaller tracts with houses near or in the timber make the management practices for oak less feasible for landowners, because they do not want to "ruin" there woods. Most people want to preserve their forests with big trees thinking that this will keep their forest in its current condition. The woodland becomes an extension off their yard and not a forest. People generally believe that by doing nothing that they can preserve their forest, when in reality it take disturbance to maintain an oak-hickory forest type. Many of the oak regeneration issues can be addressed through proper application of silvicultural techniques and forest management.

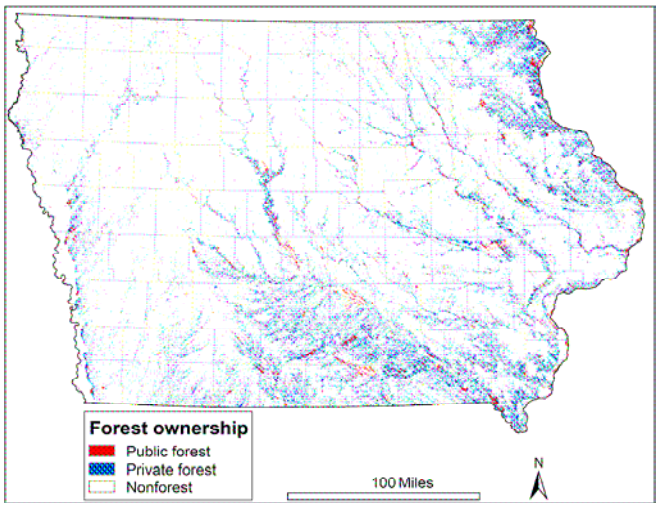


Figure 3.—Distribution of forest land by public (0.469 million acres) and private (2.586 million acres) owner groups, Iowa.

Projection: UTM Zone 15N, NAD83.

Data sources: forest/nonforest - U.S. Forest Service, 2001 Forest Type Groups map, (Ruefenacht et al. 2008); ownership - Conservation Biology Institute, Protected Areas Database, 4.5; basemap - ESRI Data & Maps.

Harvesting activities do not destroy the woodland wildflower and forb seed bank, even in heavily scarified sites. Plants such as Anemone, blood root, Blue cohosh, fern come back in reaction to the disturbance and additional light. They are more likely to disappear under a very dense canopy of shade tolerant hardwoods.

Even though Iowa's forest land is currently increasing, the land is becoming more fragmented and the species growing on the land is converting to more shade tolerant species. Iowa has about 8.3% of its land classified as forest, according to 2007 Forest Inventory Data provided by the Forest Service. That means about 3.1 million acres of Iowa is forested. Most of Iowa's forest land is privately owned, 90% by 138,000 landowners. In 1990 there were 55,000 forest landowners in Iowa that owned on average of 31 acres of forest land. By 2007 the number of forest landowners increased to 150,000 with an average of 12 acres of forested land.

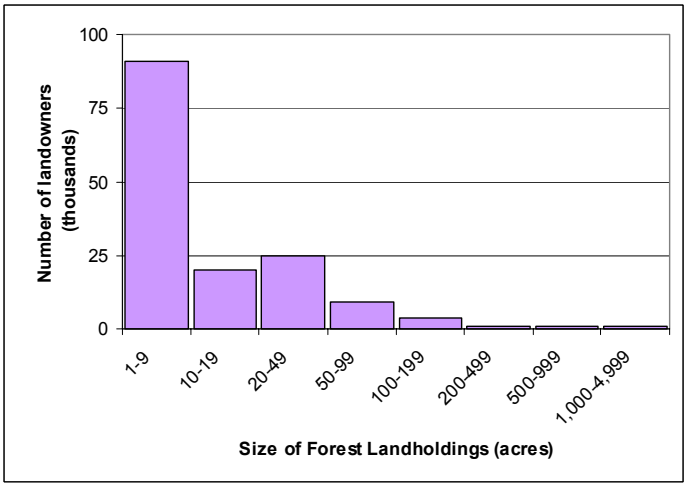


Figure 4.—Number of nonindustrial private forest landowners by size of forest landholding, Iowa, 2006. Data were derived from Butler (2008).

Net annual growth barely exceeded the combined removal and mortality of Iowa's forestland in 2007, the latest FIA data available. The net annual mortality and removals were up from the 2006 FIA. This trend may continue without adequate funding to control forest health issues (mortality). This data is shown in the following bar graph.

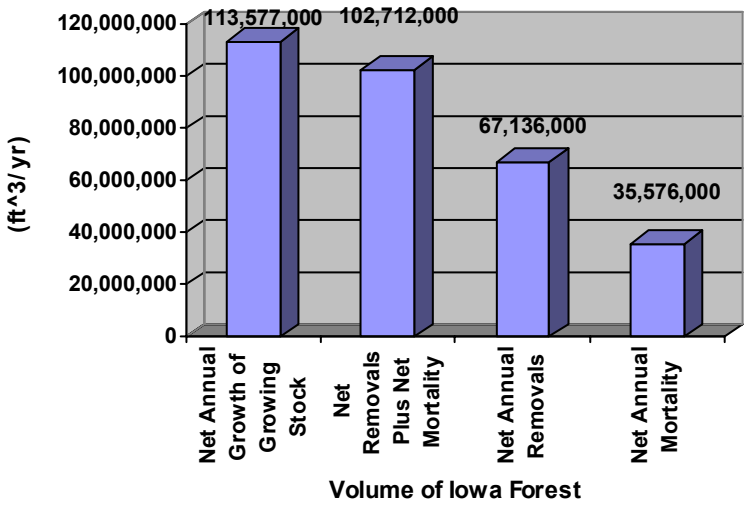


Table 1, based on 2007 FIA data, shows that 24% of our current forests are composed of tree species that are not expected to be long lived. Elm (Dutch elm disease), ash (Emerald Ash Borer), and Scotch pine (Pine Wilt) are all in peril because of insects and diseases that pose serious threats to their survival in the future. What will Iowa's forests look like for the next generation?

Table 1.—Top 10 tree species by statewide volume estimates, Iowa, 2007.

Rank	Species	Volume of live trees on forest land (1,000,000 ft^3)	Sampling error (%)	Change since 2006 (%)	Volume of sawtimber trees on timberland (1,000,000 board feet)	Sampling error (%)	Change since 2006 (%)
1	Silver maple	516.2	20.2	4.3	1017.8	20.1	-7.2
2	Bur oak	434.6	11.7	-6.7	1015.1	14.7	-7.9
3	Cottonwood	372.2	31.5	2.0	1549.5	31.4	0.1
4	White oak	351.0	13.5	-0.9	1179.1	15.2	-1.1
5	Black walnut	266.9	12.5	2.5	912.2	15.1	2.4
6	Northern red oak	257.1	15.3	-1.2	965.3	17.7	-1.6
7	American elm	245.2	8.0	3.8	359.5	15.6	7.4
8	American basswood	193.0	15.6	0.3	634.8	18.5	-3.5
9	Hackberry	186.5	13.1	0.9	485.6	16.2	1.7
10	Shagbark hickory	159.2	12.0	-2.7	410.0	15.4	-6.5
	Other softwood species	44.8	16.3	-5.9	79.4	23.8	-24.7
	Other hardwood species	1217.2	4.8	2.5	2369.1	7.5	0.7
	All species	4243.9	4.5	0.8	10977.6	6.1	-1.8

The Value of Iowa's Forests

Over 186 businesses in Iowa utilize the wood grown in Iowa's forests. The forest products industry contributes over $1.5 billion each year to Iowa's economy, including over 11,000 jobs for Iowans. (US Department of Commerce, Census Bureau, 2002 Economic Census Data)

Many of the finest quality black walnut, oak and maple trees in the world are grown in Iowa. These trees are exported over seas to countries like China, Japan and Germany. Iowa is one of the leading states in the U.S. for the export of veneer walnut.

Emerald Ash Borer Surveillance Effort

The Emerald Ash Borer (EAB) is native to the Orient, and was introduced in the United States near Detroit in the 1990's. On December 1, 2006 a quarantine was placed by USDA-APHIS for the entire states of Illinois, Indiana and Ohio. The lower peninsula of Michigan is under this quarantine, also. The federal order prohibits the interstate movement of ash nursery stock, ash green lumber, and any other materials including logs, stumps, roots, branches, composted and un-composted chips. Due to the difficulty of distinguishing between species of hardwood firewood, all hardwood firewood is included in this quarantine.

Although an infestation has not yet been found in Iowa, EAB has more potential for future harm to Iowa forests and urban communities than any other insect currently being dealt with in the United States. EAB kills all ash species by burrowing under the bark and eating the growth (cambium) layers of the trees. EAB has been found capable of killing every species and size of ash tree in neighborhoods or woodlands. Ash is one of the most abundant native tree species in North America, and has been a preferred and heavily planted landscape tree in yards and other urban areas.

Iowa Emerald Ash Borer Surveillance Effort – 2009

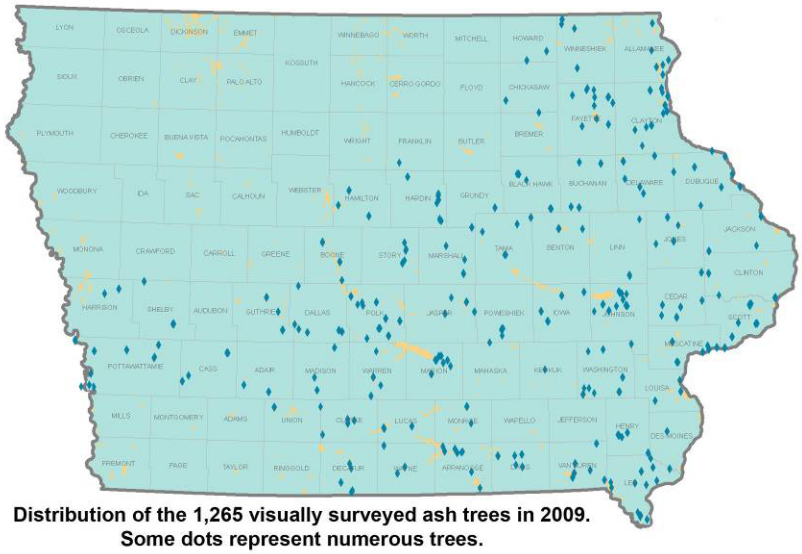
The Iowa Department of Natural Resources (IDNR) Forestry Bureau in cooperation with the Iowa Department of Agriculture (IDALS) State Entomologist Office have been following the United States Department of Agriculture Forest Service (USFS) protocol to monitor Iowa for signs of the emerald ash borer (EAB). The detection of EAB in Victory, WI in spring 2009 places this insect only few miles away from Allamakee County, which is of concern because of it is one of Iowa's heavily forested counties and is essential to our timber industry. The detection of EAB in Peru, IL in July 2007 places this insect only 85 miles away from Davenport, IA, which is of concern because of its proximity to Iowa and Interstate 80 linking the two states. Furthermore, the confirmation of EAB in Missouri in 2008 is of great concern. According to recent sources, Iowa has an estimated 50 million rural ash trees (USFS 2007) and 35 million urban ash trees (USFS 2008).

<u>Visual surveys</u>:

Surveillance efforts have been in place for the past five years in Iowa to look for EAB. For 2004 and 2005, this activity consisted of visual surveys of urban ash trees (towns/cities with a population greater than 1000) in all 99 counties, visual inspection of ash saw logs at 43 sawmills, and ash nursery stock. Visual surveys in 2004 involved 2,078 trees on 252 sites and in 2005 involved 1,318 trees on 238 sites.

During the 2006, 2007, 2008, and 2009 seasons, surveillance strategy shifted to the highest risk areas in the state, campgrounds. Sites were selected based on location near interstate highways, near tourism sites, and/or on the eastern border of Iowa. Up to 10 trees were examined in each campground for signs of EAB. The larger the campground and the greater the ash density, the more ash trees visually examined. In 2006, 417 ash trees were visually examined in 50 state and 10 county campgrounds. In 2007 EAB visual surveillance increased to 400 campgrounds (all federal, all state, all private and large campgrounds in 69 counties) involving 1102 trees. In 2008, 235 campgrounds in 55 counties were identified as high risk sites and 1,269 ash trees were inspected.

2009 Emerald Ash Borer Visual Survey of Parks and Sawmills

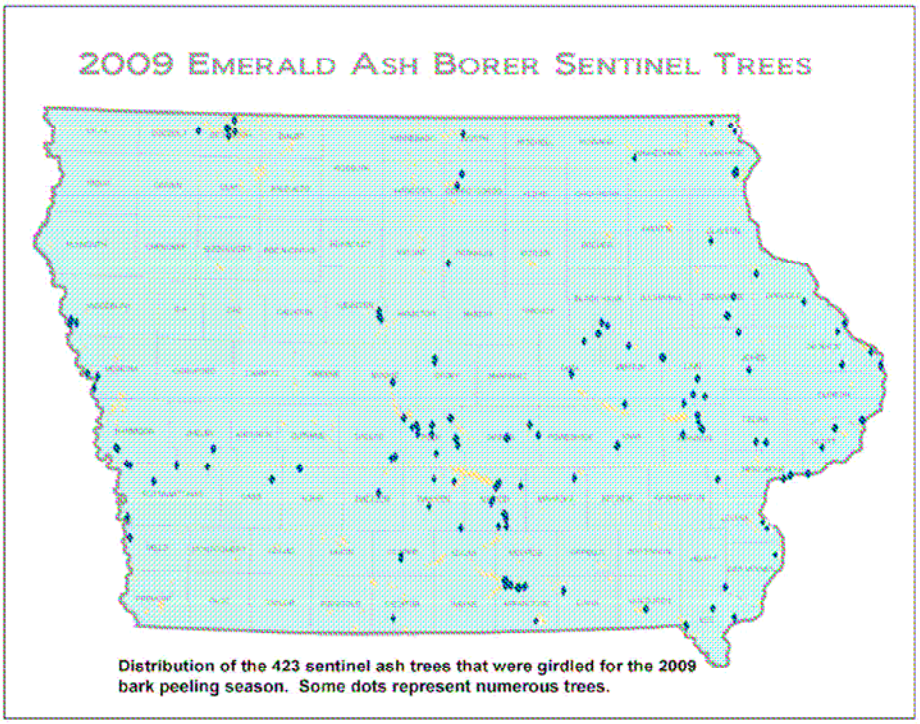


Distribution of the 1,265 visually surveyed ash trees in 2009. Some dots represent numerous trees.

In 2009, 234 campgrounds in 55 counties were identified as high risk sites and 1,265 ash trees were inspected. No evidence of EAB was noted during visual surveillance in Iowa (2004 – 2009).

Sentinel trees:
Sentinel trees in Iowa were created in one of two ways: girdling standing ash trees (4-13 inch DBH) or planting donated containerized ash trees (approximately 3 inch caliper). Sentinel trees were established by June 1 each season. In general, containerized trees were used for private campgrounds or in areas with few ash trees, while standing ash trees were used on federal, state or county properties. A tree was girdled by using a folding hand saw, making two cuts through the bark (4 – 6 inches apart), and then removing the bark with a drawknife between the cuts. Every effort was made to select standing ash either in the open or with exposure on two or three sides; trees were rejected as possible sentinel trees if they were within a forest stand.

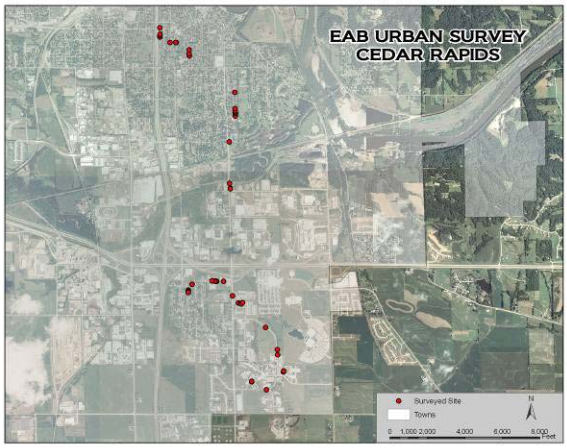
In 2005, **48** sentinel trees (23 standing, 25 container) on 12 sites were also used to monitor for EAB. In 2006, **68** sentinel trees (27 standing, 41 container) were established on 18 sites; 10 were retained for evaluation in 2007. In 2007, **237** sentinel trees (190 standing, 47 container) were established on 57 sites. In 2008, **401** sentinel trees (272 standing, 129 container). In 2009, **423** sentinel trees (294 standing, 129 container). During the fall of each year, sentinel trees were bark peeled on site. New sentinel trees for monitoring the following season were girdled before leaving the site. A single EAB larvae was detected in one sentinel tree in Clayton County in 2008, but no infestations has been identified to date.

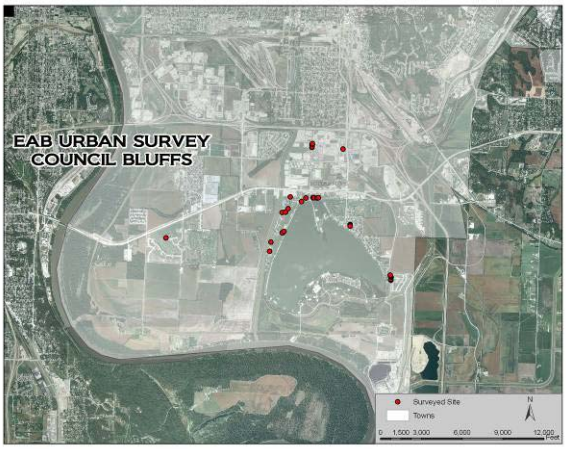


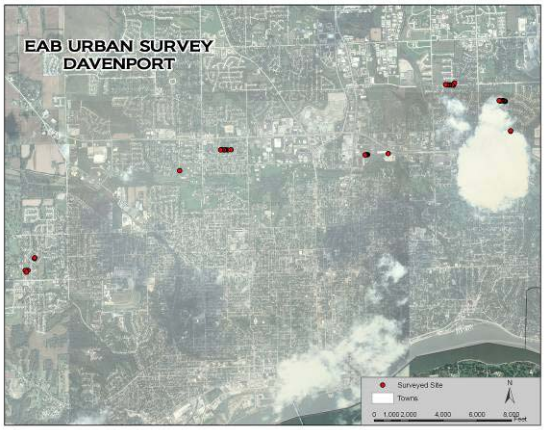
Distribution of the 423 sentinel ash trees that were girdled for the 2009 bark peeling season. Some dots represent numerous trees.

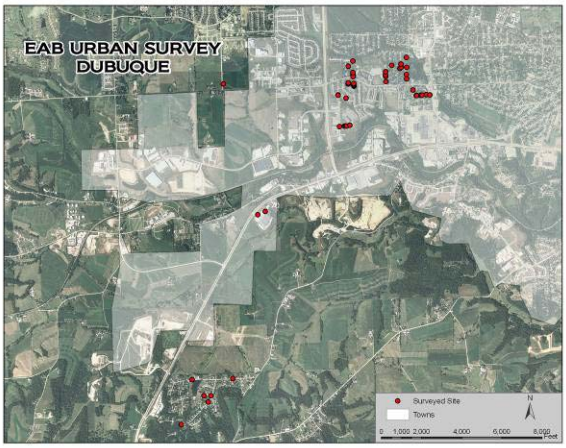
EAB Visual Survey of New Developments:

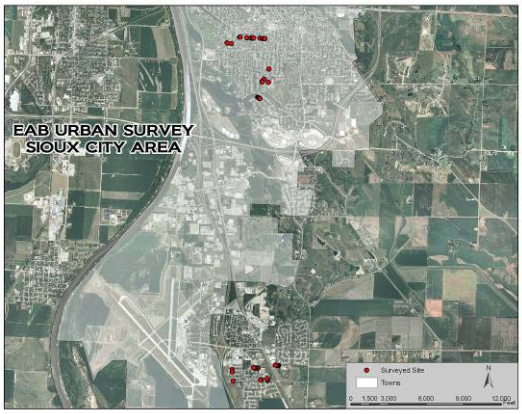
During 2009, additional surveillance efforts shifted to six communities focusing on the new developments since 2002. The theory is that ash trees from East of the Mississippi, in what is now a known EAB quarantined area, may have been planted in these new developments. A total of 274 green ash trees in six new community developments were surveyed for the presence of EAB symptoms. A total of 5 trees were flagged as suspect trees, but all were negative for EAB after the follow-up inspections or removals.

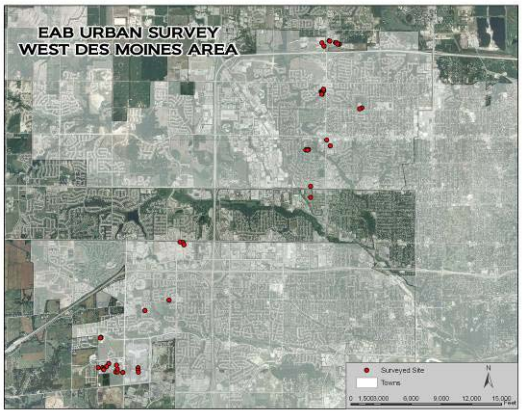








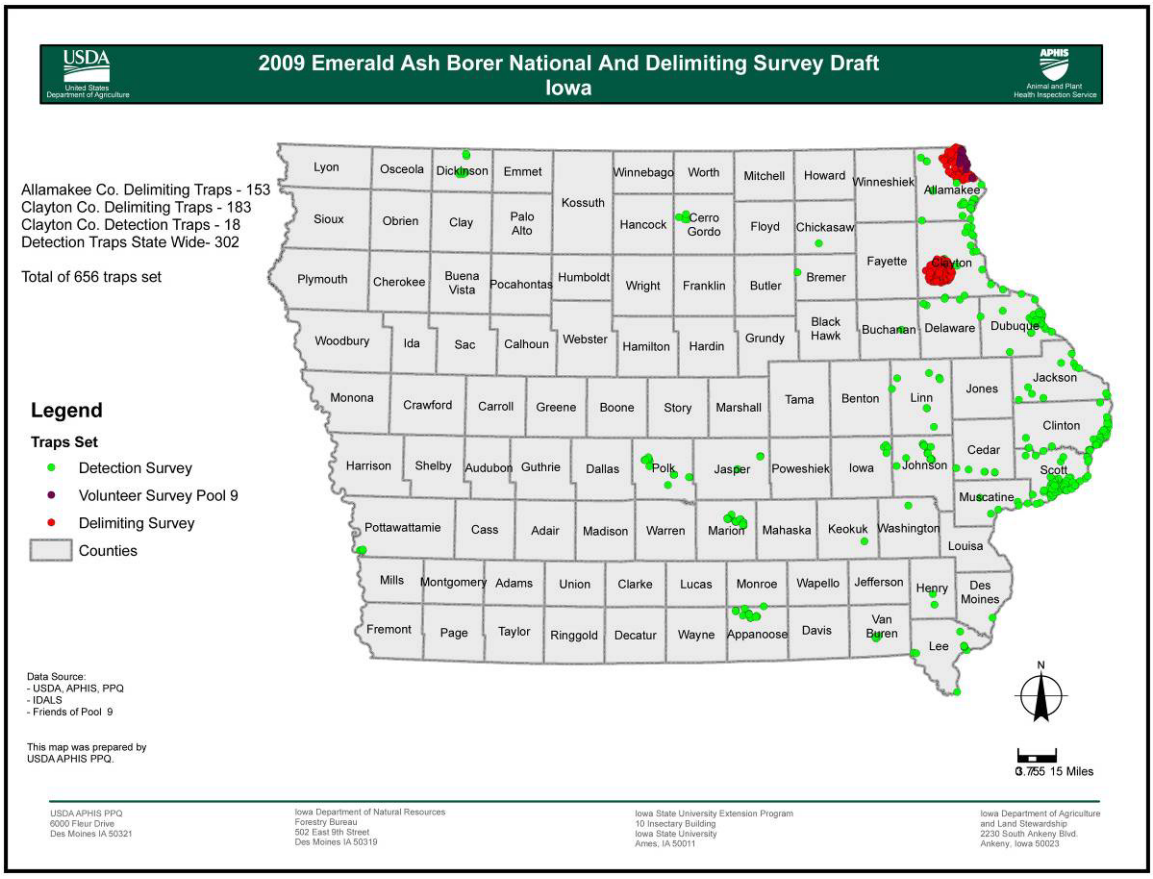




USDA Experimental Traps:

During 2009, 656 purple sticky traps were obtained from USDA for detection efforts in Iowa. Traps were installed in June and a midseason trap check was conducted approximately one month after placement, collecting suspect beetles, recoating panels with Tanglefoot, and reinstalling traps in the canopy. All traps were removed by the end of November 2009, suspect insects collected, and traps were discarded.

EAB was not found on any of the 656 purple traps that were hung in the 2009 trapping season. The above picture is an example of an EAB purple trap in an ash tree.



EAB Outreach:
Educational efforts in Iowa during 2009 included the following:

- EAB posters, wallet size ID cards and fact sheets (USFS Pest Alert and USDA APHIS Green Menace) were provided to all EAB sentinel tree sites, Department of Transportation Rest Areas, sawmills, and campgrounds that were visually monitored.
- During visual survey work and sentinel tree establishment, collaborators and contractors visited with park rangers/facility managers about EAB, either updating them on this pest or providing initial education on identification, importance, firewood transport, and contact information. EAB information was provided.
- Presentations were made by collaborators to many audiences, including the U.S. Army Corps of Engineers Foresters, ISUE county meetings, Cooperative Weed Management Associations, Iowa Arborist Association, Iowa Turfgrass, Iowa Association of Municipal Utilities, and the Iowa League of Cities.
- EAB information was distributed at the Iowa State Fair.
- ISUE has a Web page dedicated to providing information to Iowa citizens on EAB. Items on this site include EAB Readiness Plan, Upcoming Training Sessions, PowerPoint slide presentations with scripts, and links to the national EAB Web site. The URL for this site is: http://www.extension.iastate.edu/pme/home/pests/EAB.php
- Billboards with the message of do not bring out of state firewood to Iowa were rented. A single page fact sheet outlining the problems associated with bringing firewood to Iowa from out of state was placed in every out-of-state license application that was mailed (47,000 out of state hunters in Iowa annually).
- On-line registration for state parks included a message about not bringing firewood into Iowa if visiting from out of state.
- Blaze Orange signs asking campers to “Declare out of State Firewood” was placed in high risk DNR campgrounds.
- IDNR sent out regular press releases informing Iowa citizens about the EAB and the trapping methods being used.
- IDNR created the comprehensive EAB Toolkit to provide information to Iowa citizens and municipalities to help prepare the EAB arrival. http://www.iowadnr.gov/forestry/eab/index.html

A map showing the current known locations of EAB in the United States can be viewed in Map 1 in Appendix A. Also in Appendix A, Map 2 shows the distribution of ash across the United States that is at risk to this exotic insect.

For more information on the most current status of the EAB log onto www.emeraldashborer.info .

Juniper Decline in 2009:

Iowa DNR started receiving reports of Eastern Red Cedar and white cedar (arborvitae) declining statewide in late April. The symptomatic trees started out healthy, turned a pale green color, and completely browned by the second week in May (about a two week time period). Hundreds of calls and samples were submitted to the Iowa DNR since the original reports in May, and the decline continued to spread within the state.

Several fungal infections were identified on the declining trees including: Pestalotia twig blight (*Pestalotiopsis* spp.), Berckmann's blight (*Seimatosporium berckmanssii*), Phomopsis twig blight (*Phomopsis juniperovora*), and Kabatina blight (*Kabatina juniperi*). These fungal blights were identified on the branchlets and foliage, but not on the established twigs. In addition, twelve of the 173 trees that were destructively sampled had Annosum root rot (*Heterobasidion annosum).*

The abrupt mortality, widespread distribution of the mortality throughout the state, and the fact that the declining trees did not have one pathogen uniformly found on the declining trees lead us to believe that other factors could be involved. Many of the destructively sampled trees had evidence of bark beetle activity. Typically we think of the bark beetles as a secondary pest on junipers. However, the dead and dying junipers we found was sporadic and sometimes only a few trees were affected in a windbreak planting. All of the affected trees examined did have some limited bark beetle activity, but IDNR does not feel that bark beetles were the cause at this time. The roots and other plant tissues were sampled for signs of nematodes. Nematodes have <u>not</u> been identified at this time.

The current management recommendation is to remove the dead and dying junipers and destroy the plant. Iowa DNR will continue to follow the problem, keeping in mind that the mortality could be a result of the unusually cool moist spring and early summer. If no other damaging agents are determined, the mortality may be a result of the various fungal diseases thriving during this cool moist spring.

Gypsy Moth Survey

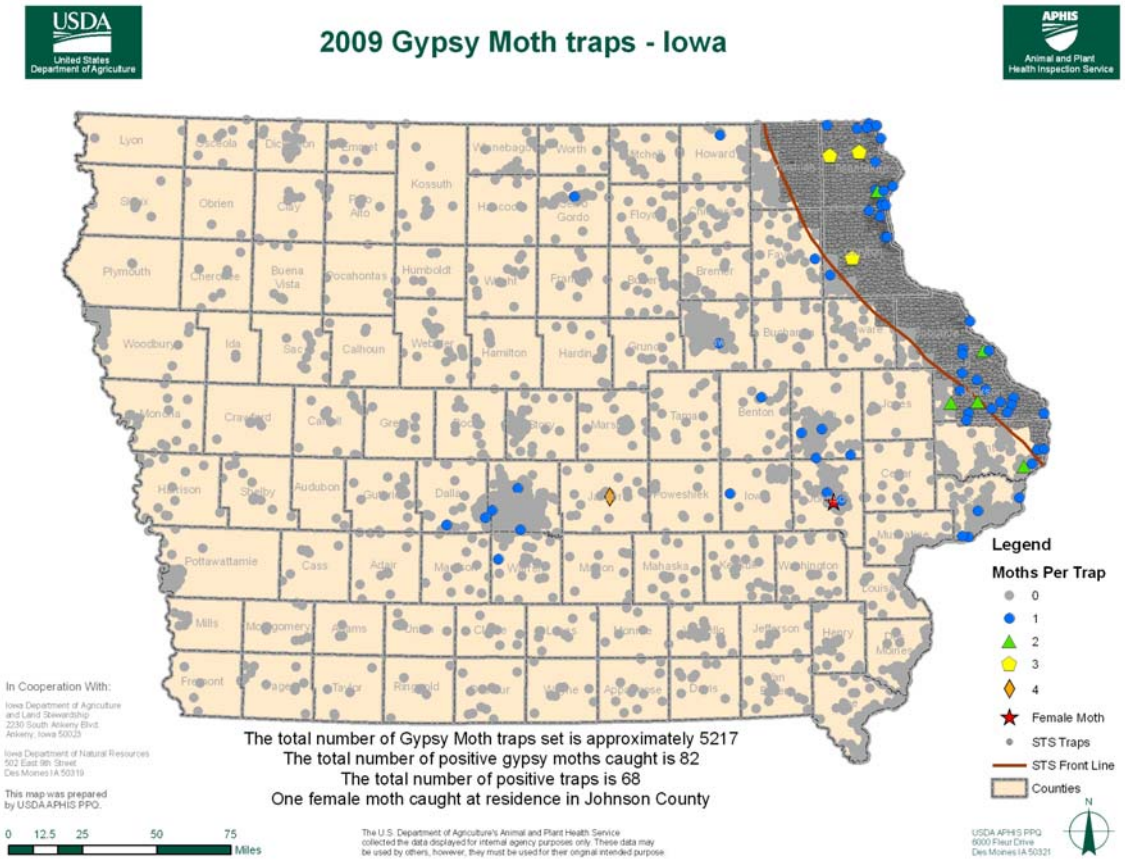
Gypsy Moth is a European insect species introduced into New England over 100 years ago as an experiment to help provide silk for the textile industry. This exotic insect continues to spread west from that introduction site and defoliate native forests wherever they become established. Establishment of gypsy moth in Iowa will affect the survival of our mature and oldest trees the most. The larvae of this insect will feed on the leaves of its over 300 host species during the summer removing a trees ability to create food with its leaves. It is repeated defoliation that occurs several years in a row on the same trees that will deplete the stored reservoirs of nutrients the tree has, thus leading to the decline of that tree.

Gypsy Moth has established itself in eastern Wisconsin now, and is just beginning to move towards northeast Iowa. Through Iowa's trapping program and follow up treatments, Gypsy Moth has been kept from becoming established in Iowa, but there are now 5 counties (Allamakee, Clayton, Dubuque, Jackson, Clinton) within 60 miles of the gypsy moth establishment boundary line. Furthermore, Wisconsin is reporting that the gypsy moth population is building in neighboring Adams, Columbia, Dane, Marathon and Sauk counties.

The 2008 summer season provided the largest catch of male gypsy moths in state history. There were 626 moths caught in 495 traps throughout the state, but most catches were made in NE IA, the area closest to the established population in WI. Many traps this year had multiple moths in them compared to previous years.

The 2009 summer season caught far fewer male gypsy moths in the state. A total of 82 male moths were captured in 68 traps. Because no egg masses have been found there are no treatments planned in Iowa for 2010. There will be additional traps placed around the positive catches for 2010.

Weather patterns along with an introduced fungus disease for gypsy moth called *entomophaga maimaiga* and a federal program called "Slow the Spread" (STS) have combined to slow the spread of gypsy moth into Iowa. Budget cuts to the 2009 STS budget reduced treatments that were needed, however many treatments were completed along the Iowa border in Wisconsin, Illinois, and Minnesota. These treatments, in combination with the cool moist spring, likely contributed to the reduced moth capture. Potential budget cuts to the 2010 STS treatment blocks may increase the spread of this insect across Iowa faster than historical rates. For more information about the STS program visit their website at: http://www.gmsts.org/



A history of the number of gypsy moth catches and the number of acres treated for gypsy moth eradication in Iowa between1970-2009 can be viewed in Table 1 of Appendix B. For more background information and the latest national maps for the movement of gypsy moth visit www.aphis.usda.gov/ppq/ispm/gm/.

Background Information

The Iowa Department of Agriculture and Land Stewardship (IDALS) in cooperation with USDA-APHIS-PPQ have conducted an annual male moth detection trapping program since the 1960's. In 2001 the Iowa Department of Natural Resources (IADNR) Forestry Bureau became involved with the gypsy moth trapping program because of budget cuts to the IDALS gypsy moth detection program. Forestry believes this is an important issue for Iowa's forest resource and has since provided labor in the form of its district foresters and contractors to help with the surveying of the 99 counties in Iowa.

Eradication Efforts

Eradication prevents establishment of the gypsy moth in new areas by eliminating isolated populations. Indications of isolated populations include: 1.)

male moths caught in pheromone traps; or 2.) the presence of other moth life stages.

Eradication programs, utilizing insecticide spraying of a *Bacillus thuringiensis* (Bt) var. *kurstaki* are implemented by IDALS and USDA-APHIS-PPQ to eliminate the gypsy moth populations in Iowa. Bt is a pesticide derived from a bacterial toxin that affects only certain butterfly and moth larvae. A history of acreage treated with Bt since 1972 to eradicate gypsy moth is also shown in Table 1 in Appendix C.

IDALS in cooperation with IADNR and USDA Forest Service have conducted extensive professional and general public education efforts. These efforts have ranged from the publication of gypsy moth brochures and identification cards, to formal training programs for professional nursery, arborists and foresters, and workshops for the general public and volunteers.

Current

The gypsy moth trap locations in 2009 were focused within cities, campgrounds, and around nursery operations. Along the Mississippi a trap was placed every 1500 meters to form a line of detection along Iowa's eastern border. Nine of our largest cities were also put on a 1500 meter grid.

In 2009 the following agencies were involved with gypsy moth trapping:

Agency	Employees	Traps
IDALS	4	192
PPQ	4	1539
Contractors	8	2499
IA DNR	7	987
Total	23 Employees	5217 traps

DNR hired seven contractors that were paid by the number of traps they set-up ($10/ trap) and took down ($10/ trap). If 95% of the traps were placed in the correct locations the contractor was rewarded an additional $5/ trap. This gave the contractors an incentive to do the work properly, yet gave them the flexibility to do the work on their own schedule. This is the first year that DNR paid a flat fee for trapping (higher than in 2008), and did not reimburse mileage.

This will be the second year that Iowa will be working with the USDA Slow the Spread Foundation to start trapping in Allamakee, Winneshiek, Fayette, Clayton, Delaware, Dubuque, Jackson, and Clinton Counties. Using the STS calculations, 2,566 traps will be setup in those counties alone while maintain approximately 4,000 traps outside the STS zone. With in the STS zone in Iowa, five areas were identified to start some delimit trapping.

Gypsy Moth
Slow the Spread
Foundation, Inc.

The Threat :

Gypsy moth is a destructive, exotic forest pest that was accidentally introduced into the United States in 1869. It is currently established throughout the northeast and parts of the upper mid-west (red shaded area on maps).

- It feeds on over 300 species of trees but oaks are most preferred.
- 75 million acres have been defoliated by gypsy moth since 1970.
- Gypsy moth defoliation causes extensive tree mortality, reduces property values, adversely affects commerce and causes allergic reactions in sensitive individuals that come in contact with the caterpillars.
- Most (almost 70%) of the susceptible hardwood forests in the United States have not been infested by gypsy moth and are still at risk.

The Current Proactive Strategy

Since Congress funded the Slow the Spread Program (STS) in the year 2000, ten states located along the leading edge of gypsy moth populations, in cooperation with the USDA Forest Service, have implemented a region-wide strategy to minimize the rate at which gypsy moth spreads into uninfested areas. As a direct result of this program, spread has been dramatically reduced by more than 70% from the historical level of 13 miles per year to 3 miles per year. In just 6 years, this program has prevented the impacts that would have occurred on more than 40 million newly infested acres.

The Benefits

- STS reduces spread of this destructive pest to 3 miles per year, which will prevent infestation of more than 150 million acres over the next 20 years (compare maps).
- STS protects the extensive urban and wildland hardwood forests in the south and upper mid-west.
- STS protects the environment through the use of gypsy moth specific treatment tactics.
- STS unifies the partners and promotes a well coordinated, region-wide action based on biological need.
- STS yields a benefit to cost ratio of more than 4 to 1 by delaying the onset of impacts that occur as gypsy moth invades new areas.

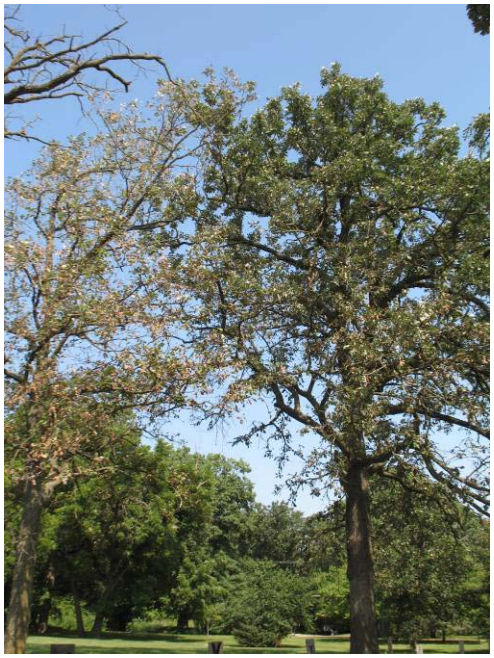
Bur Oak Blight (Tubakia species)

This disease has been found on bur oak trees over the past 4 years in Iowa. It shows up in late July or August showing discolored leaves especially along the interveinal tissue. It was reported by homeowners throughout Western and Central Iowa and seems to become less numerous as you go east across Iowa.

In an effort to better understand the impact this disease is having on bur oaks each year, permanent monitoring plots were established in 2007 at Loess Hills State Forest, Gull Point State Park and Thomas Mitchell Park in Polk county. Trees were mapped, rated for severity of infection, digital pictures were taken showing the condition of each tree and notes were taken about the presence of new leaves flushing as a result of this infection. Leaves are collected from each tree that was documented and bagged separately for the ISU Plant Insect Lab to diagnose what was causing the leaf discoloration. All the samples tested positive for Tubakia and negative for bacterial leaf scorch. In 2009, the name Bur Oak Blight has been associated with this species of Tubakia, which is causing mortality after 3-5 years of infections.

Pictured below are sample leaves with typical signs of tubakia on a bur oak leaf.

Pictured below are trees with typical signs of tubakia on them. Notice a dead tree to the left, an infected tree in the middle and a healthy bur oak tree to the right.



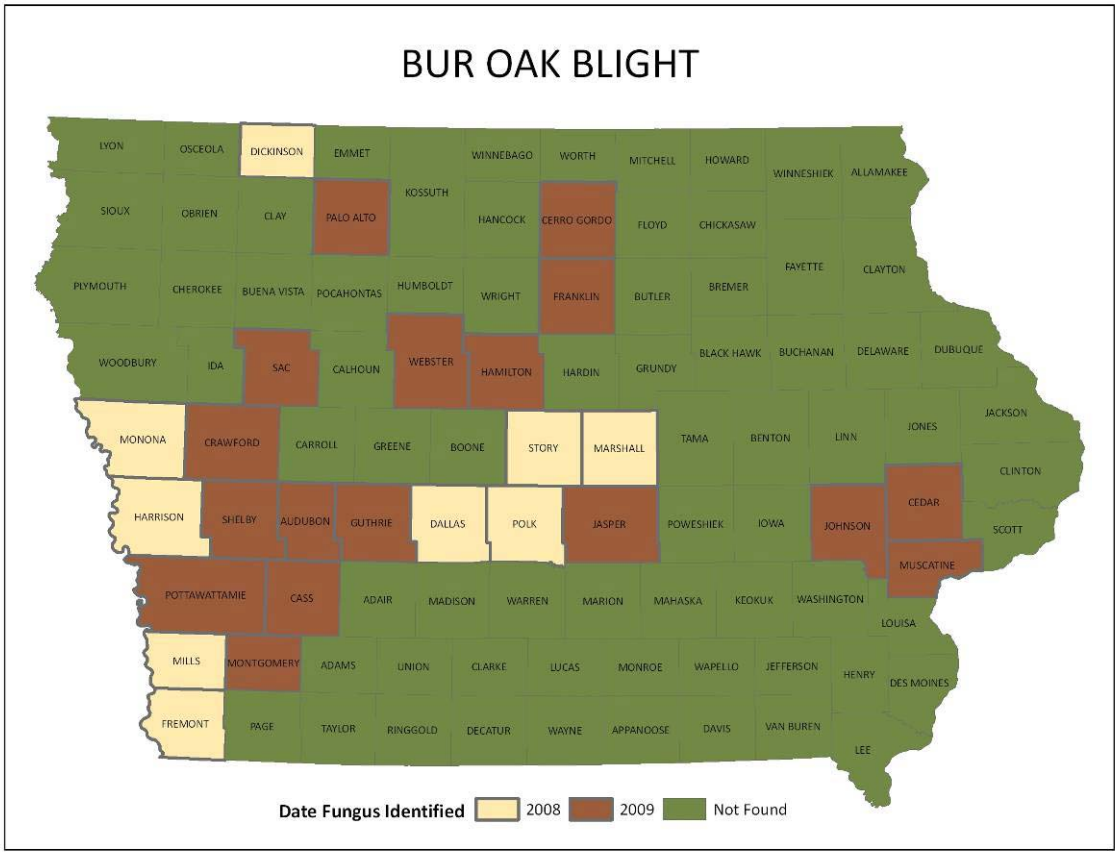
Pictured below is a bur oak tree that is re-leafing in August at Gull Point State Park. The concern about these trees using stored starch reserves at the end of the growing season is a concern to foresters because of how this will affect the health of that tree.

During the 2009 season, samples from around the state were sent to Dr. Tom Harrington at Iowa State University for genetic analysis. Here are his findings to date: Based on DNA sequence analyses and morphology of cultures, the Tubakia species that is consistently associated with blighted bur oak trees in Iowa is distinct from two other species we have found: a common leaf-spot fungus on red oak and another leaf-spot fungus found on an ornamental white oak on the ISU campus. The red oak fungus is probably the commonly reported Tubakia leaf spot fungus in eastern North America. We found the red oak

Tubakia on a single bur oak tree, though this tree was not seriously affected, and leaves on only a few twigs were symptomatic.

The Tubakia species associated with bur oak blight apparently moves into twigs and branches as an endophyte and can probably overwinter in the host in this manner. This might explain how the leaf symptoms tend to be uniform across affected branches and often uniform throughout the entire crown in the most seriously affected trees. Trees seriously affected one year tend to be severely affected the next year, and leaves of affected trees may be colonized by the fungus even before leaf symptoms appear in late July.

The Tubakia causing blight on bur oak was confirmed on post oak in Missouri (Tom Harington, 2009). Further research is needed to understand this fungal blight.



Sudden Oak Death

Phytophthora ramorum is the cause of the disease known as sudden oak death (SOD), ramorum leaf blight, and ramorum dieback. It is a non-native disease that was discovered in California in 2000. This pathogen has the potential to infect oaks and other trees and shrubs. For the latest information and a background of host species for this disease, visit www.suddenoakdeath.org.

The reason Iowa is monitoring for *Phytophthora ramorum* is because it is a quarantine pest and it may have been inadvertently introduced to all states outside the regulated areas of CA and OR on infested nursery stock in 2003-04 and again in separate incidents in 2004-05.

The Iowa Department of Natural Resources (IDNR) did not survey for this in 2008 because there have not been any positive finds in the Midwest. Map 1 in Appendix C shows all the sites surveyed for this disease in Iowa from 2003-2005.

Plant disease personnel are still studying whether this disease could exist on oak in Iowa and be able to withstand the winters. Iowa is not in the lowest risk category for this disease to become established, but is one level higher.

Tatters Study in Iowa

Leaf tatters affects the leaves of trees causing them to look deformed or "tattered". It causes newly emerged leaves to have reduced interveinal leaf tissue as the leaves grow larger. Tatters was first reported in Iowa, Indiana, and Ohio in the 1980's and more recently in Wisconsin and Minnesota. Tatters has been reported on trees of all ages in rural and urban environments.

Not all trees become tattered because the leaves have to be exposed to the correct conditions after the leaves have emerged from their buds. The beginning stage of tatters is a curling of the young succulent white oak.

Foresters have not found insects or diseases when reviewing the damage caused by tatters. Current belief for the cause of tatters centers on environmental conditions that are causing farm chemicals to be moved off site and onto the leaves of trees.

A study done in a lab at the University of Illinois in 2004 - 2006 has reproduced the same damage that tatters causes to oak leaves by directly applying a chemical called acetochlor at 1/100 rate during the leaf emergence phase on white and red oak trees. For a complete report on what the Illinois study has found visit their web site: http://www.nres.uiuc.edu/research/herbicide_research/index.htm

Here in Iowa, IDNR and the U of I Hygiene laboratory decided to collect 14 air, 12 rain water, and 15 oak leaves during a six week period of time to see how the

levels of acetochlor varied in relation to the tatters event that was happening. Two urban sites were set-up with these collection stations. The Forestry Bureau has not yet received the results of the study.

In addition, in 2008 the IDNR and ISU started a cooperative effort to help determine what chemicals could be causing oak tatters in Iowa. A total of 720 white oak seedlings were planted to be treated with six different treatments. The trees were treated with Acetachlor (300g {1/10 application rate}, 30g {1/100 application rate }, and 3g {1/1000 application rate}), Chlorine (5 ppm), 2-4D, and water. There were 120 trees in each treatment.

As expected the control, water, did not have any visual effects. Chlorine did caused the leaves to purple for about two weeks before starting to green up again. Then 2-4D completely killed the leaf material on the trees that were treated at bud break, and discolored and cupped the leaves that were expanding. The trees treated with 2-4D started to reflush with new growth within one month. The new growth did not show any signs of damage from the 2-4D. Acetachlor caused tatters at all levels. The 1/1000 application rate had minimal tattering on the leaves that were expanded, but did cause tattering on the trees that were just breaking bud.

Tatters from 1/10th application rate Acetachlor.

Tatters from 1/10th Acetachlor application rate at bud break.

Tatters from 1/10th Acetachlor application rate, leaf tissue separating out and gone within two weeks of treatment.


Cupping and discoloration of leaves prior to tattering treated with Acetachlor rate of 1/100th. Leaves treated at bud break.

Purpling from chlorine treatment.

Cupping from 2-4D treatments.

The same greenhouse treatments continued in 2009 and into 2010 in attempts to quantify the damage done to the white oak trees looking at leaf and root mass, starch levels, and photosynthetic rates. More details are expected in the 2010 Forest Health Report.

Pine Shoot Beetle

The pine shoot beetle (*Tomicus piniperda* L.) is an introduced pest of pines. It was first discovered in the US at a Christmas tree farm near Cleveland, Ohio, in July 1992. A native of Europe, the beetle attacks new shoots of pine trees, stunting the growth of the trees. The pine shoot beetle may also attack stressed pine trees by breeding under the bark at the base of the trees. The beetles can cause severe decline in the health of the trees, and in some cases, kill the trees when high populations exist.

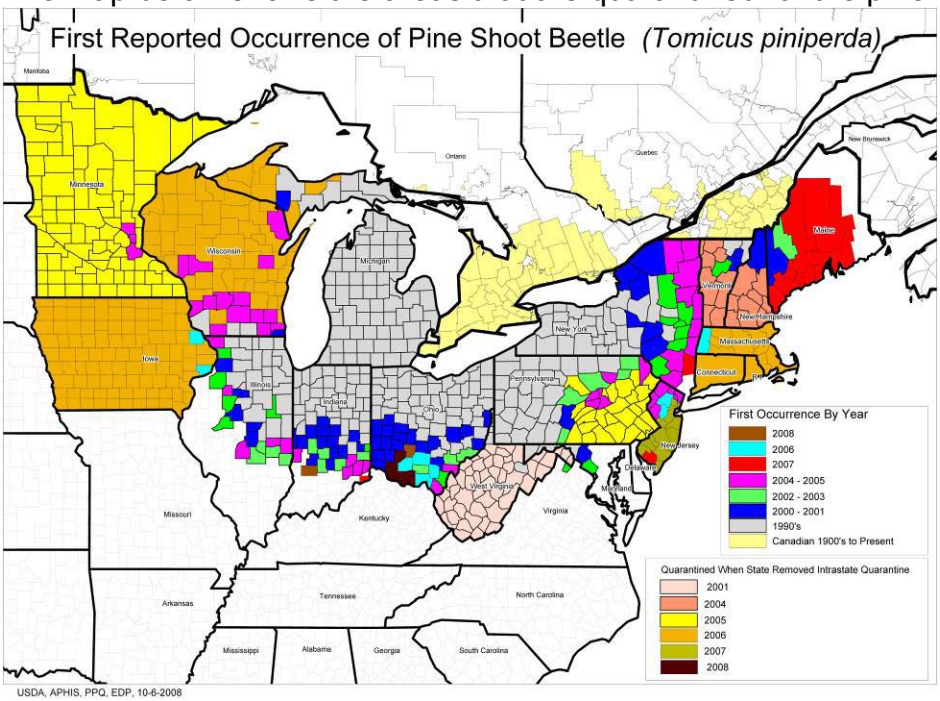
In May, 2006, USDA-APHIS-PPQ confirmed the presence of pine shoot beetle (PSB) in Dubuque and Scott counties. A Federal Order was issued effective June 22, 2006 placing Dubuque and Scott counties under a Federal quarantine for interstate movement of PSB regulated articles. Iowa Department of Agriculture and Land Stewardship (IDALS) was provided a copy of the Federal Order as well as additional information concerning the pine shoot beetle, and was requested to consider placing a state PSB quarantine for intrastate movement of PSB regulated articles from Dubuque and Scott Counties. However, after considerable review, IDALS declined to implement an intra-state quarantine for PSB. Therefore, a Federal Order was issued effective September 18, 2006 for quarantine of the entire state of Iowa for PSB, *Tomicus* piniperda.

The quarantine affects the following pine products, called "regulated articles":

- Pine nursery stock
- Pine Christmas trees
- Wreaths and garlands
- Pine logs/lumber (with bark attached)

All pine nursery stock shipped from Iowa to a non-regulated state must be inspected and certified free from PSB. This inspection and certification must occur just before shipping. Small pine seedlings (less than 36 inches tall, and 1 inch in diameter) and greenhouse grown pines require a general inspection of the whole shipment. All other (larger) pine nursery stock shipments must have 100% tip-by-tip inspection.

The map below shows the areas that are quarantined for the pine shoot beetle.



As a result of this quarantine there are restrictions on nursery stock producers and Christmas tree growers.

Nursery Growers

- Pine nursery stock and other pine regulated articles produced in Iowa, and other PSB-quarantined areas can move freely among the quarantine areas, barring other state-required phytosanitary and plant pest regulations.
- Pine nursery stock (and other regulated articles) growers AND distributors wishing to ship regulated articles outside of Iowa must contact USDA, APHIS, PPQ, Des Moines, 515-285-7044, as soon as possible to make arrangements for inspections, and possibly enactment of compliance agreements, to ensure that seamless shipping activities can occur this shipping season.
- Pine nursery stock and other regulated articles produced outside the quarantine area, moved into Iowa and then out to a non-quarantined final destination, are also subject to quarantined requirements, as if they had originated from a quarantined area.

Christmas Tree Growers

- Christmas trees, wreaths, garlands and other pine regulated articles produced in Iowa, and other PSB-quarantined areas can move freely among the quarantine areas, barring other state-required phytosanitary and plant pest regulations.
- Growers of Christmas trees and other regulated articles AND distributors wishing to ship regulated articles outside of Iowa must contact USDA, APHIS, PPQ, Des Moines, 515-285-7044, as soon as possible to make arrangements for inspections, and possibly enactment of compliance agreements, to ensure that seamless shipping activities can occur this shipping season.
- Christmas trees, wreaths, garlands and other pine regulated articles produced outside the quarantine area, moved into Iowa and then out to a non-quarantined final destination, are also subject to quarantined requirements, as if they had originated from a quarantined area.

For more information on the biology of PSB, a description of the insect, and symptoms on trees, review this website at: http://www.aphis.usda.gov/ppq/ispm/psb/

If you suspect that you have PSB, you may collect a sample and send it to USDA, APHIS, PPQ, 6000 Fleur Dr., Des Moines, IA 50321, or contact USDA-APHIS-PPQ at 515-285-7044. If you think that you will be shipping out of the quarantine area, contact USDA-APHIS-PPQ at 515-285-7044 to set up an appointment to have your facility inspected for PSB.

PSB has only been detected in Scott and Dubuque Counties, however the whole state is under federal quarantine, in response to the decision made by the State of Iowa Department of Agriculture that an intrastate quarantine will not be implemented. Without an intrastate quarantine, USDA must assume that PSB is

spreading to other Iowa counties and thus place a quarantine on the entire state, which restricts the movement of all regulated articles such as Pine nursery stock, Pine Christmas trees, Wreaths and garlands, Pine logs/lumber (with bark attached) into non regulated areas.
Additional information on the pine shoot beetle, such as background information, biology, regulations, fact sheets, federal orders, quarantine maps, etc.

USDA's main website for Pine shoot beetle is:
http://www.aphis.usda.gov/ppq/ispm/psb/
Fact Sheet
http://www.aphis.usda.gov/lpa/pubs/fsheet_faq_notice/fs_phpsb.html
Federal Order for Iowa
http://www.aphis.usda.gov/ppq/ispm/psb/regs.html
Federal Regulations for PSB
http://www.aphis.usda.gov/ppq/ispm/psb/psbcfr06.txt
PSB Quarantine Map
http://www.aphis.usda.gov/ppq/maps/psbquarantine.pdf

Hickory Decline and Mortality

Jennifer Juzwik, Northern Research Station
October 28, 2009

Dead and dying bitternut hickory in Carley State Park, Minnesota, August 2006.

Hickory Decline Field Survey
Fungal isolates obtained from cankered stems of bitternut hickory trees sampled during 2008 survey were identified. All *Ceratocystis* isolates obtained in 2007 and 2008 surveys were found to be *C. smalleyi* based on morphological characteristics and DNA sequences (ITS and tef gene regions). All *Fusarium* isolates obtained were identified as *F. solani*, though two types were found (black walnut canker and birch bark types) based on DNA sequences (tef gene region). *C. smalleyi*, *F. solani* and *Phomposis* sp. isolates obtained during the survey were summarized by state on a poster (separate attachment) presented at the 2009 meeting of the American Phytopathological Society. These findings represent the first report of *C. smalleyi* and associated cankers in IN, MN, NY and OH. Two additional field evaluations (transect surveys) were completed in Iowa and Wisconsin in July 2009. Disease incidence and severity data were collected.

Monitoring Crown Decline Progression an d Tree Mortality
Multiple year monitoring plots were established in two eastern Wisconsin locations during summer 2009. Six to eight, apparently healthy bitternut hickories were selected for each plot. The plots are adjacent to areas of stands with advanced hickory decline and mortality. Data on tree size, tree crown condition, stem damage present, and other stand information were collected for each plot in August 2009. Plots will be visited two times per growing season during the next 3 years in order to assess the rate at which hickories become affected and decline progresses within individual trees and whether mortality results.

Role of *Ceratocystis smalleyi* in Hickory Decline

Pathogenicity studies. We fulfilled Koch's Postulates demonstrating that *C. smalleyi* is the cause of diffuse cankers with reddish inner bark and sapwood on pole-timber size bitternut hickory. Ji-Hyun Park, Ph.D. student working on the project, is currently preparing a Disease Note for publication on this work.

Effect of multiple *C. smalleyi* infections on tree health. Evaluations were made of pole-timber size bitternut hickory inoculated in July 2008 at 5 and 50 points on the main stem with ascospores of *C. smalleyi*. The objective was to determine the relationship between Ceratocystis cankers and crown decline. No evidence of crown decline was observed 14 months later; however, elongate diffuse cankers with reddish inner bark and outer sapwood were common (Figure 1). Effect of the 50 point inoculations on sap flow in the treated trees compared to water inoculated and negative control trees was the subject of 2 week field monitoring efforts in mid-September. Data are currently being summarized and analyzed.

Host resistance response to *C. smalleyi* infection. An ongoing anatomical study is examining vessel occlusion by metabolic substances and occurrence of tyloses in response to fungus infection. Presence of the fungus in the sapwood associated with the infection sites has been documented.

Association between hickory bark beetle attacks and bark/sapwood cankers. Frequency of hickory bark beetle (*Scolytus quadrispinosus*) attack, life stages present, egg niche and larval gallery presence, and occurrence of associated lesions or cankers were documented for three pole-timber size bitternut hickory exhibiting 55 to 70% crown decline symptoms (Figure 2). Data were recorded for each variable for 1 m long stem sections from the tree base to tree top (stem diameter > 7 cm). Larval galleries were not found to coalesce. Hickory bark beetle attacks, ranging from aborted to full gallery establishment, numbered between 700 and 1400 per tree. Hundreds of stem lesions were found (commonly associated with the beetle attacks) and the margins of the lesions extended beyond any larval galleries present.

C. smalleyi – S. quadrispinosus relationship. Bark beetles were emerged from stem sections obtained from declining bitternut hickory in late spring 2009. Of 150 groups of beetles (3 per group) from May collected logs, *C. smalleyi* was found for only one based on serial dilution plating of aqueous suspensions resulting from vigorous agitation of beetles in 1.0 ml sterile distilled water. *F. solani* was found more frequently and *Penicillium*-like colonies were even more common. Assay of beetles emerged from June collected logs is underway. Bark beetles attacking stems of declining bitternut hickory were collected from three locations in late August and early September 2009 (Figure 3). Similar assays are being conducted with these specimens. Thus far, we have been successful in obtaining *C. smalleyi* from the collected attacking beetles (2 of 19 from southeastern MN location; 12 of 14 from a location east of Wausau, WI).

Conclusions to Date

Of the three most commonly observed scenarios associated with hickory decline/dieback and mortality of hickory, the relatively rapid crown decline associated with *S. quadrispinosus* and diffuse stem cankers was most prevalent based on field surveys conducted in six states. Coalescing larval galleries is not what is killing the affected hickory. Rather, it appears that either the coalescing of hundreds of stem lesions or cankers associated with beetle attacks is the cause. Preliminary results show *C. smalleyi* and *F. solani* are causes of these cankers. Other, as yet undetected, fungi may be involved. Further work is underway to test this hypothesis. However, control of hickory bark beetle is the key to managing hickory decline. Survey data suggests that reducing density of bitternut hickory in a stand may greatly reduce tree decline and mortality during bark beetle outbreaks. Sanitation is also recommended, but is difficult for landowners to accomplish.

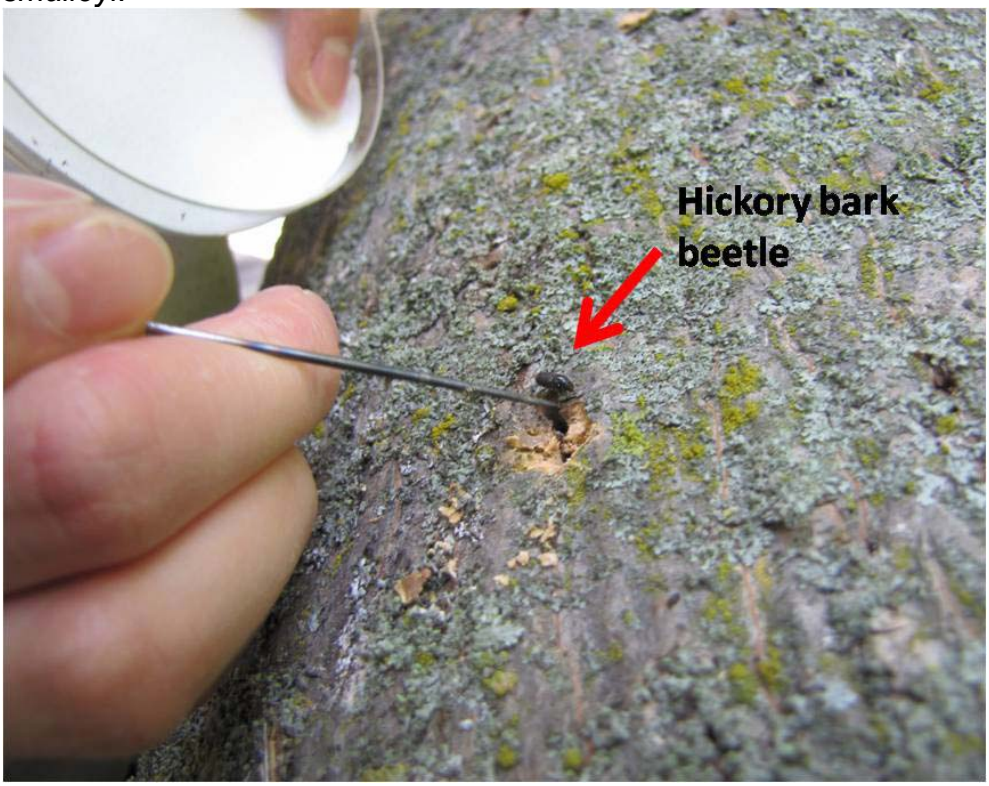
Future Work

We will be formulating work plans for the 2010 field season once we have processed all samples and summarized data from the 2009 field work. Planning will likely begin in February 2010.

The picture below details an elongate, diffuse cankers with reddish inner phloem and outer sapwood resulted from inoculation of bitternut hickory with *Ceratocystis smalleyi*. This evaluation was completed 14 months after inoculation.

Bark and sapwood lesions were commonly associated with hickory bark beetle attacks.

Hickory bark beetles attacking bitternut hickory in late August and early September 2009 were collected and assayed for presence of *Ceratocystis smalleyi*.



INVASIVE PLANT SPECIES

Invasive species are plants that are non-native to an ecosystem and cause or are likely to cause economic or environmental harm to humans, crops, livestock or natural plant and animal communities. Some examples of non-native species found to be a problem in Iowa forests are buckthorn, garlic mustard, honeysuckle and multifora rose. These invasive and exotic plants are out competing native forest species, diminishing fisheries and wildlife habitat, reducing water quality, reducing economic returns from forest management and tourism, and threaten long term forest sustainability and bio-diversity. In 2009, Oriental Bittersweet was identified as upcoming threat to Iowa's Forest Health. Information on Oriental Bittersweet, a list of invasive plants known to exist in Iowa, and an invasive species risk map is provided in a table located in Appendix D.

A website facilitating the training and participation of volunteers, public educational and outreach efforts, for the entry and management of volunteer generated data for Iowa have been created. The website is http://www.nrem.iastate.edu/Invasive_Species/Invasives.html.

The Forestry Bureau is committed to developing better awareness about invasive species and their presence on both public and private lands. The Forestry Bureau works with MIPN, a regional group consisting of natural resource professionals employed by public and private organizations that are monitoring for invasive plants in the Midwest. Visit the MIPN website at www.MIPN.org for more detailed information on prevention and management strategies for invasive plants.

Additional web resources for learning about invasive species are:

- Center for Invasive Plant Management- www.weedcenter.org Invasive Plant Management on-line textbook
- National Invasive Species Information Center- www.invasivespeciesinfo.gov
- USDA-APHIS web site- www.invasive.org
- Forest Service web site: www.na.fs.fed.us/fhp/invasive_plants/links/index.shtm
- Natural Resource Conservation Service web site: http://plants.usda.gov
- Woodland invasive species in Iowa brochure produced by Iowa State University- https://www.extension.iastate.edu/store/ItemDetail.aspx?ProductID=6497&SeriesCode=&CategoryID=&Keyword=invasive%20species

CONCLUSION

Management plays an important role in creating a healthy Iowa forest. The best insurance a person can have when managing their woodlands is diverse woodlands that have a goal oriented management plan. The best management plan for community forests is not have more than 10% of any one species represented. Iowa forests provide an important role by providing abundant forest products and amenities, including outdoor recreation opportunities, wildlife habitat, water qualtiy, and the economic benefits of a vast array of wood and wood fiber products.

Future Iowa forests will be impacted by exotic and invasive species that are already establishing themselves in the woodland understory or are within a neighboring state. No longer will passive management allow for woodlands to be "preserved" in the condition they are in today. Learning about your woodlands and how each component affects another will make it easier for Iowa's woodlands to be managed for long term health. If you need technical assistance with your woodlands contact your district forester for assistance at http://www.iowadnr.gov/forestry/district.html.

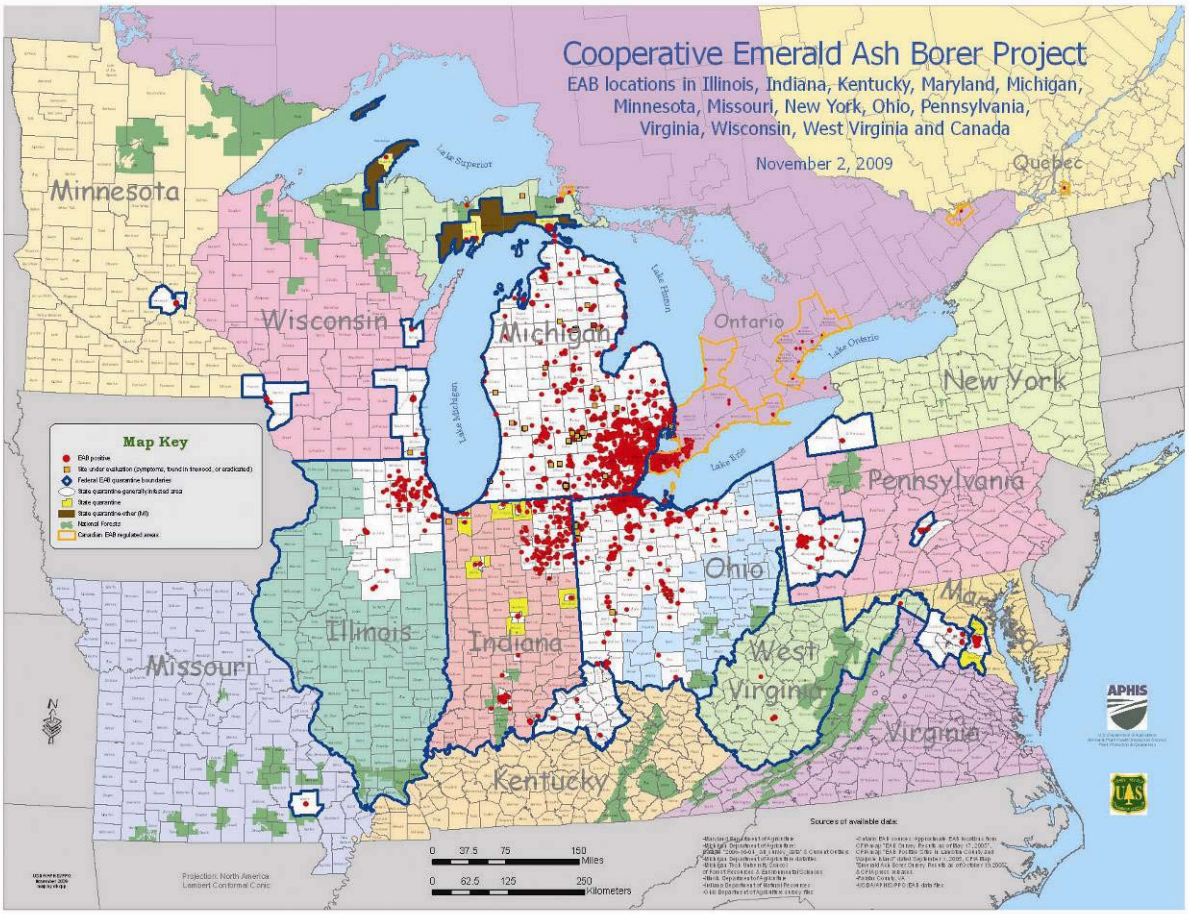
The Bureau of Forestry, through cooperation with other agencies has programs in place to monitor forest stressors which have potential to move into Iowa and damage our forests. Those programs operated vigorously during 2009, and plans are in place for similar, continued vigorous forest health program operations in 2010.

IDNR would like to thank its collaborators from USDA-APHIS-PPQ, Iowa State University Extension, Iowa Department of Agriculture and Land Stewardship, and Department of Natural Resources Foresters.

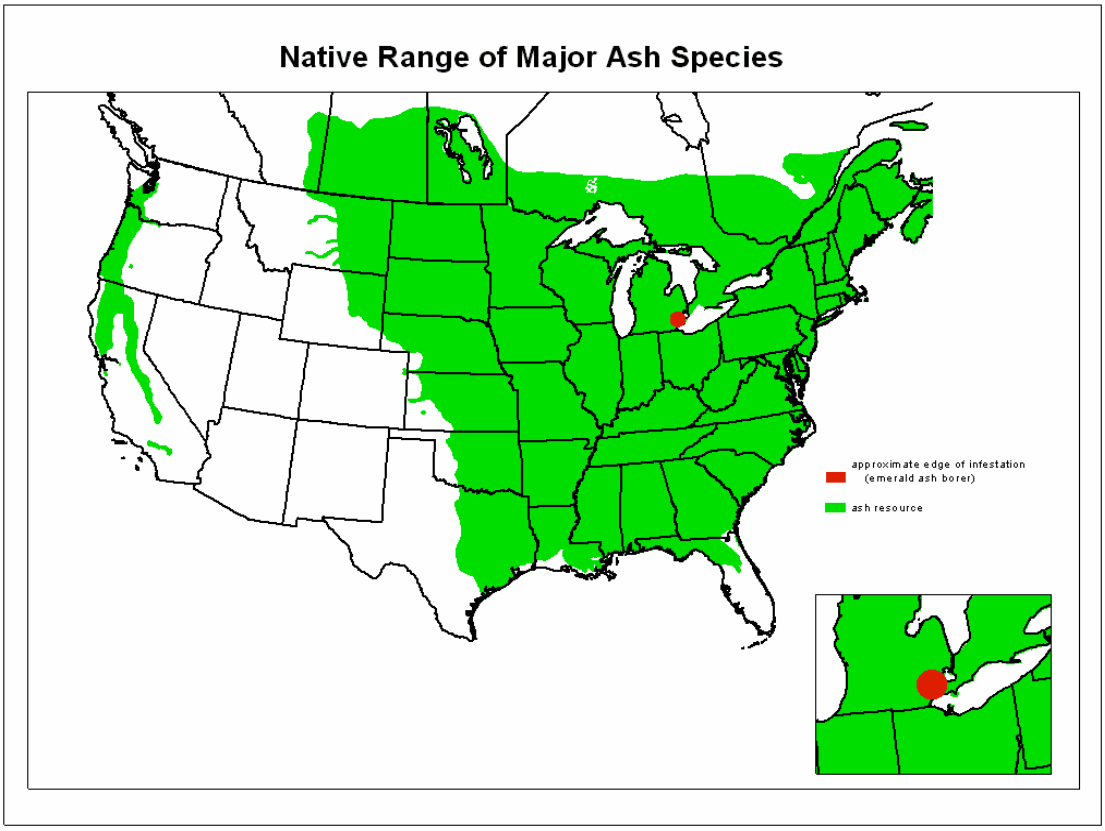
Appendix A

North America.

Map 1. Current known Emerald Ash Borer sites as of October 1, 2009.

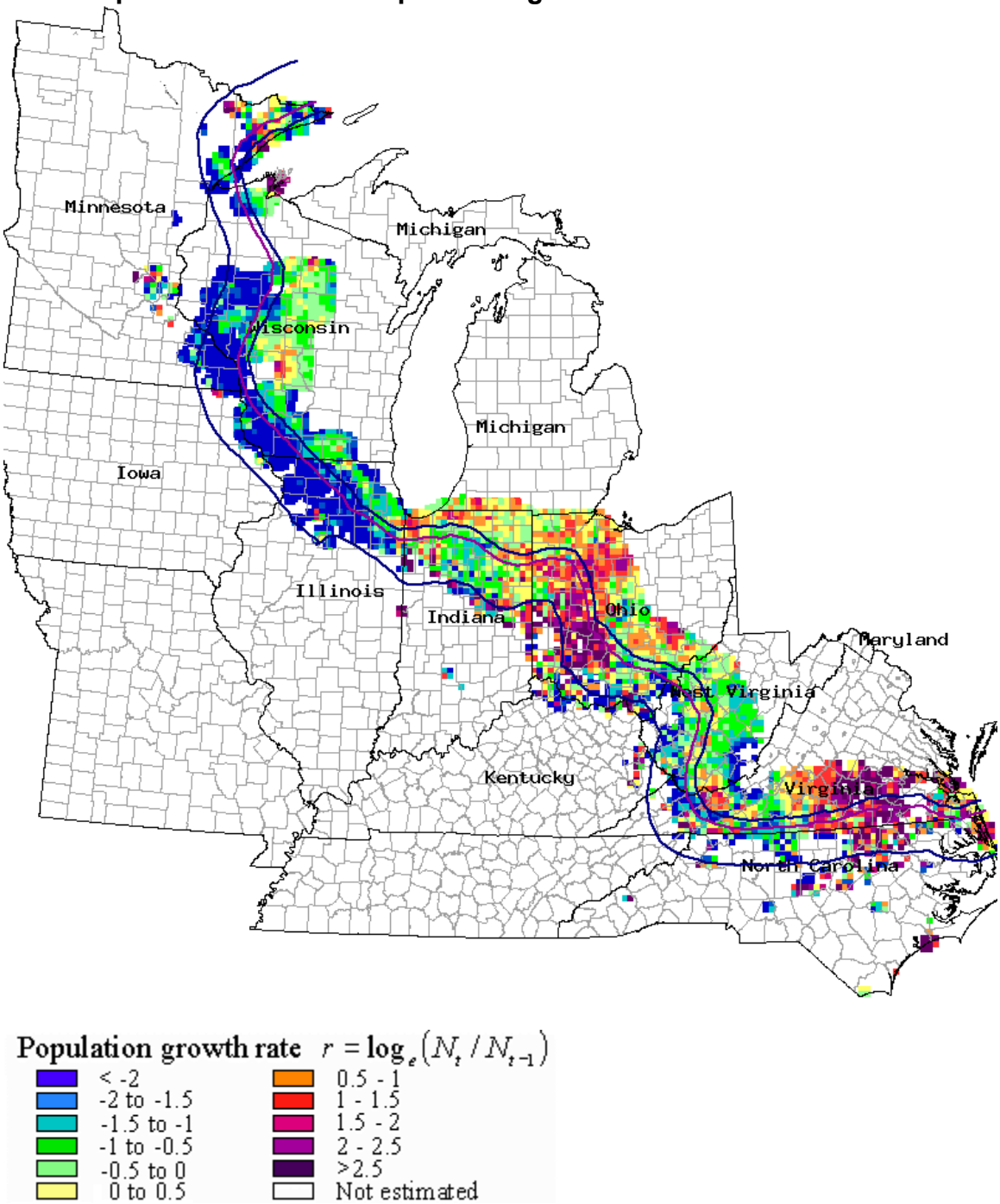


Map 2. Distribution of Ash in the United States is highlighted in Green.



Appendix B

Map 1. Gypsy Moth Summary Map Showing the population growth rate in the Midwest. See Legend for color definitions. Note the Iowa counties that are now part of the Slow the Spread Program are east of the solid blue line.



Map 2. Gypsy Moth Summary Map Showing Trap Distribution Patterns and Where Male Moths were Caught in Iowa' STS Zone.

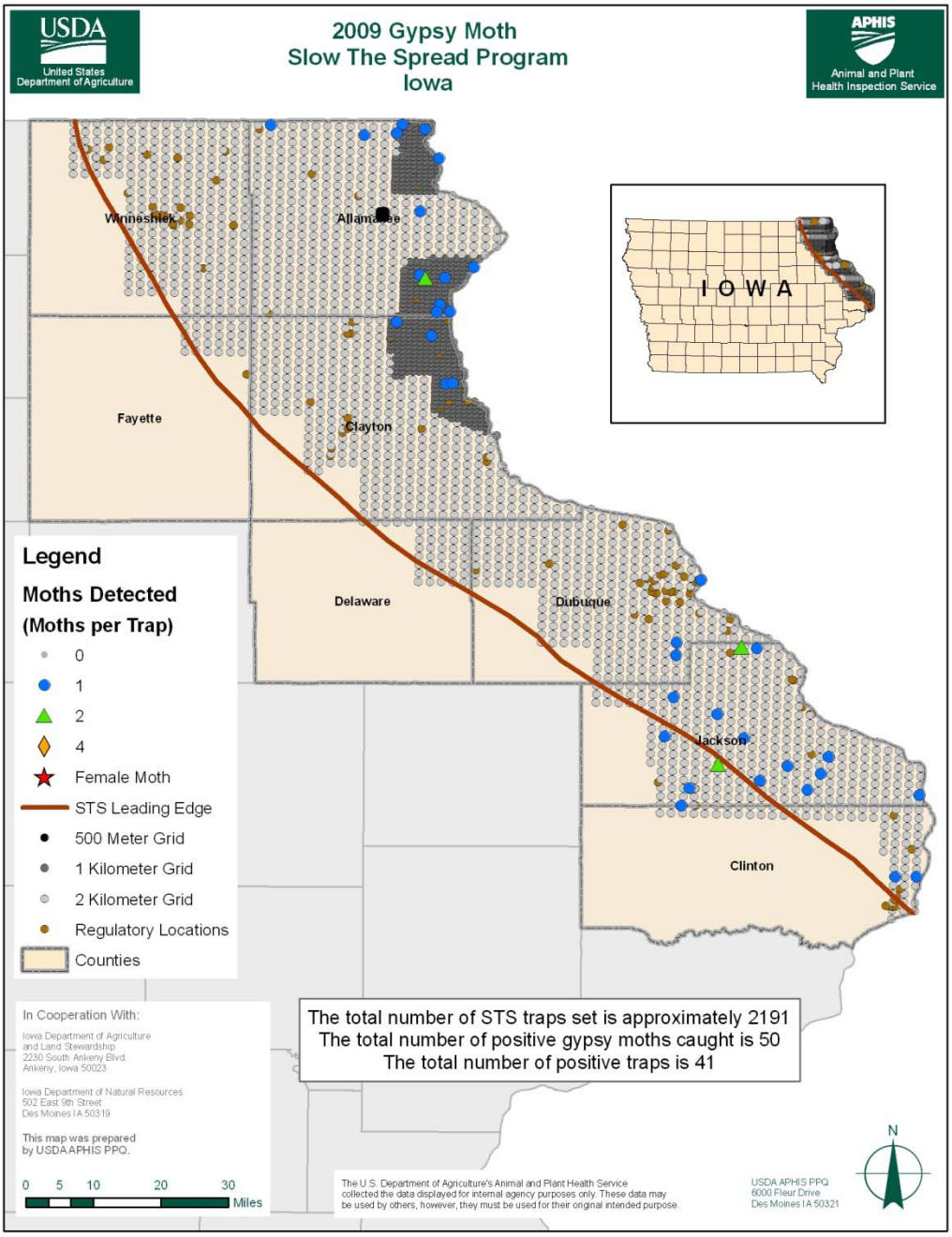
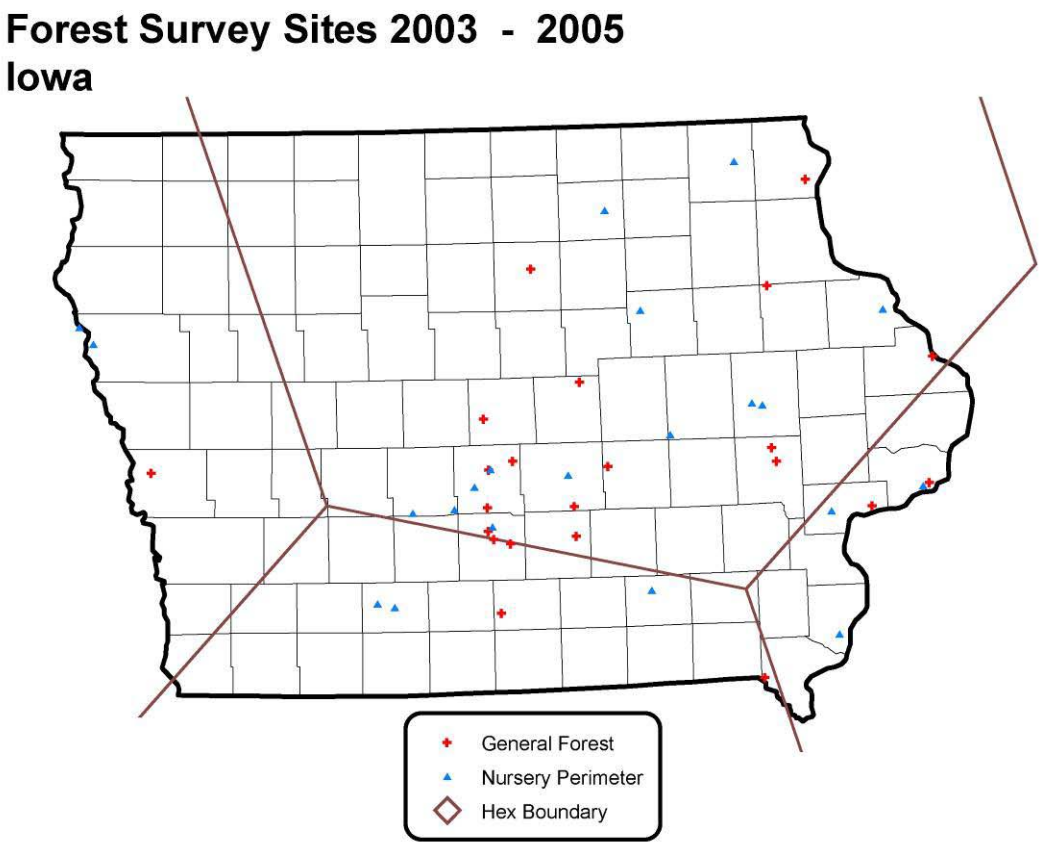


Table 1: History of the Number of Gypsy Moth Catches and the Number of Acres Treated for gypsy moth eradication in Iowa (1972-2009). Unless specified, *Bacillus thuringiensis* var. *kurstak*i was the treatment method.

Year	Number of Traps used in Survey	Number of Multiple Catches	Total Number of Moths Caught	Number of Acres Treated
1972	253		1	
1973	1196		0	
1974	1210		1	
1975	1120		0	
1976	1650		0	
1977	1130		0	
1978	741		1	
1979	854		0	
1980	676		1	
1981	970		6	
1982	1123		11	
1983	1617		14	
1984	3585		10	
1985	2538		6	
1986	3217		15	
1987	3084		18	
1988	2259		13	
1989	2858		27	9
1990	2760		17	0
1991	2775		61	0
1992	4738		162	21
1993	4800		72	73.5
1994	5797		143	90
1995	6324		76	52
1996	5241		104	25
1997	5899		151	10
1998	7093		371	21.3
1999	7532		135	224 (pheromone flakes)
2000	6834		47	42
2001	5729		26	15
2002	5729		35	2
2003	3068		159	3 (carbaryl)
2004	4374		27	26
2005	4996		4	0
2006	4891		20	0
2007	4900		175	0
2008	4732		626	0
2009	5217		82	0

Appendix C

Map 1. Summary of Sites Surveyed for SOD in 2003-2005 for Iowa.



Appendix D

Known Invasive Plants in Iowa 2008

Key: NP= Not Present- Not known to exist in Iowa

I= Isolated- the species is infrequent, not commonly seen

LA= Locally Abundant- the species is present but is not in the majority of the counties

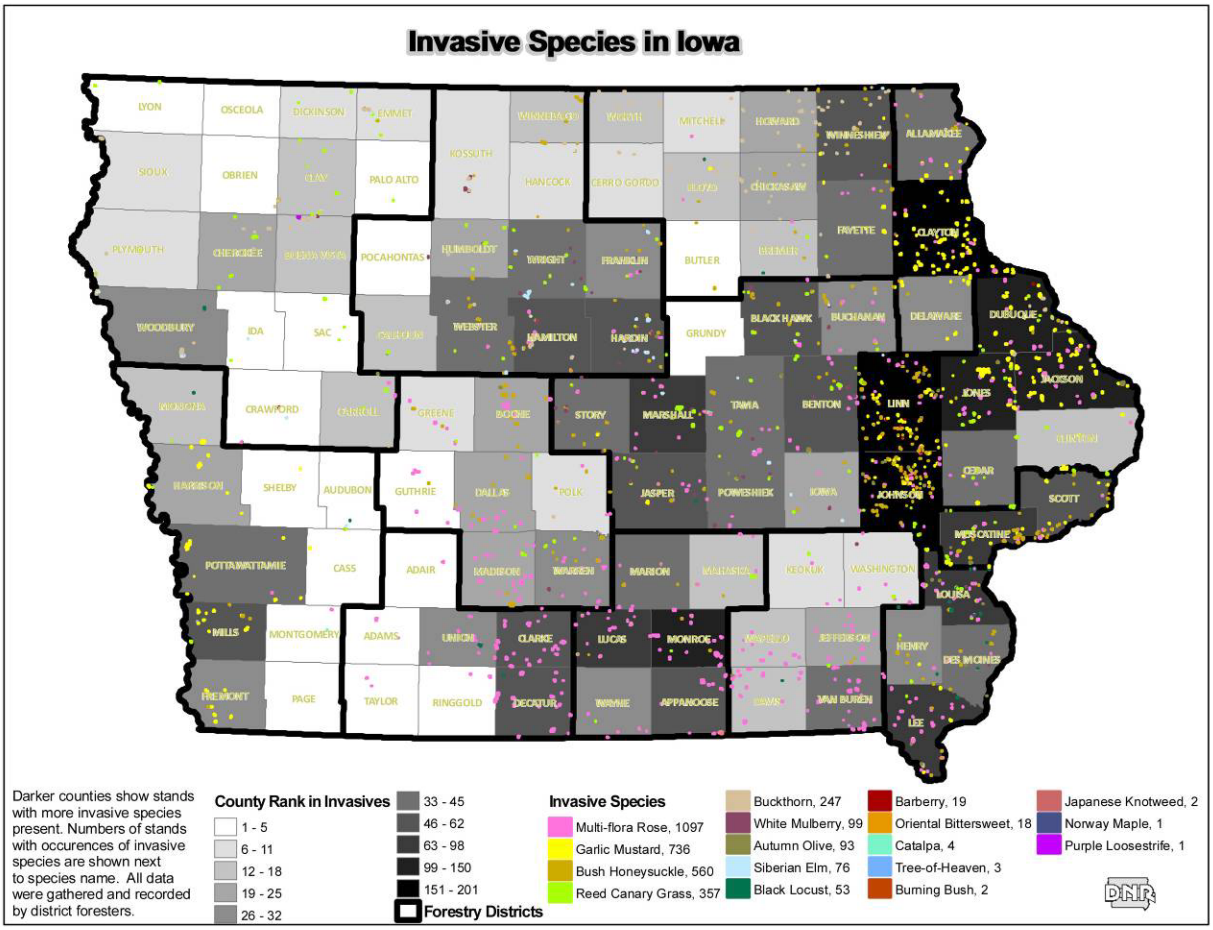
W= Widespread- commonly seen in the majority of counties in large or small populations

Species	Common Name	Abundance
Abutilon theophrasti	velvetleaf	W
Ailanthus altissima	tree-of-heaven	W
Alliaria petiolata	garlic mustard	W
Berberis thunbergii	Japanese barberry	W
Bromus tectorum	cheatgrass	W
Butomus umbellatus	flowering rush	I
Carduus acanthoides	plumeless thistle	I
Carduus nutans	Musk thistle	W
Celastrus orbiculata	Oriental bittersweet	LA
Centaurea maculosa/ biebersteinii	spotted knapweed	LA
Centaurea repens	Russian knapweed	I
Centaurea solstitialis	yellow starthistle	I
Cirsium arvense	Canada thistle	W
Cirsium spp.	thistle	W
Cirsium vulgare	bull thistle	W
Conium maculatum	poison hemlock	I
Coronilla varia	crown vetch	W
Daucus carota	Queen Anne's lace	W
Dipsacus fullonum/sylvestris	common teasel	I
Dipsacus laciniatus	cutleaf teasel	I
Dipsacus sativus	Indian teasel	NP
Elaeagnus angustifolia	Russian olive	I
Elaeagnus umbellata	autumn olive	LA
Euonymus alatus	burning bush	LA
Euphorbia esula	leafy spurge	W
Fallopia japonica/ Polygonum cuspidatum	Japanese knotweed	LA
Frangula alnus/Rhamnus frangula	glossy buckthorn	I
Heracleum mantegazzianum	giant hogweed	NP
Hesperis matrionalis	dame's rocket	W
Lespedeza cuneata	Sericea lespedeza	I
Ligustrum japonicum	Japanese privet	NP
Ligustrum obtusifolium	blunt-leaved or border privet	I
Ligustrum sinense	Chinese privet	NP
Ligustrum vulgare	common or European privet	I
Lonicera fragrantissima	fragrant honeysuckle	NP

Species	Common Name	Abundance
Lonicera japonica	Japanese honeysuckle	LA
Lonicera maackii	Amur honeysuckle	W
Lonicera morrowii	Morrow's honeysuckle	I
Lonicera standishii	Standish's honeysuckle	NP
Lonicera tatarica	Tatarian honeysuckle	W
Lonicera x bella	Bell's honeysuckle	I
Lonicera xylosteum	European fly honeysuckle	NP
Lythrum salicaria	purple loosestrife	W
Morus alba	white mulberry	W
Pastinaca sativa	wild parsnip	W
Potamogeton crispus	curlyleaf pondweed	I
Pueraria montana	kudzu	I
Rhamnus cathartica	common buckthorn	W
Rosa multiflora	multiflora rose	W
Tamarix spp.	salt cedar	I

Information on controlling Oriental Bittersweet can be found on this web page.
http://www.nps.gov/plants/alien/fact/ceor1.htm
http://na.fs.fed.us/spfo/invasiveplants/downloads/files/29%20march%202005.pdf
http://www.invasivespeciesinfo.gov/plants/bittersweet.shtml

Pictured below are Oriental Bittersweet vines climbing and shading out shade trees. This is an invasive plant that needs to be managed as soon as it is identified, and preferably before it goes to seed. Stay in contact with you District Forester for new management plans. (Pictures from Mark Vitosh, IDNR District Forester).


Invasive Species in Iowa
LYON
OSCEOLA
DICKINSON
EMMET
KOSSUTH
WINNEBAGO
WORTH
MITCHELL
HOWARD
WINNESHIEK
ALLAMAKEE
SIOUX
O'BRIEN
CLAY
PALO ALTO
HANCOCK
CERRO GORDO
FLOYD
CHICKASAW
PLYMOUTH
CHEROKEE
BUENA VISTA
POCAHONTAS
HUMBOLDT
WRIGHT
FRANKLIN
BUTLER
BREMER
FAYETTE
CLAYTON
WOODBURY
IDA
SAC
CALHOUN
WEBSTER
HAMILTON
HARDIN
GRUNDY
BLACK HAWK
BUCHANAN
DELAWARE
DUBUQUE
MONONA
CRAWFORD
CARROLL
GREENE
BOONE
STORY
MARSHALL
TAMA
BENTON
LINN
JONES
JACKSON
CLINTON
HARRISON
SHELBY
AUDUBON
GUTHRIE
DALLAS
POLK
JASPER
POWESHIEK
IOWA
JOHNSON
CEDAR
SCOTT
MUSCATINE
POTTAWATTAMIE
CASS
ADAIR
MADISON
WARREN
MARION
MAHASKA
KEOKUK
WASHINGTON
LOUISA
MILLS
MONTGOMERY
ADAMS
UNION
CLARKE
LUCAS
MONROE
WAPELLO
JEFFERSON
HENRY
DES MOINES
FREMONT
PAGE
TAYLOR
RINGGOLD
DECATUR
WAYNE
APPANOOSE
DAVIS
VAN BUREN
LEE
Darker counties show stands with more invasive species present. Numbers of stands with occurences of invasive species are shown next to species name. All data were gathered and recorded by district foresters.
County Rank in Invasives
1 - 5
6 - 11
12 - 18
19 - 25
26 - 32
33 - 45
46 - 62
63 - 98
99 - 150
151 - 201
Forestry Districts
Invasive Species
Multi-flora Rose, 1097
Garlic Mustard, 736
Bush Honeysuckle, 560
Reed Canary Grass, 357
Buckthorn, 247
White Mulberry, 99
Autumn Olive, 93
Siberian Elm, 76
Black Locust, 53
Barberry, 19
Oriental Bittersweet, 18
Catalpa, 4
Tree-of-Heaven, 3
Burning Bush, 2
Japanese Knotweed, 2
Norway Maple, 1
Purple Loosestrife, 1
DNR