December 2012

Iowa's Forest Health Highlights

IDNR, Forestry Bureau/ 515-281-4915

Special Interest Articles:

- Drought Update.
- USFS Major Forest Pests List.
- New EAB finds.
- Gypsy moth captures.
- Thousand Cankers Disease Survey.

Individual Reports:

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, Iowa's land characteristics, and several survey summaries for insects, diseases, and invasive plants that have the potential to impact the health of Iowa's forests. The 2012 Forest Health Highlights will focus first on the Forest Service's Major Forest Pest List (Page 3) and then covers the additional damaging agents that IDNR surveyed.

Weather Review:

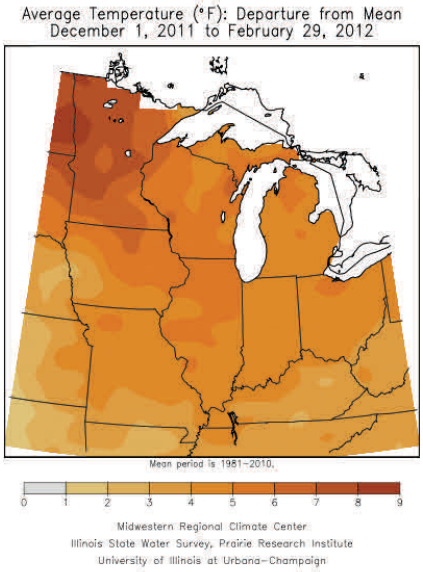
This winter did bring about several challenges for Iowa with warmer than average temperatures and slightly higher precipitation. The warmer temperature (3-4° higher than average) broke the winter dormancy in many conifers allowing for winter desiccation and eventual death.

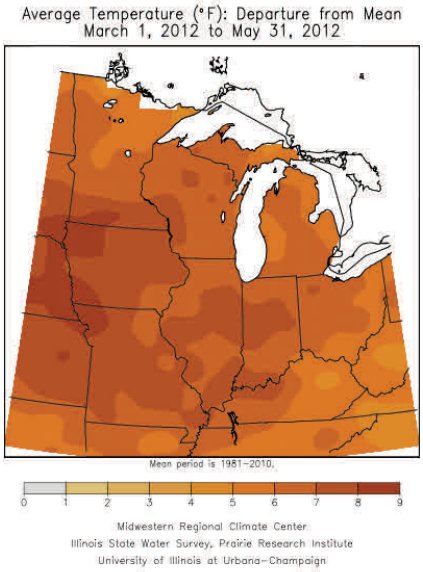
The entire state experienced a much warmer than normal spring; with most all of Iowa having normal rainfall events. The warmer spring helped limit the occurrence of Anthracnose (a fungal leaf disease) on sycamore and maple throughout the state.

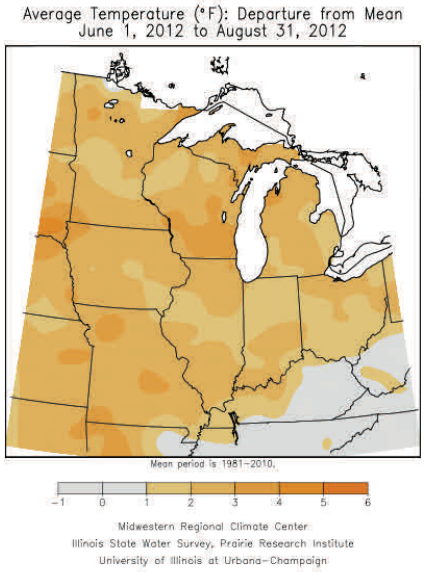
Most of the state experienced a much warmer than normal summer. The summer months were warmer (3-4° higher than average), and the rainfall events were down by 50-75% statewide. Extreme drought conditions were being reported statewide by July. The extreme drought conditions seemed to have intensified the development of wilt fungi (oak wilt, verticillium wilt, and Dutch Elm Disease) causing rapid mortality. Trees within in urban areas that were declining from construction damage, mower damage, and poor planting declined faster than expected with the drought conditions.

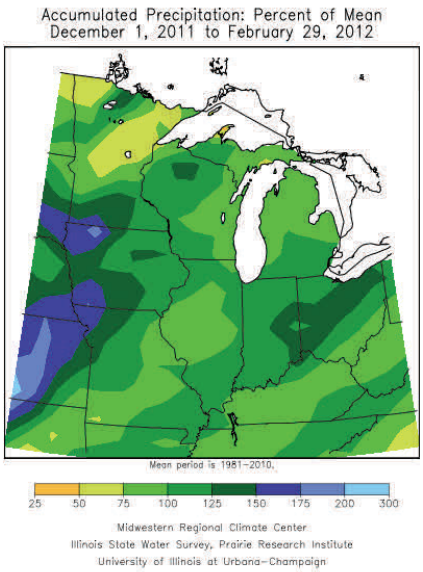
Effects of the extreme drought conditions were reported on conifers statewide. Many conifers had some level of winter desiccation as mentioned above. The lack of moisture during the summer months exacerbated the decline, causing the needles to continue to dry out and lead to the eventual mortality of the conifer. White pines, arborvitae, Canadian hemlock, and fir were identified as having high mortality from the drought. IDNR will continue to monitor the ongoing drought effects to Iowa's trees.

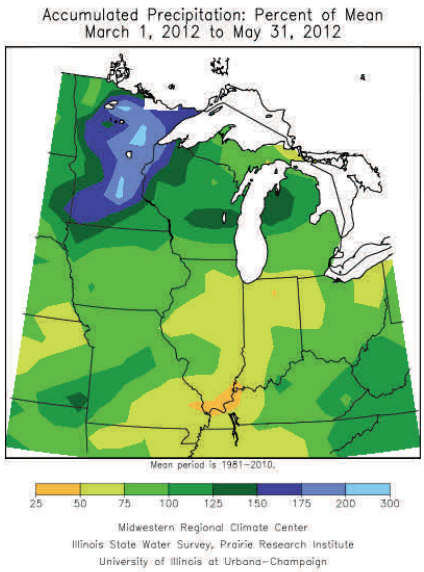
Weather Review Continued:

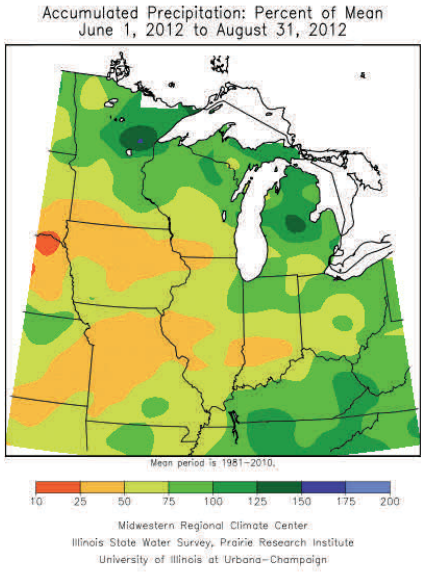












Images provided by Midwest Climate Watch http://mcc.sws.uiuc.edu/cliwatch/watch.htm.

Weather Review Continued:

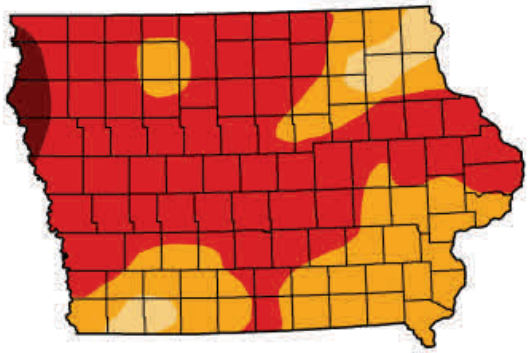
U.S. Drought Monitor

Iowa

October 16, 2012
Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	0.00	100.00	100.00	95.30	63.88	2.52
Last Week (10/09/2012 map)	0.00	100.00	100.00	100.00	75.31	2.52
3 Months Ago (07/17/2012 map)	0.00	100.00	100.00	58.77	0.00	0.00
Start of Calendar Year (12/27/2011 map)	60.99	39.01	30.33	24.15	0.00	0.00
Start of Water Year (09/25/2012 map)	0.00	100.00	100.00	100.00	65.77	2.52
One Year Ago (10/11/2011 map)	14.95	85.05	57.46	14.49	0.00	0.00



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://droughtmonitor.unl.edu

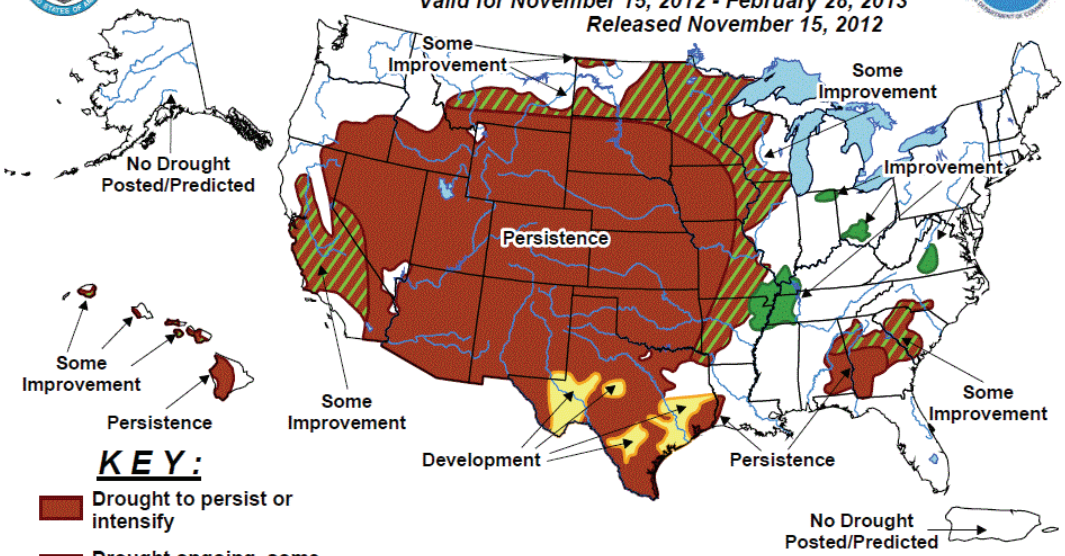
USDA National Drought Mitigation Center

Released Thursday, October 18, 2012
Matthew Rosencrans, NOAA/NWS/NCEP/CPC

U.S. Seasonal Drought Outlook

Drought Tendency During the Valid Period

Valid for November 15, 2012 - February 28, 2013
Released November 15, 2012



KEY:

- Drought to persist or intensify
- Drought ongoing, some improvement
- Drought likely to improve, impacts ease
- Drought development likely

Depicts large-scale trends based on subjectively derived probabilities guided by short- and long-range statistical and dynamical forecasts. Short-term events -- such as individual storms -- cannot be accurately forecast more than a few days in advance. Use caution for applications -- such as crops -- that can be affected by such events. "Ongoing" drought areas are approximated from the Drought Monitor (D1 to D4 intensity). For weekly drought updates, see the latest U.S. Drought Monitor. NOTE: the green improvement areas imply at least a 1-category improvement in the Drought Monitor intensity levels, but do not necessarily imply drought elimination.

Land Characteristics:

Iowa has approximately 3.1 million acres of forested land representing a steady increase over the past few decades. 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's forests are conifer forests.

There are currently 1.15 million acres of oak-forest in Iowa. Succession to shade tolerant hardwoods eventually replaces shade intolerant hardwoods, like oak, in the absence of disturbance. An annual decrease of 6,800 acres of red and white oak from 2003-2008 has been observed. This is an alarming trend.

Currently, there are 186 businesses in Iowa which utilize the wood grown in Iowa's forests. The forest products industry contributes over $3.9 billion each year to Iowa's economy, including over 18,000 jobs for Iowans (Analysis by E.M. (Ted) Bilek, Economist, USDA Forest Service, Forest Products Laboratory, Madison, WI). Additional details can be found on page 192 of *Iowa's Forests Action Plan*.

United States Forest Service Major Pests List

(This is a national list, pests highlighted in red do not pertain to Northerneastern Area and do not need to be reported on.)

Non-Native Pests

- Asian Longhorned Beetle
- Balsam Woolly Adelgid
- Beech Bark Disease
- Butternut Canker
- Dogwood Anthracnose
- Emerald Ash Borer
- Goldspotted Oak Borer
- Gypsy Moth
- Hemlock Woolly Adelgid
- Laurel Wilt
- Oak Wilt
- Port-Orford-Cedar Root Disease
- Sirex Woodwasp
- Sudden Oak Death
- Thousand Cankers Disease
- White Pine Blister Rust
- Winter Moth

Native Pests

- Aspen Leafminer
- Douglas-Fir Beetle
- Fir Engraver
- Fusiform Rust
- Heterobasidion Root Disease
- Jeffrey Pine Beetle
- Large Aspen Tortrix
- Mountain Pine Beetle
- Northern Spruce Engraver
- Southern Pine Beetle
- Spruce Beetle
- Spruce Budworm
- Subalpine Fir Mortality
- Western Five-Needle Pine Mortality
- Western Pine Beetle
- Western Spruce Budworm
- Yellow-Cedar Decline

Twenty Major Forest Insects and Diseases: Asian long-horned beetle

Year 2012
State: Iowa

Forest Pest

Common Name: Asian long-horned beetle
Scientific Name: *Anoplophora glabripennis*

Hosts: Maple, horsechestnut/buckeye, willow, elm, birch, and sycamore

Setting: N/A

Counties: N/A

Survey Methods: N/A

Acres Affected: N/A

Narrative: Asian long-horned beetle has not been identified in Iowa. State Legislative Funds allowed IDNR to follow up on 166 maples that were identified in 2010 and 2011 community inventories as having advanced dieback, large exit holes, and no obvious reason for the decline (e.g. girdling roots, construction damage, or planting depth).

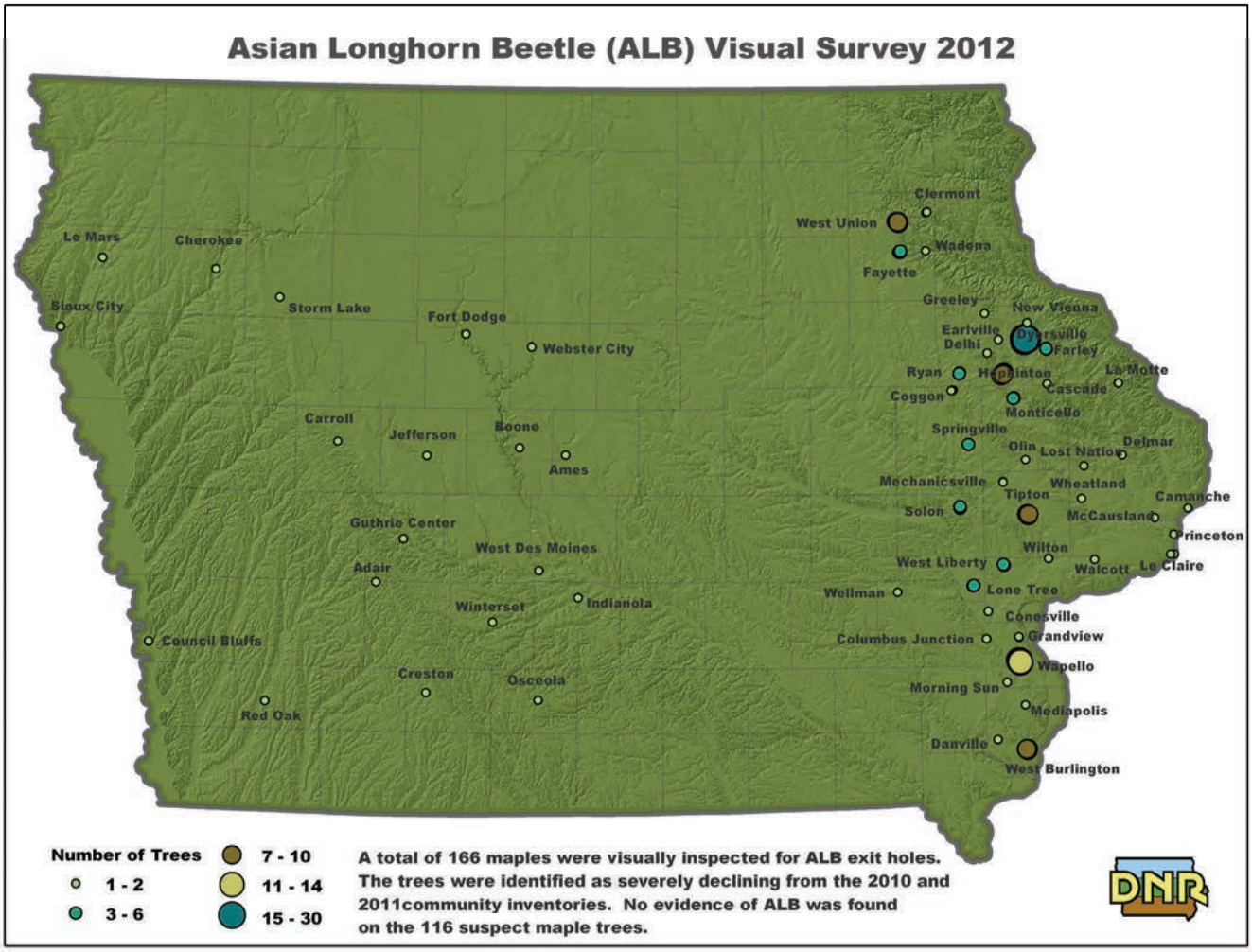
All 166 maples were visually examined for ALB exit hole using binoculars. After the initial inspection, only one tree remained suspect. That tree was in Tipton, IA and was removed and destructively sampled. No indications of ALB were found in that tree or any of the surveyed trees in 2012.

If beetles are found (Figure 1.) contact Christine Markham (USDA National Coordinator) at 919-855-7328 and Robin Pruisner (State Entomologist) at 515-725-1465. http://www.aphis.usda.gov/plant_health/plant_pest_info/asian_lhb/index.shtml.

Figure 1. Adult Asian long-horned Beetle (Image: Dennis Haugen, USDA Forest Service, Bugwood.org).

Twenty Major Forest Insects and Diseases: Asian longhorned beetle Continued:

Figure 2. Survey location where the declining maples were examined for Asian longhorned beetle exit holes.



Twenty Major Forest Insects and Diseases: Aspen Leaf-miner

Year 2012
State: Iowa

Forest Pest

Common Name: Aspen Leafminer
Scientific Name: *Phyllocnistis populiella*

Hosts: Aspen

Setting: N/A

Counties: N/A

Survey Methods: N/A

Acres Affected: N/A

Narrative: No formal survey work was conducted for aspen leafminer. No suspect samples were submitted to IDNR or the ISU Plant Diagnostic Clinic. No damage was reported in 2012. It is not known whether this insect is common in Iowa.

If a landowner finds aspen leaf miner, please contact Tivon Feeley (IDNR Forest Health Program Leader) at 515-281-4915 or the ISU Plant Diagnostic Clinic at 515-294-0581.

http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fsbdev2_038064.pdf

Figure 3. Aspen Leafminer (Image: William M. Ciesla, Forest Health Management International, Bugwood.org

Twenty Major Forest Insects and Diseases: Beech Bark Disease

Year 2012
State: Iowa

Forest Pest

Common Name: Beech bark disease
Scientific Name: *Nectria coccinea* var. *faginata*

Hosts: American Beech

Setting: N/A

Counties: N/A

Survey Methods: N/A

Acres Affected: N/A

Narrative: American beech is not a native tree to Iowa. Iowa is well outside of the native range of American beech and no survey work was conducted for beech bark disease. If a landowner has beech trees that they believe have beech bark disease please contact Tivon Feeley (IDNR Forest Health Program Leader) at 515-281-4915 or Robin Pruisner (State Entomologist) at 515-725-1465. http://na.fs.fed.us/spfo/pubs/fidls/beechbark/fidl-beech.htm.

Figure 4. Beech bark disease "tarry spot" or flux. (Image: Joseph O'Brien, USDA Forest Service, Bugwood.org).

Twenty Major Forest Insects and Diseases: Butternut Canker

Year 2012
State: Iowa

Forest Pest

Common Name: Butternut Canker
Scientific Name: *Sirococcus clavigignenti-juglandacearum*

Hosts: Butternut

Setting: Rural Forest

Counties: Statewide

Survey Methods: General Observation

Acres Affected: Eastern half of Iowa (Scattered throughout roughly 2 million acres)

Narrative: Butternut canker is found throughout Iowa, but is largely concentrated in the Eastern half of Iowa where butternuts occur. The disease is fatal to native non hybrid butternuts.

IDNR collected seed from 20 native butternut trees and has established an Iowa butternut orchard in the Loess Hills. The 20 butternut trees displayed outstanding growth in Western Iowa (where the canker is rarely found) and no signs of butternut canker were found in 2012.

Additionally, DNA tests confirmed that 150 selected native Iowa butternut trees are not hybrids. The testing was done in 2011 and 2012. IDNR has added seeds from these 150 trees to the native orchard and will start testing for tolerance.

Figure 5. Examples of canker found on butternut trees (Image: Minnesota Department of Natural Resources Archive, Minnesota Department of Natural Resources, Bugwood.org).

Twenty Major Forest Insects and Diseases: Dogwood Anthracnose

Year 2012
State: Iowa

Forest Pest

Common Name: Dogwood Anthracnose
Scientific Name: *Discula destructiva*

Hosts: Flowering Dogwood and Pacific Dogwood

Setting: N/A

Counties: N/A

Survey Methods: N/A

Acres Affected: N/A

Narrative: Flowering Dogwood and Pacific Dogwood are not native to Iowa. There are some flowering dogwoods planted as ornamentals in Iowa that are currently not at risk since this pathogen tends to be an Eastern United States Pest. Dogwood anthracnose does not affect Iowa's native dogwoods. No survey methods were needed No reporting on this pest is necessary. http://na.fs.fed.us/spfo/pubs/howtos/ht_dogwd/ht_dog.htm

Figure 6. Example of a flowering dogwood that is defoliated and declining from anthracnose. (Image: Charles Hoysa, Virginia Cooperative Extension, Bugwood.org).

Twenty Major Forest Insects and Diseases: Dwarf Mistletoe

Year 2012
State: Iowa

Forest Pest

Common Name: Dwarf Mistletoe
Scientific Name: *Arceuthobium*

Hosts:	Ponderosa pine, lodgepole pine, western larch, Douglas-fir, western hemlock, mountain hemlock, rarely western white pine, and spruce
Setting:	Rural Forest
Counties:	Dubuque
Survey Methods:	Ground
Acres Affected:	None
Narrative:	White Pine Hollow was surveyed for dwarf mistletoe (parasitic plant) in 2011. White pine is scattered throughout the 712 acre park. No evidence of dwarf mistletoe was found. No samples were submitted to the ISU Plant Diagnostic Lab. If a landowner finds dwarf mistletoe, please contact Tivon Feeley (IDNR Forest Health Program Leader) at 515-281-4915 or the ISU Plant Diagnostic Clinic at 515-294-0581. http://na.fs.fed.us/pubs/fidls/ed_mistletoe/ed_mistletoe.pdf

Figure 7. Example of dwarf mistletoe growing on white pine (Image: William M. Ciesla, Forest Health Management International, Bugwood.org).

Twenty Major Forest Insects and Diseases: Emerald Ash Borer

Year 2012
State: Iowa

Forest Pest

Common Name: Emerald Ash Borer
Scientific Name: *Agrilus planipennis*

Hosts: All Ash (*Fraxinus)* species

Setting: Rural Forest, Nursery, Urban

Counties: Statewide

Survey Methods: Ground, General Observation, and Trapping

Acres Affected: Approximately 1,500 acres

Narrative: Emerald ash borer (EAB) was identified and confirmed in Iowa on May 14, 2010 on Henderson Island in Allamakee County. EAB has since been confirmed on 4 new sites within Allamakee County in 2012. Allamakee County remains the only county quarantined for EAB in Iowa.

IDNR visually inspected 1,291 ash trees in 58 counties at 239 high risk campgrounds and 19 sawmills. The survey identified 2 suspect trees that had purple traps hanging in the tree. The trees were later confirmed positive for EAB by PPQ based on positive purple traps.

In addition, IDNR bark peeled 416 sentinel trap trees in 2012. IDNR and ISU confirmed two positive sentinel trees; one in Black Hawk Point and one in Pool Slough in Allamakee County. These were the first positive sentinel trees in Iowa.

In addition, PPQ placed 1,165 purple detection traps throughout the state. There were two purple EAB traps that were positive with one adult EAB on each trap. Those trees were also identified as suspect trees during the INDR visual survey and our located near Lansing and New Albin, IA. The purple trap and sentinel tree finds are the first detection of EAB off the Henderson Island series.

If a landowner has an ash tree that they believe has emerald ash borer please contact Tivon Feeley (IDNR Forest Health Program Leader) at 515-281-4915 or Robin Pruisner (State Entomologist) at 515-725-1465.

Emerald Ash Borer Background:

Emerald Ash Borer (EAB; *Agrilus planipennis*) is a small green invasive wood boring beetle that attacks and kills ash trees. The adults live on the outside of ash trees feeding on the leaves during the summer months. The larvae are white and feed on the living plant tissue (phloem and cambium) underneath the bark of ash trees. The trees are killed by the tunneling activity of the larvae under the tree's bark, which disrupts the vascular flow.

EAB is a highly invasive forest pest that has the potential to kill nearly 100% of the native ash trees of any size, age, or stage of health where it is present. Over 50 million ash trees outside of Iowa have been killed where EAB is present. Much of Iowa's forestland is populated with ash trees, and Iowa's community street trees are heavily planted with ash cultivars. The US Forest Service's 2008 inventory indicates that there are 52 million woodland ash trees and 3.1 million urban ash trees in Iowa. Trees attacked by EAB can die within two years. Once trees that have been killed by EAB are discovered in a community, nearly all ash trees in that community will be dead in five to six years.

Economic Impacts
The total impact of Emerald Ash Borer to Iowa's forest landowners and wood products businesses is over **$27 million** or an annualized loss of **$1 million** in perpetuity for Iowa's economy. Other economic losses include non-timber products such as reduced wildlife habitat and an over **$2.5 billion** cost for tree removal and tree replanting, along with the loss of community tree derived benefits, such as energy savings, property value, storm water retention and carbon sequestration. Communities and homeowners will bear the cost burden of removing dead trees caused by EAB.

Wildlife Impacts
Ash has moderate importance to wildlife as a food source. Seeds are known to be eaten by wood ducks, finches, and cardinals.

Management Solution
Proper woodland and community tree management have a critical role in creating healthy trees. The best insurance policy a landowner can have when managing their woodlands is by maintaining a diversity of tree species, while ensuring an appropriate number of trees are growing on each acre. The best course of action for communities is to have a tree inventory and a community tree resource plan.

Good woodland and tree care under the direction of a forester or an arborist is the best defense against all forest health threats.
(Images from top to bottom:Howard Russell, Michigan State University, Bugwood.org, James W. Smith, USDA APHIS PPQ, Bugwood.org, and David Cappaert, Michigan State University, Bugwood.org)

Figure 8. Location of the May 14, 2010 emerald ash borer find on the Henderson Island series. To date, Allamakee County remains the only county quarantined (Image: Tivon Feeley, IDNR).

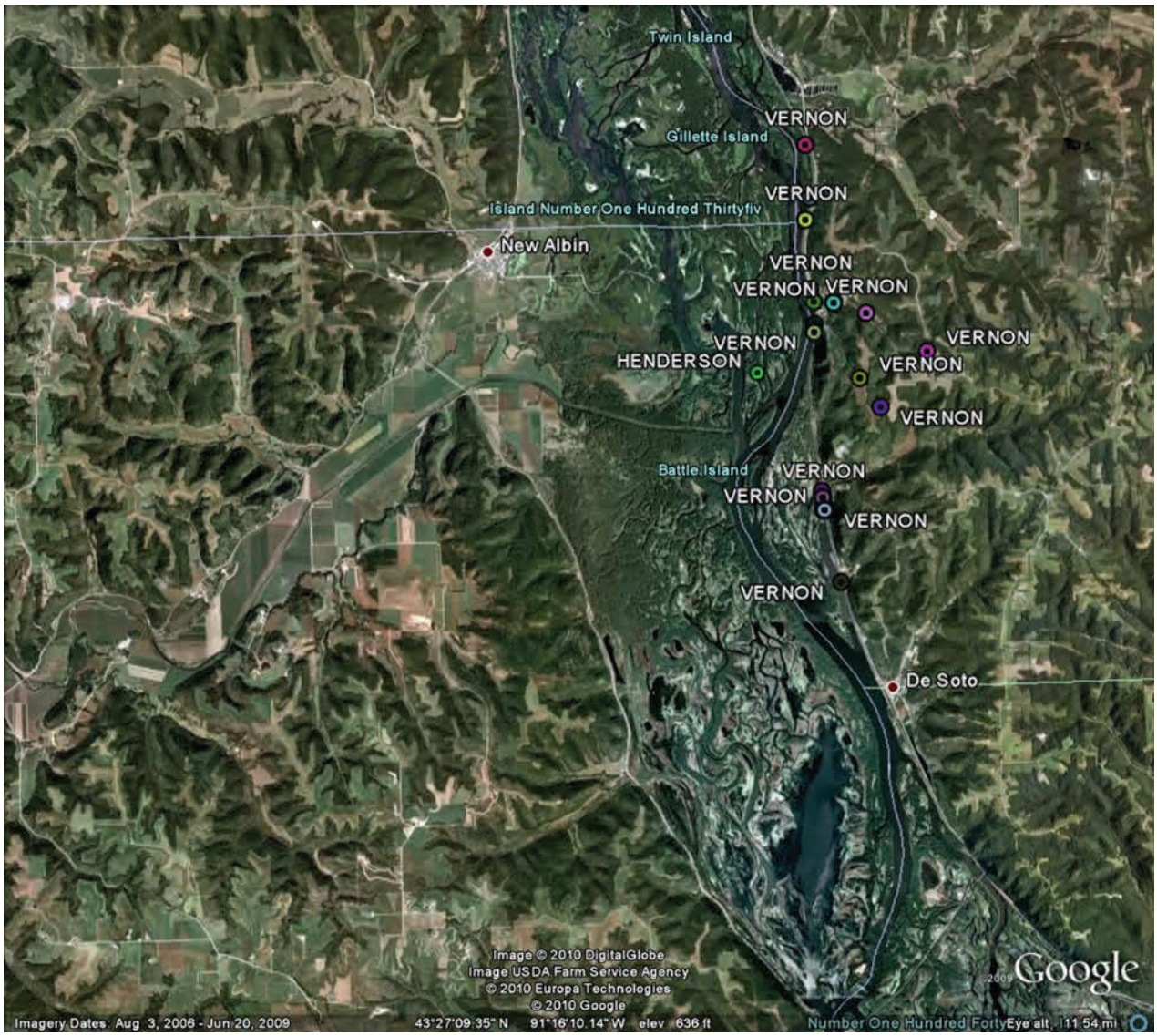


Figure 9. Locations of the current quarantined counties or states for emerald ash borer . The map below does not currently show a quarantine for the State of Kansas, which was added into the national quarantine in August 2012. The new EAB finds in the State of Kansas, and in Kansas City, Missouri provide new corridors for EAB to move into Western Iowa. New EAB finds just outside of the Quad Cities, on the Illinois side, put EAB a few miles away from Davenport. IDNR and partners will continue to trap and monitor the state through 2013.

(Image provided by USDA-APHIS-PPQ and posted here http://www.emeraldashborer.info/).

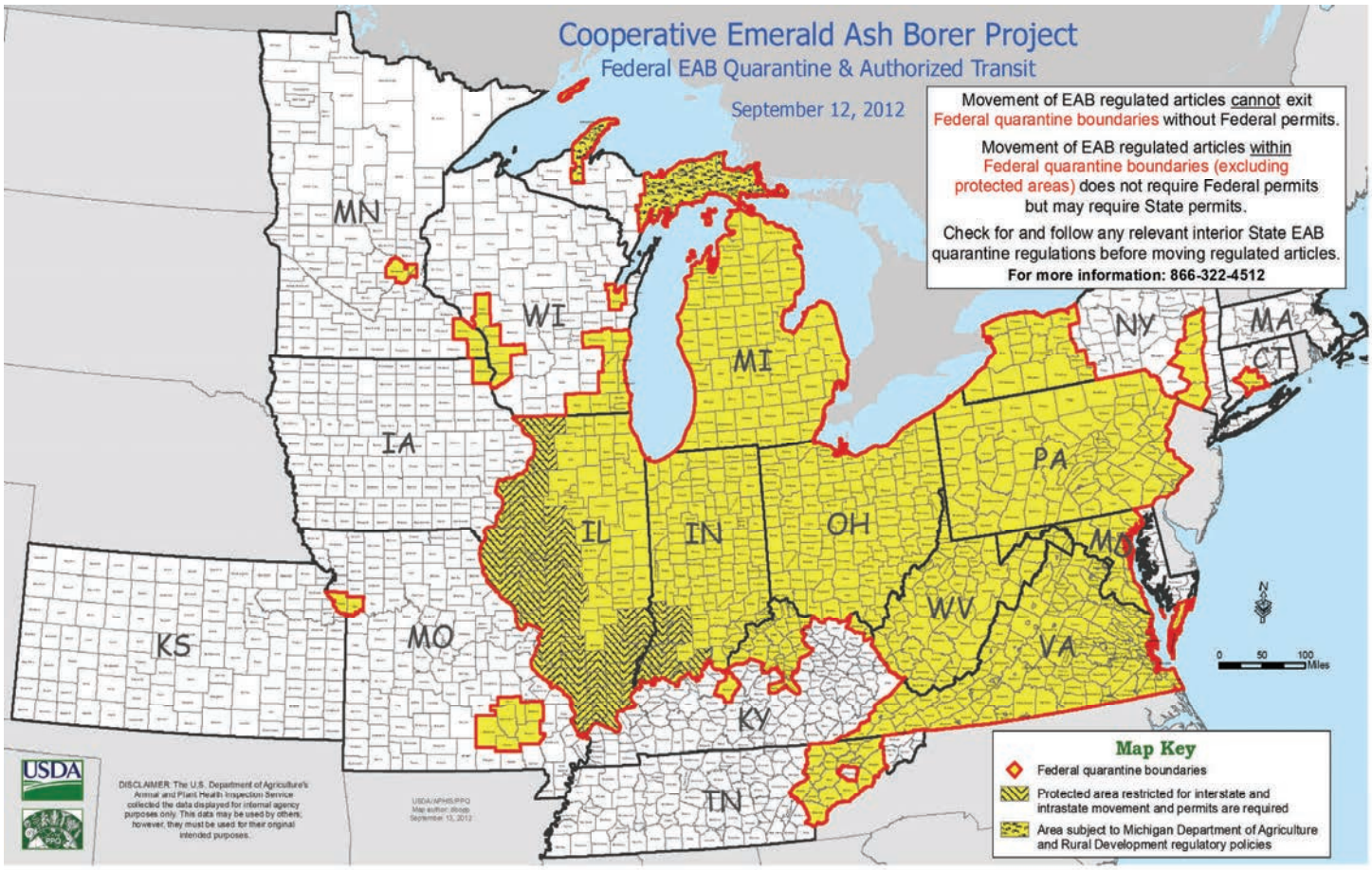


Figure 10. The map below details the location of 1,291 ash trees that were visually surveyed for the presence of emerald ash borer in Iowa. There were 220 high risk campgrounds and 19 high-risk sawmills in 58 counties that were surveyed. The level of risk for campgrounds was determined by the amount of campers visiting from quarantined states. Every active sawmill in Iowa was visited and ash nearby were examined for emerald ash borer. A total of 3 trees were flagged as possible suspect infestations for emerald ash borer. Branches were bark peeled from one tree in Davenport, and no evidence of emerald ash borer was found. The remaining two suspect trees had purple traps hanging in them. Those traps were confirmed positive by PPQ identifiers. One of the suspect trees was located in Lansing and was removed before it could be examined for EAB damage. The remaining tree is located just south of New Albin. ISU Forestry is planning on following up on this tree to determine how long EAB has been in that area, so that tree is still standing and will be monitored. (Image: Tivon Feeley, IDNR).

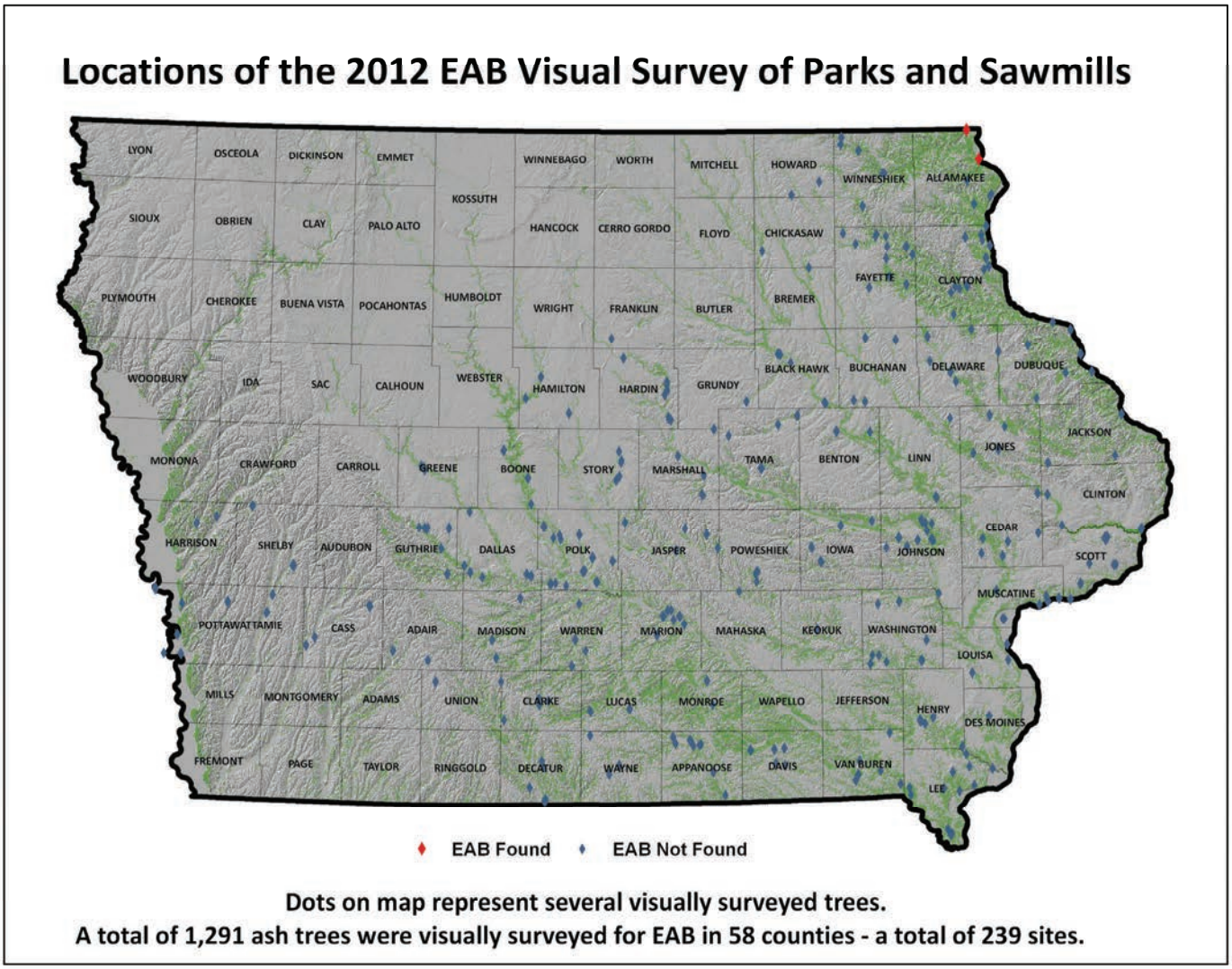


Figure 11. The map below details the locations where the 2013 sentinel ash trees are located (in blue). A sentinel tree is an ash tree that had been double girdled at the base of the tree in 2012 and allowed to decline throughout the 2013 growing season. The declining trees help lure in nearby wood boring beetles. The trees are to be taken down in the fall of 2013 and the bark removed to examine the trees for the presence of beetle larvae.

Two sentinel trees (established in 2011), in red, were positive for EAB when they were bark peeled in fall of 2012. The 2012 sentinel trees also had bark beetles present in all of the sentinel trees and 51 native wood boring beetles were found. The blue dots represent the location of the sentinel trees that will be bark peeled in 2013. Those trees were negative for emerald ash borer at the time of girdling.

The two new EAB finds in 2012 does not change the current quarantine. Allamakee is already a quarantined county and no regulations need to be changed. EAB has not been found outside Allamakee County. (Image: Tivon Feeley, IDNR).

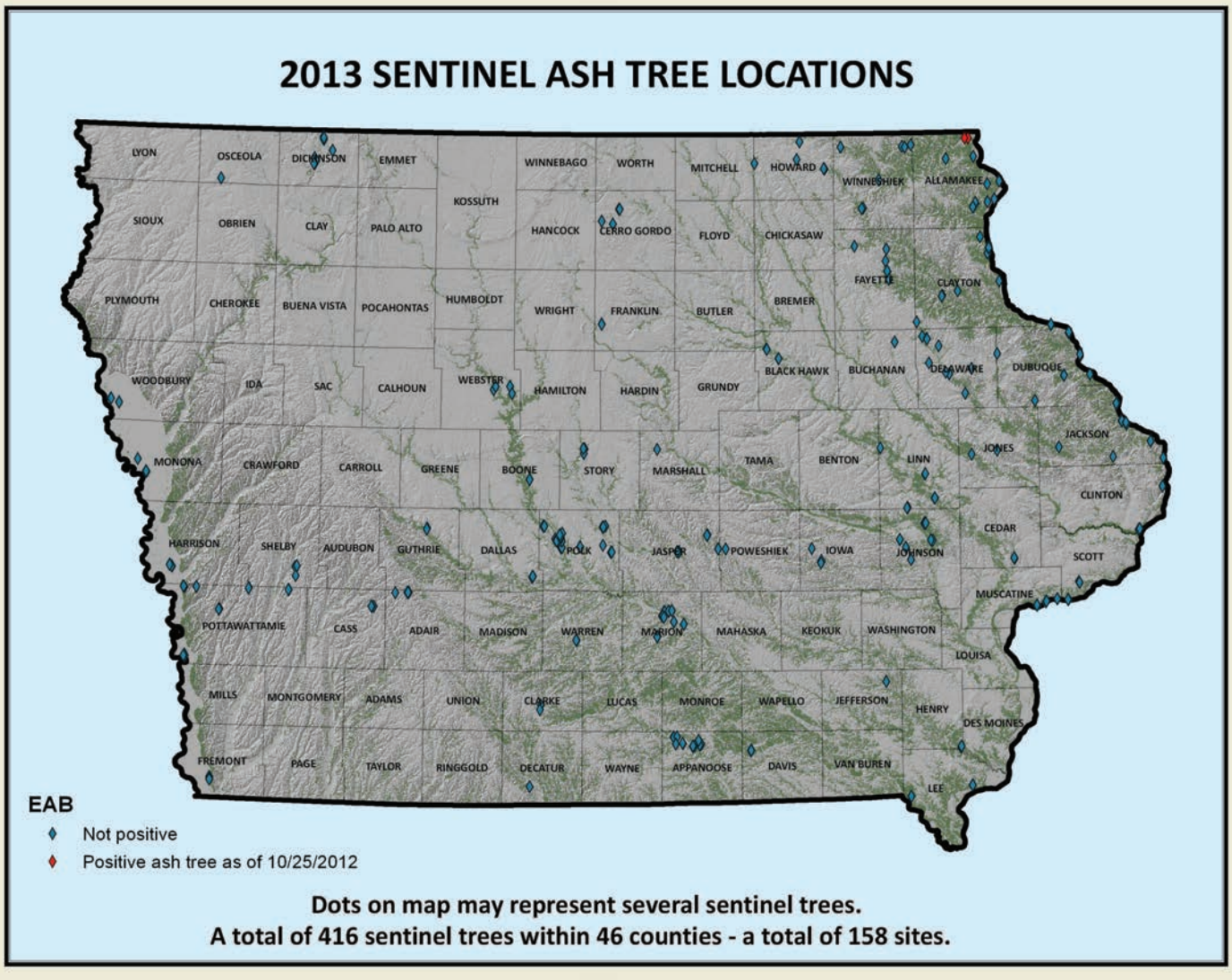


Figure 12. The map below details the locations where the community street tree inventories have been conducted. Every publicly owned ash street tree was inspected for signs and symptoms of emerald ash borer following the US Forest Service's Emerald Ash Borer Survey Guidelines. A total of 144 communities of the 182 inventoried have received urban forest management plans that include ash phloem reduction and tree diversification. No emerald ash borers have been found in any of the ash that were surveyed at the time of the inventories. The remaining 38 Communities will receive management plans in 2013. (Image: Emma Bruemmer, IDNR).

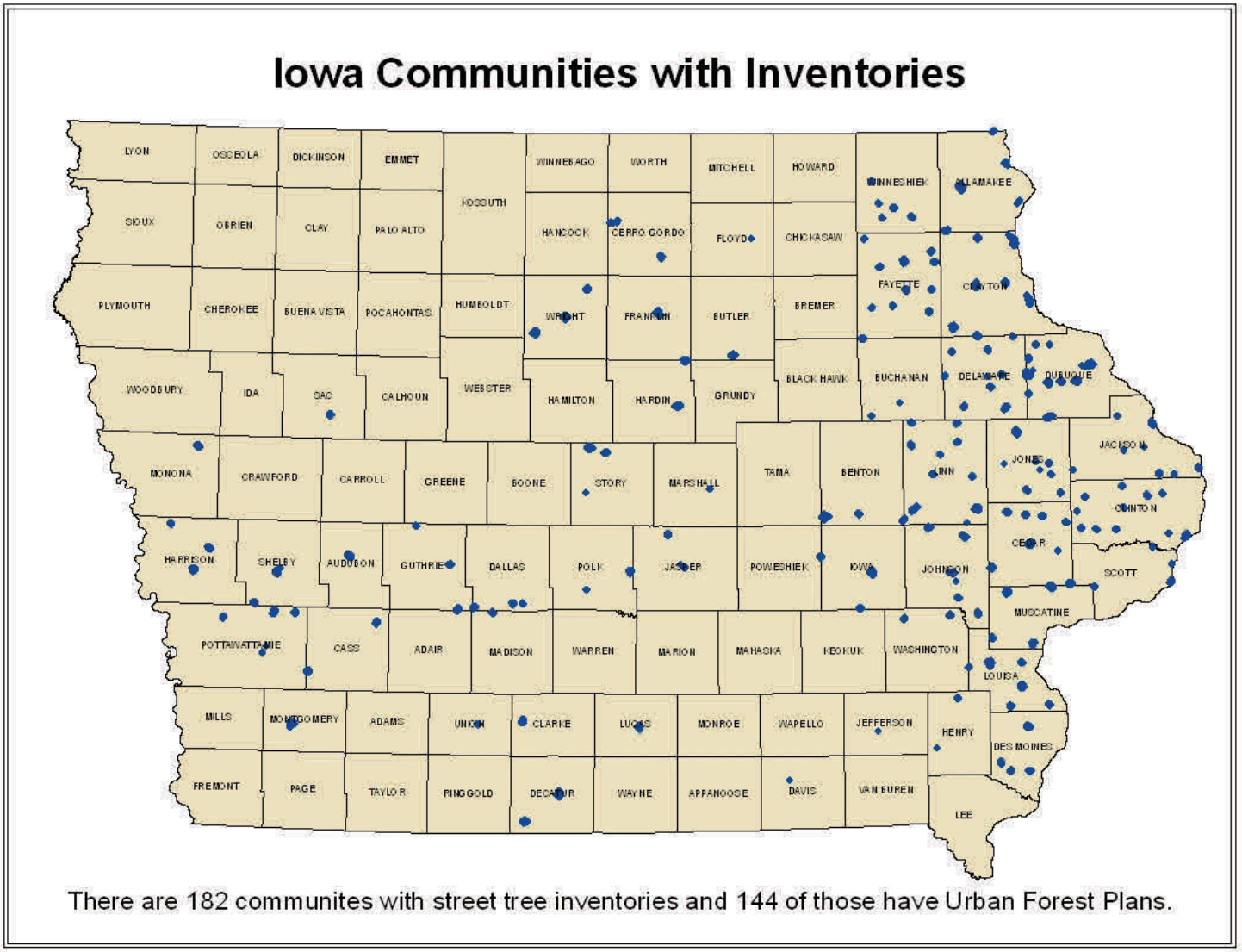


Figure 13. The map below details the locations of where the emerald ash borer purple sticky traps were located. These traps utilize tree scents and the color purple, which seems to attract emerald ash borer, to capture adult beetles. All 1,220 purple traps, placed by USDA APHIS Plant Protection and Quarantine and the Iowa Department of Agriculture and Land Stewardship. Two traps, in red, were positive for emerald ash borer in 2012. (Image: Mark Hollister, USDA-APHIS-PPQ, Iowa).

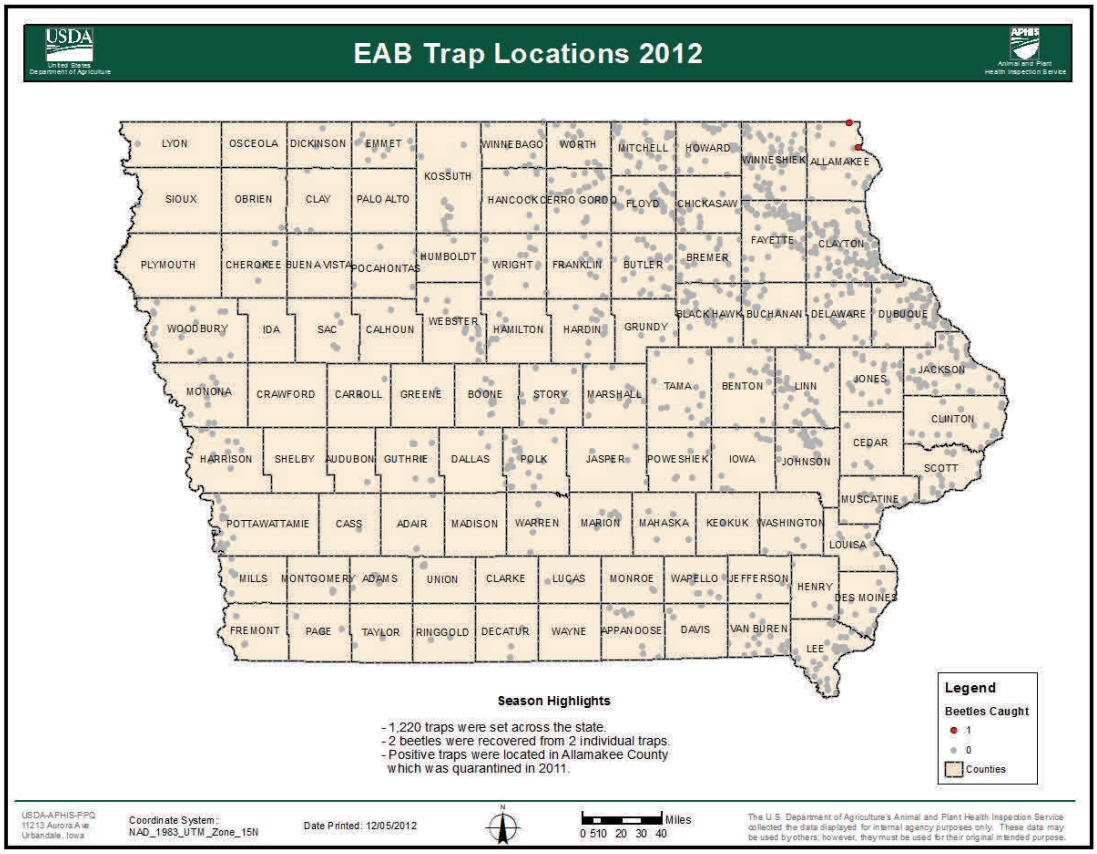


Figure 14. The picture below shows a purple emerald ash borer trap in a tree. (Image: Dr. Mark Shour, ISU Extension Entomology).

Twenty Major Forest Insects and Diseases: Fusiform Rust

Year 2012
State: Iowa

Forest Pest

Common Name: Fusiform Rust
Scientific Name: *Cronartium fusiforme*

Hosts: Southern Pine

Setting: N/A

Counties: N/A

Survey Methods: N/A

Acres Affected: N/A

Narrative: Fusiform rust and the southern pine species they are found on are not native to Iowa. No survey work was done. If a landowner has a Southern Pine that they believe has fusiform rust please contact Tivon Feeley (IDNR Forest Health Program Leader) at 515-281-4915 or ISU Plant Diagnostic Clinic at 515-294-0581.

http://na.fs.fed.us/spfo/pubs/fidls/fusiform/fidl-fusi.htm

Figure 15. Example of Fusiform rust causing branch damage on a southern pine. (Image: USDA Forest Service - Region 8 - Southern Archive, USDA Forest Service, Bugwood.org)

Twenty Major Forest Insects and Diseases: Gypsy Moth

Year 2012
State: Iowa

Forest Pest

Common Name: Gypsy Moth
Scientific Name: *Lymantria dispar*

Hosts: Oak, spruce, maples, elms, and many more

Setting: Rural Forests and Urban

Counties: Statewide

Survey Methods: Pheromone Delta Traps

Acres Affected: None

Narrative:

Gypsy moth has repeatedly been captured in Iowa, but the population level has effectively been controlled by environmental conditions, *entomophaga* (fungal pathogen of gypsy moth), and mating disruption. Feeding damage has not occurred to Iowa's trees.

Iowa captured 225 male moths in 2012, 478 male moths in 2011, and a state record 2,260 male moths in 2010. The state record capture in 2010 prompted the state's largest aerial treatments using pheromone flakes to disrupt mating.

This year's capture of 225 male moths is low. However, the moth captures were concentrated into two areas in the state. One area is south of New Albin and one south of Dubuque, Iowa.

The gypsy moth treatment algorithm assigned a risk factor of 3.74 for the area just south of Dubuque and 3.34 for the area just south of New Albin. Treatments are recommended for any risk factor greater than 2.8. All of the data indicates that this may be an early isolated infestation of gypsy moth several miles ahead of the generally infested line. There is a strong possibility that treatment will occur in 2013, in cooperation with the Gypsy Moth Slow the Spread Foundation (STS).

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

Twenty Major Forest Insects and Diseases: Gypsy Moth Continued:

About STS: This nonprofit organization was established for the purpose of aiding in the implementation of the U.S.D.A. National Slow the Spread of the Gypsy Moth Project. The National Slow the Spread Project is part of the U.S.D.A.'s national strategy for gypsy moth management. http://www.gmsts.org/

Since Congress funded the Slow the Spread Program (STS) in the year 2000, eleven 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 its first 6 years, this program prevented the impacts that would have occurred on more than 40 million newly infested acres.

- 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.
- 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.

Philosophy

While traditional approaches to gypsy moth management address potentially defoliating populations occuring in generally infested areas, the STS project focuses on populations in the area between that of general infestation and generally uninfested. In this transition zone, populations are low and somewhat discontinuous. Male moths are the primary population indicators, and other life stages are rarely found. The project attempts to meet its goals by conducting intensive monitoring with pheromone-baited traps in order to detect isolated or low-level populations in the transition zone. Although all available tactics to control gypsy moth populations will be considered, emphasis is placed upon the most environmentally benign tactic which meets management objectives.

Design

The STS Project is composed of two types of management areas: the Action Area, where STS management strategies are applied, and the Evaluation Area, where normal state and federal management strategies are maintained. Data from the Evaluation Area, along with data from surrounding state gypsy moth surveys, will be used to assess the efficacy of STS management strategies in the Action Area. Intensive monitoring within the Action Area is the foundation of the project and provides the trap catch data used in a decision-making algorithm to determine the appropriate management activities.

Gypsy Moth Background:

Gypsy Moth is a European insect species introduced in Boston, MA in 1869 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.

Establishment of gypsy moth in Iowa will affect the survival of mature trees. The larvae of this insect will feed on the leaves of over 300 host species during the important summer growing season, a time when a trees leaves are converting sunlight to energy. Repeated defoliation that occurs several years in a row on the same tree will deplete the stored nutrients, leading to the decline of that tree. In 2010 a record number of 2,260 male gypsy moths were captured in 31 Iowa counties.

Economic Impacts

The total estimated impact of Gypsy Moth to Iowa's forest landowners and wood products businesses is over $551 million or an annualized loss of over $22 million in perpetuity for Iowa's economy.

Other economic losses include non-timber products like seed production, reduced wildlife habitat and a $4.1 billion cost for tree removal and tree replanting, along with the loss of community tree derived benefits such as energy savings, property value, and storm water retention and carbon sequestration. Communities and homeowners will bear the cost burden of removing dead trees caused by Gypsy Moth.

The loss of oaks and other preferred tree species of gypsy moth will negatively impact the economic contribution of $1.5 billion that fish and wildlife recreation provides to Iowa's economy.

Wildlife Impacts

Oak leaves are a preferred food source for Gypsy moth caterpillars. Acorns produced by oaks are eaten by many species of birds and mammals. A reduction in the number of oak trees in Iowa's forests caused by repeated defoliation from gypsy moth caterpillars will affect a wide variety of game

Management Solution

Proper woodland and community tree management have a critical role in creating healthy trees. The best insurance policy a landowner can have when managing their woodlands is by maintaining a diversity of tree species, while ensuring an appropriate number of trees are growing on each acre. The best course of action for communities is to have a tree inventory and a community tree resource plan. (Images: Aron Flickinger, IDNR, USDA APHIS PPQ Archive, USDA APHIS PPQ, Bugwood.org, and Tivon Feeley, IDNR).

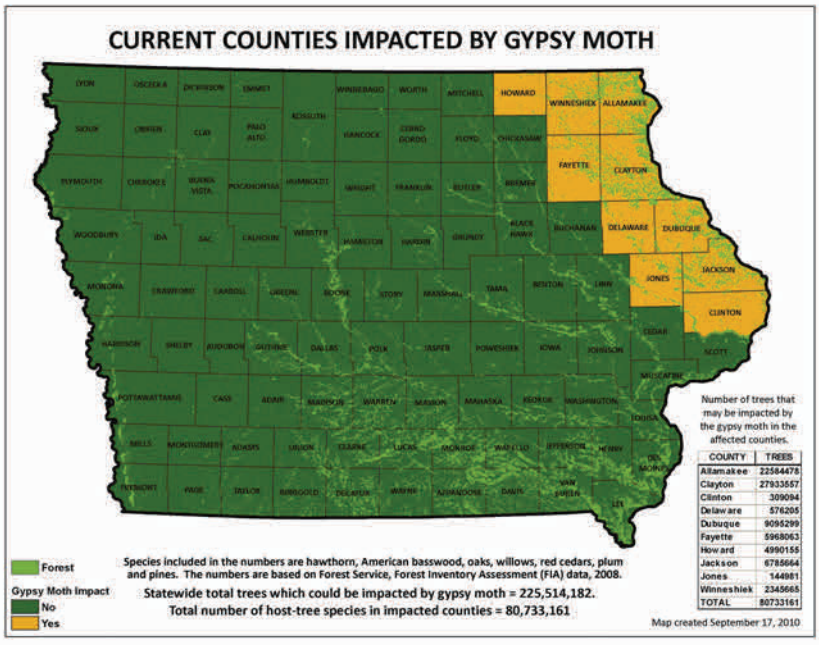
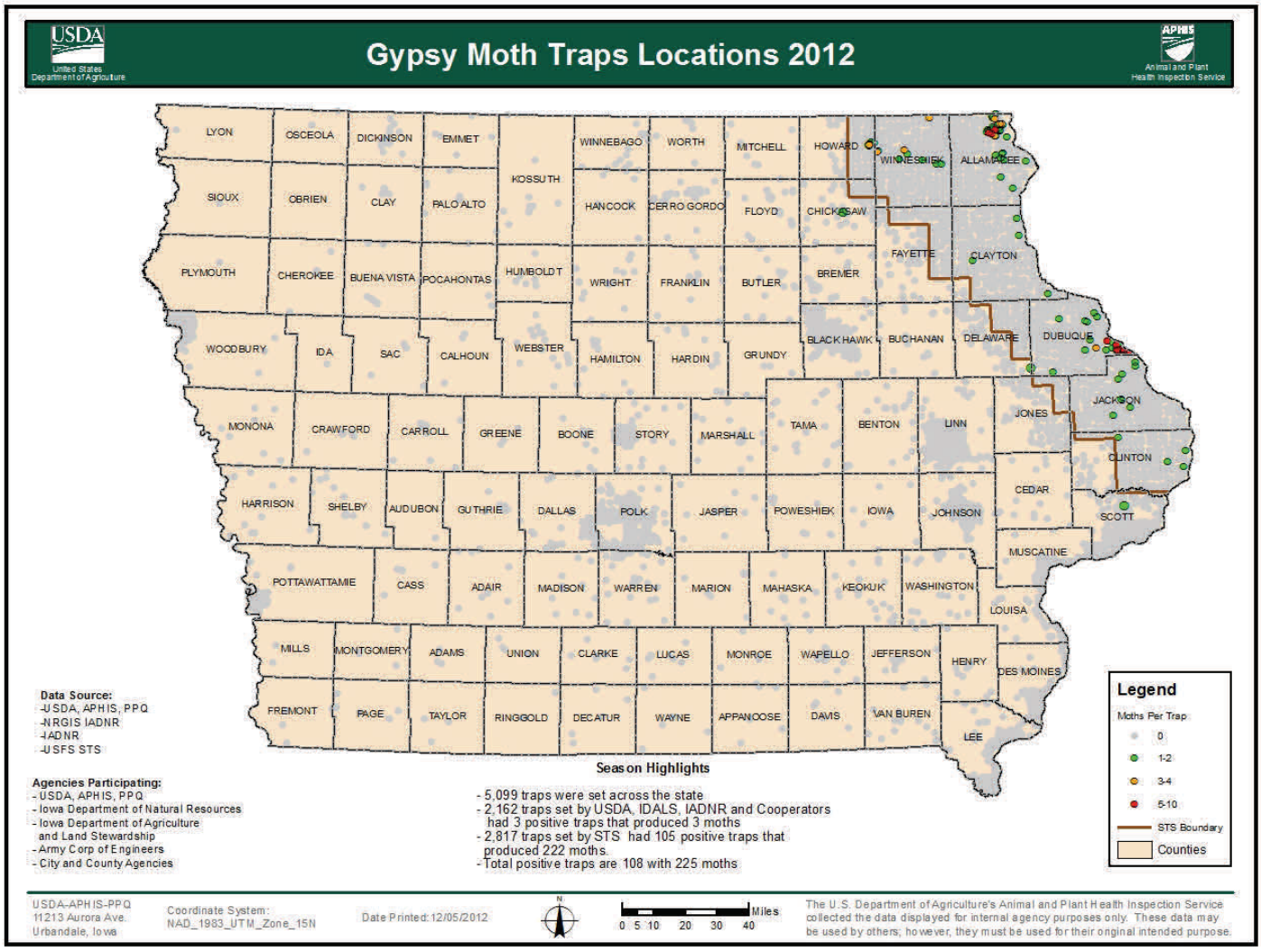


Figure 16. The map below details the locations of all the gypsy moth traps and the number of moths captured in them during the 2012 trapping season. The total male moth capture was 225 male moths. This number is down from the 2011 capture of 478 male moths and the 2010 capture of 2,260 male moths. The reduction in the population can be attributed to the successful mating disruption treatment in Iowa and surrounding states in 2011. The red dots are the areas of gypsy moth concentration this year and are identified for possible treatment in 2013 to continue to control the gypsy moth population. (Image: Mark Hollister, PPQ).



Twenty Major Forest Insects and Diseases: Heterobasidion Root Disease

Year 2012
State: Iowa

Forest Pest

Common Name: Heterobasidion root disease
Scientific Name: *Heterobasidion spp.*

Hosts: Conifers (All)

Setting: N/A

Counties: Lucas and Van Buren

Survey Methods: N/A

Acres Affected: N/A

Narrative: Heterobasidion root disease has been identified in Iowa, and is a pest that can occur throughout Iowa on pines or red cedar. Historically it has been reported on jack pine in Stephens State Forest and white pine in Shimek. No other survey work was conducted for Heterobasidion root disease. If a landowner suspects Heterobasidion root disease , please contact the ISU Plant Diagnostic Clinic at 515-294-0581.

http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5329556.pdf

Figure 17. Example of heterobasidion root disease (Image: William Jacobi, Colorado State University, Bugwood.org)

Twenty Major Forest Insects and Diseases: Hemlock Wooly Adelgid

Year 2012
State: Iowa

Forest Pest

Common Name: Hemlock woolly adelgid
Scientific Name: *Adelges tsugae*

Hosts: Hemlock (All)

Setting: N/A

Counties: N/A

Survey Methods: N/A

Acres Affected: N/A

Narrative: Hemlock is not a native tree found in Iowa. Hemlock woolly adelgid is known to occur only in the Eastern and Northern part of the United States. No survey methods were needed. No need to contact authorities on this pest.

http://na.fs.fed.us/fhp/hwa/

Figure 18. Example of Hemlock woolly adelgid, feeding on hemlock needles. (Image: Connecticut Agricultural Experiment Station Archive, Connecticut Agricultural Experiment Station, Bugwood.org)

Twenty Major Forest Insects and Diseases: Large Aspen Tortrix

Year 2012
State: Iowa

Forest Pest

Common Name: Large Aspen Tortrix
Scientific Name: *Choristoneura conflictana*

Hosts: Maple, horsechestnut/buckeye, willow, elm, birch, and sycamore

Setting: N/A

Counties: N/A

Survey Methods: N/A

Acres Affected: N/A

Narrative: No formal survey work was conducted for large aspen tortrix. No suspect samples were submitted to IDNR or the ISU Plant Diagnostic Clinic. No damage was reported in 2012. This insect reportedly occurs throughout much of the natural range of quaking aspen in the U.S, but it is not known whether this insect is common in Iowa.

If a landowner finds large aspen tortrix, please contact Tivon Feeley (IDNR Forest Health Program Leader) at 515-281-4915 or the ISU Plant Diagnostic Clinic at 515-294-0581.

http://www.fs.usda.gov/detail/r10/communityforests/?cid=fsbdev2_038387

Figure 19. Large aspen tortrix adult (Image: Edward H. Holsten, USDA Forest Service, Bugwood.org).

Twenty Major Forest Insects and Diseases: Laurel Wilt

Year 2012
State: Iowa

Forest Pest

Common Name: Laurel Wilt Disease
Scientific Name: *Raffaelea lauricola*

Hosts: Redbay

Setting: N/A

Counties: N/A

Survey Methods: N/A

Acres Affected: N/A

Narrative: Redbay is not a native tree found in Iowa. Laurel wilt disease is known to occur only in the Southeast United States. No survey methods were needed. No need to contact authorities on this pest.

http://www.fs.fed.us/r8/foresthealth/laurelwilt/

Figure 20. Example of a redbay killed by laurel wilt disease. (Image: Albert (Bud) Mayfield,,USDA Forest Service, Bugwood.org)

Twenty Major Forest Insects and Diseases: Northern Spruce Engraver

Year 2012
State: Iowa

Forest Pest

Common Name: Northern Spruce Engraver
Scientific Name: Ips perturbatus

Hosts: All Spruce

Setting: N/A

Counties: N/A

Survey Methods: N/A

Acres Affected: N/A

Narrative: No formal survey work was conducted for northern spruce engraver. No suspect samples were submitted to IDNR or the ISU Plant Diagnostic Clinic. No damage was reported in 2012. Spruce is not native to Iowa, but many species of spruce are planted in windbreaks, plantations, and ornamental plantings. This insect reportedly occurs on white spruce throughout the Lake States, but it is not known whether this insect is common in Iowa.

If a landowner finds northern spruce engraver, please contact Tivon Feeley (IDNR Forest Health Program Leader) at 515-281-4915 or the ISU Plant Diagnostic Clinic at 515-294-0581.

http://www.fs.usda.gov/detail/r10/forest-grasslandhealth/?cid=fsbdev2_038903

Figure 21. Northern spruce Beetle (Image: Edward H. Holsten, USDA Forest Service, Bugwood.org).

Twenty Major Forest Insects and Diseases: Oak Wilt

Year 2012
State: Iowa

Forest Pest

Common Name: Oak Wilt
Scientific Name: *Ceratocystis fagacearum*

Hosts: All Oak Species

Setting: Woodlands and Urban

Counties: Statewide

Survey Methods: Aerial and Ground

Acres Affected: 10,000 ground acres

Narrative: IDNR received an unexpected high number of oak wilt samples from public lands. There were 328 oak wilt positive white oaks out of 483 tested. There were 91 oak wilt positive red oaks out of 112 trees tested. All trees were cultured and oak wilt was confirmed by fungal morphology.

Although the samples came from several counties in the state, the majority of the samples came from the SE quadrant of Iowa. In this area, the white oaks declined and died rapidly, within one season. It appears that the white oak trees have been infected for 10+ years and that the drought may have intensified the development of oak wilt, or at least caused enough decline on the tree that the oak wilt fungus finally killed the trees. IDNR has helped with nine management plans and will follow up on these larger sites in 2013 to see how the fungus has progressed.

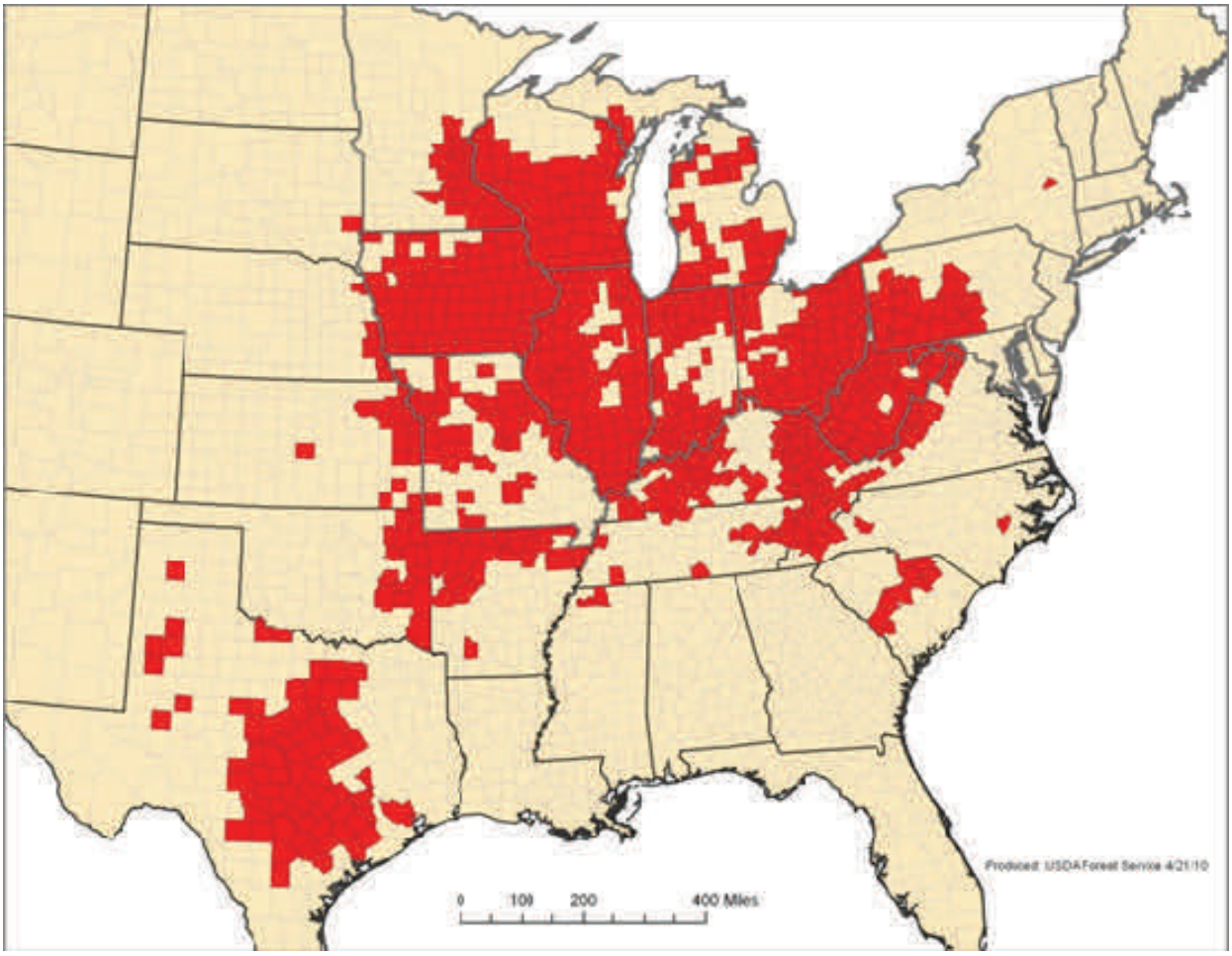
IDNR will follow up on 4 outbreak sites in 2013 to determine if the management plans developed, slowed or stopped the spread of oak wilt on those sites. A combination of tree removal, trenching to sever root grafts, and preventive injections have been used on 3 of the study sites. One of the study sites had trees removed that were positive, plus the next adjacent tree to prevent the spread. This method was used because of the steep, rocky terrain.

If a landowner feels that they have discovered oak wilt, please contact the ISU Plant Diagnostic Clinic at 515-294-0581.

http://na.fs.fed.us/pubs/howtos/ht_oakwilt/identify_prevent_and_control_oak_wilt_print.pdf

Twenty Major Forest Insects and Diseases: Oak Wilt Continued:

Figure 22. The map below details the counties in Iowa with confirmed oak wilt. Oak wilt may occur in the non red counties, but has not been confirmed by the ISU Diagnostic Clinic. (Image: Quinn Chavez, USFS).



Twenty Major Forest Insects and Diseases: Sirex Woodwasp

Year 2012
State: Iowa

Forest Pest

Common Name: Sirex Woodwasp
Scientific Name: *Sirex noctilio*

Hosts: All Pines and occasionally spruce and fir

Setting: N/A

Counties: N/A

Survey Methods: N/A

Acres Affected: N/A

Narrative: Sirex woodwasp has not been identified in Iowa. No additional funds were available to conduct survey work. No suspect samples were submitted to IDNR or the ISU Plant Diagnostic Clinic. No other survey work was conducted for sirex woodwasp. If a landowner suspects sirex woodwasp, please contact the ISU Plant Diagnostic Clinic at 515-294-0581 or Robin Pruisner (State Entomologist) at 515-725-1465.

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

Figures 23 and 24. Images from left to right: Adult sirex woodwasp, and a female sirex woodwasp laying her eggs inside of a pine tree. The woodwasp hatch and feed inside the tree before exiting. (Images: Vicky Klasmer, Instituto Nacional de Tecnologia Agropecuaria, Bugwood.org).

Twenty Major Forest Insects and Diseases: Sudden Oak Death

Year 2012
State: Iowa

Forest Pest

Common Name: Sudden Oak Death
Scientific Name: *Phytophthora ramorum*

Hosts: All Oaks

Setting: Rural Forests, Nursery, and Urban

Counties: Statewide

Survey Methods: Water Testing and Soil Testing

Acres Affected: N/A

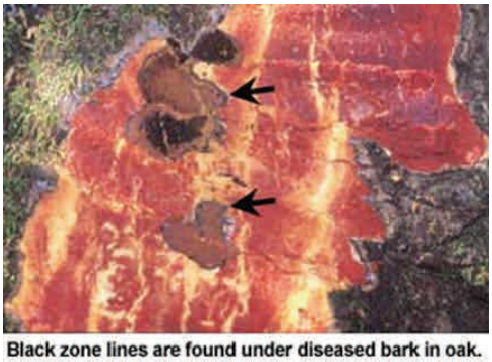
Narrative: Iowa received a trace forward of suspected sudden oak death in 2010 in the Iowa City area. PPQ conducted soil tests that were negative in 2010. Stream baiting, to test for sudden oak death, was funded for the 2012 season. Three streams were selected for baiting based on the proximity to the nursery and nursery holding location.

Three baiting periods, utilizing rhododendron leaves, were conducted in the spring and 4 baiting periods in the fall. Sudden oak death has not been found in Iowa. All stream/river testing has been negative for sudden oak death at this time. The 2013 Forest Health Highlights will detail the results of the 2012 baiting period. If a landowner suspects that they sudden oak death, please contact Tivon Feeley (IDNR Forest Health Program Leader) at 515-281-4915 or Robin Pruisner (State Entomologist) at 515-725-1465.

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

Figures 25 and 26. An example of the oozing canker found on an infected tree. The black lines under the bark are also symptomatic of sudden oak death. (Images: Joseph O'Brien, USDA Forest Service Pest Alert, and Bugwood.org)

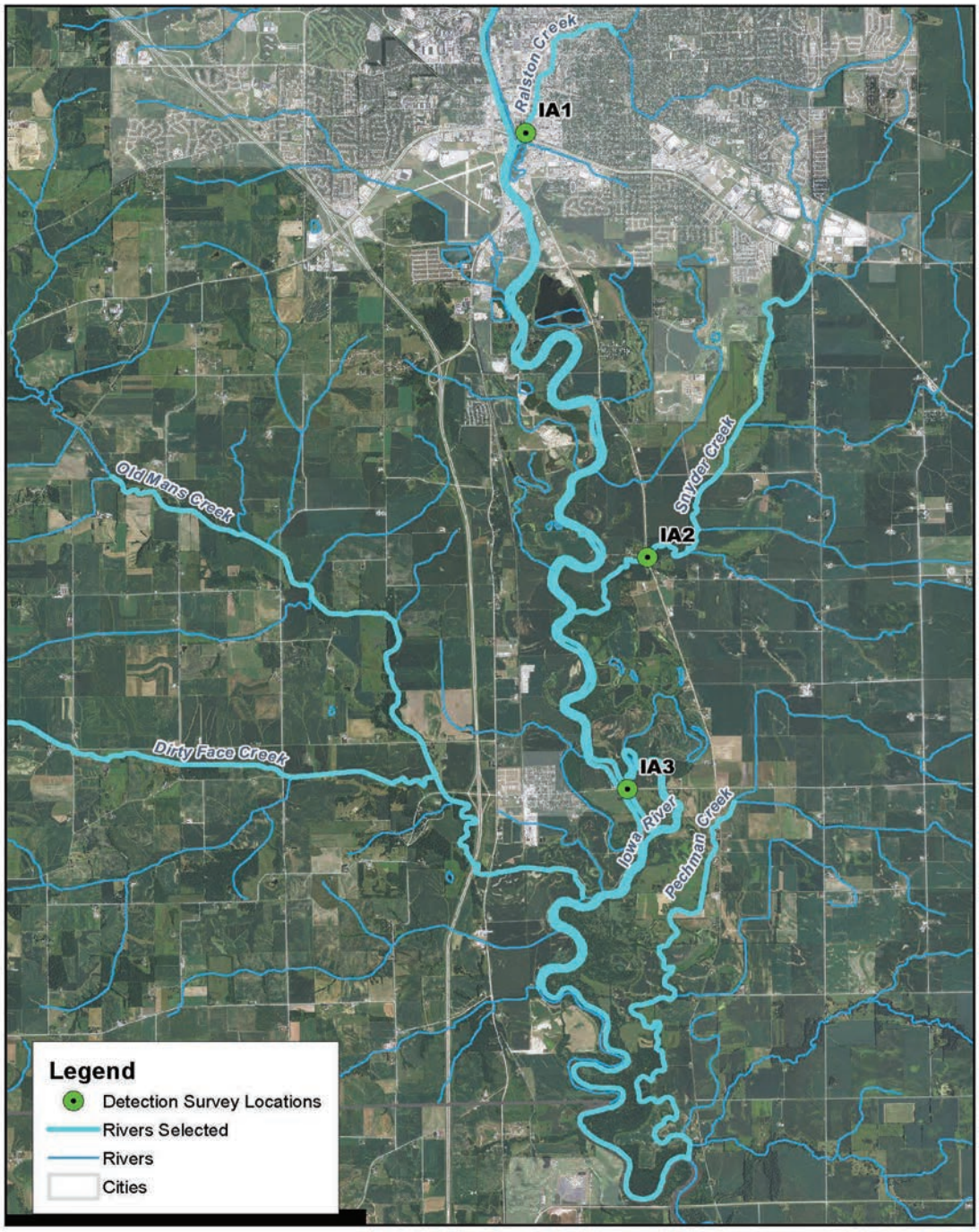
Ooze bleeds from a canker on an infected oak.



Black zone lines are found under diseased bark in oak.

Twenty Major Forest Insects and Diseases: Sudden Oak Death Continued:

Figure 27. Below is a map of the waterways where rhododendron leaves were deployed to help detect *Phytophthora spp*. The waterways were selected based on the proximity of the trace forward in 2010. The waterways were baited in the spring and fall. (Image: Tivon Feeley, IDNR).



Twenty Major Forest Insects and Diseases: Sudden Oak Death Continued:

Figure 28. Rhododendron leaves are being placed in a bait bag . The bait bag is made from mesh screens to allow water to have continual contact with the leaves. (Image: Stephanie Adams, Morton Arboretum).

Figure 29. The bait bag floating in the stream. They were left for two weeks as long as the water was under 22 degrees centigrade. The leaves were sent to the Moron Arboretum and Pennsylvania Department of Agriculture for testing. (Image: Stephanie Adams, Morton Arboretum).

Twenty Major Forest Insects and Diseases: Spruce Beetle

Year 2012
State: Iowa

Forest Pest

Common Name: Spruce Beetle
Scientific Name: *Dendroctonus rufipennis*

Hosts: All Spruce

Setting: N/A

Counties: N/A

Survey Methods: N/A

Acres Affected: N/A

Narrative: No formal survey work was conducted for spruce beetle. No suspect samples were submitted to IDNR or the ISU Plant Diagnostic Clinic. No damage was reported in 2012. Spruce is not native to Iowa, but many species of spruce are planted in windbreaks, plantations, and ornamental plantings. Spruce beetle occurs throughout the natural range of spruce in the boreal forest and western US, but it is not known whether this insect is common in Iowa.

http://na.fs.fed.us/spfo/pubs/fidls/sprucebeetle/sprucebeetle.htm

Figure 30. An example of an adult spruce beetle and the damage they cause on mature trees. (Images: Tim Ebata, BC Ministry of Forests, Forest Practices branch).

Twenty Major Forest Insects and Diseases:

Spruce Budworm

Year 2012
State: Iowa

Forest Pest

Common Name: Spruce Budworm
Scientific Name: *Choristoneura fumiferana*

Hosts: All Spruce and balsam fir

Setting: N/A

Counties: N/A

Survey Methods: N/A

Acres Affected: N/A

Narrative: No formal survey work was conducted for spruce budworm. No suspect samples were submitted to IDNR or the ISU Plant Diagnostic Clinic. No damage was reported in 2012. Balsam fir and spruce are not native to Iowa, but are planted in windbreaks, plantations, and ornamental plantings. Spruce budworm occurs throughout the natural range of spruce and balsam fir in the northeastern US, but it is not known whether this insect is common in Iowa

http://na.fs.fed.us/spfo/pubs/fidls/sbw/budworm.htm

Figure 31. An example of spruce budworm larva and the damage they cause on mature trees. (The first image was scanned from the book "Recent Advances in Spruce Budworms Research" edited by C.J.Sanders et al. Ottawa (Ontario), 1985. The second image is from Joseph O'Brien, USDA Forest Service, Bugwood.org).

Thousand Canker Disease

Year 2012
State: Iowa

Forest Pest

Common Name: Thousand Cankers Disease
Scientific Name: *Pityophthorus juglandis and Geosmithia morbida*

Hosts: Walnut

Setting: Rural Forests, Nursery, and Urban

Counties: Statewide

Survey Methods: Ground, General Observation, and Culturing

Acres Affected: None

Narrative: A total of 428 walnut trees were selected for the 2012 walnut twig beetle survey. A Lindgren four funnel dry trap with the walnut twig beetle pheromone developed by Contech was placed in a declining walnut tree for the survey.

The traps were left on the trees for three weeks before being moved to another tree during the months of May, June, July, August, and part of September. The following beetles were collected during the survey: Xyleborus atratus, Ambrosiodmus tachygraphus, Hylocurus rudis, Xylosandrus germanus, Xyleborinus saxeseni, Xyloterinus politus, Xylosandrus crassiusculus, Pityophthorus lautus, Pityophthorus crinalis, and Pityophthorus consimilis. There were a total of 3,062 ambrosia beeltes, Pityophthorus beetles, and weevils that were collected. There were numerous other beetles, not of concern, collected (i.e. Japanese beetle, June bugs...) but not counted as part of the survey.

The highest beetle captures occurred during the months of May and June. The captures may have decreased after those months because of the extreme drought conditions. Further trapping in 2013 will help determine the trends in Iowa. No walnut twig beetles were identified.

If a landowner has walnut trees that they believe have thousand cankers disease, please contact the ISU Plant Diagnostic Clinic at 515-294-0581.

http://na.fs.fed.us/pubs/palerts/cankers_disease/housand_cankers_disease_screen_res.pdf

Thousand Cankers Disease Background:

Since the 1990's, black walnut has been dying in the Western U.S. The deaths are caused by a walnut twig beetle (Pityophthorus juglandis) that carries a fungus (Geosmithia morbida) which is spread as the beetle tunnels through tree tissues. The insect disease complex is named Thousand Cankers Disease (TCD).

The introduction of TCD into Iowa would have disastrous effects economically to the wood industry in the state and the rest of the nation. Iowa has the third largest volume (1 billion board feet) of saw log size black walnut in the world. Some experts believe that TCD has the potential to decimate black walnut in the same way Dutch elm disease, emerald ash borer, and chestnut blight have destroyed their respective hosts.

Economic Impacts

• The estimated total impact of TCD to Iowa's forest landowner and wood products businesses is more than $1.8 billion or an annualized loss of $72 million in perpetuity for Iowa's economy.

• Other economic losses would include non-timber products like nut production, reduced wildlife habitat and an $859 million cost for tree removal and tree replanting, along with the loss of community tree derived benefits such as energy savings, property value, and storm water retention and carbon sequestration. Communities and homeowners will bear the cost burden of removing dead trees caused by TCD.

Wildlife Impacts

Black walnut has moderate importance to wildlife as a food source. Seeds are eaten by woodpeckers, foxes, and squirrels.

Management Solution

Proper woodland and community tree management have a critical role in creating healthy trees. The best insurance policy a landowner can have when managing their woodlands is by maintaining a diversity of tree species, while ensuring an appropriate number of trees are growing on each acre. The best course of action for communities is to have a tree inventory and a community tree resource plan. Good woodland and tree care under the direction of a forester or an arborist is the best defense against all forest health threats.

(Images top to bottom: Bruce Blair, IDNR; Steven Valley, Oregon Department of Agriculture, Bugwood.org; and Whitney Cranshaw, Colorado State University, Bugwood.org.)

Figure 32. One of the Lindgen funnel traps that were used in conjunction with the walnut twig beetle pheromone. The traps were placed at sawmills, communities, and campgrounds. (Image: Shane Donegan, IDNR)

Figure 33. A look inside the Lindgren Funnel trap capture chamber. The picture shows two pheromone pouches and a 3 inch long strip of dog collar that was used to kill the beetles that entered the capture chamber. (Image: Shane Donegan, IDNR)

Figure 34. Microscopes were used to help identify the beetle captured. The walnut twig beetle is about 1/4 of an inch long. (Image: Shane Donegan, IDNR)

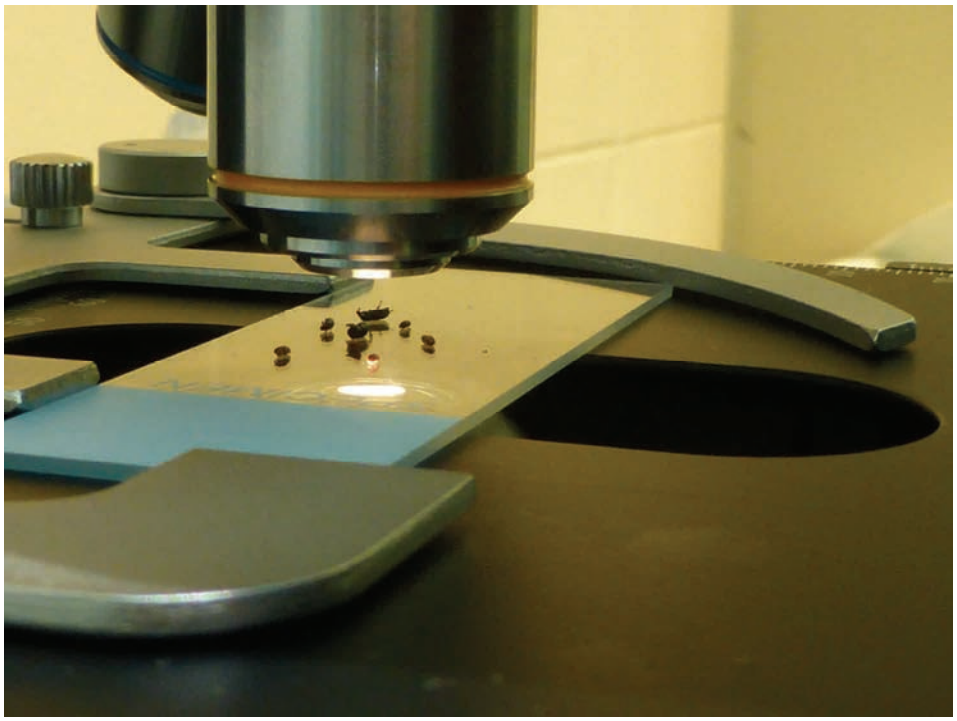


Figure 35. Pictured below is a *Pityopthorus* sp. (not *P. juglandis*) that was captured and sent in for identification. Only the walnut twig beetle (*P. juglandis)* has been shown to carry the thousand cankers disease fungus at this time. (Image: Shane Donegan, IDNR)

Figure 36. The locations of the 428 survey traps and total ambrosia and *Pityopthorus* sp. (not *P. juglandis*) beetles per trap. (Image: Tivon Feeley, IDNR)

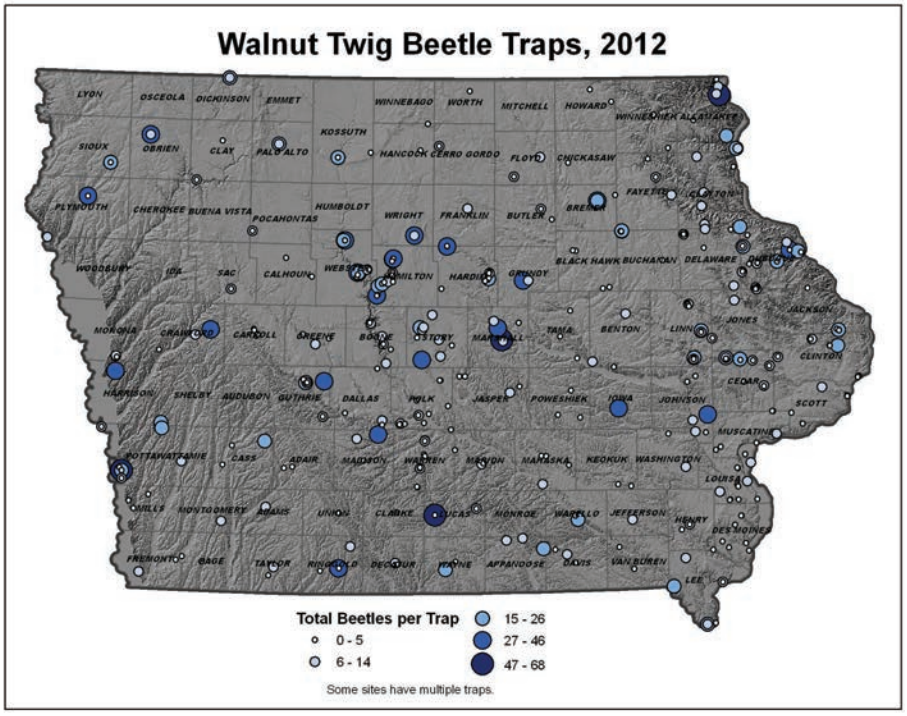


Figure 37. Pictured below is the locations where *Pityopthorus* lautus (not *P. juglandis*) was captured, showing the success of the funnel traps. (Image: Tivon Feeley, IDNR)

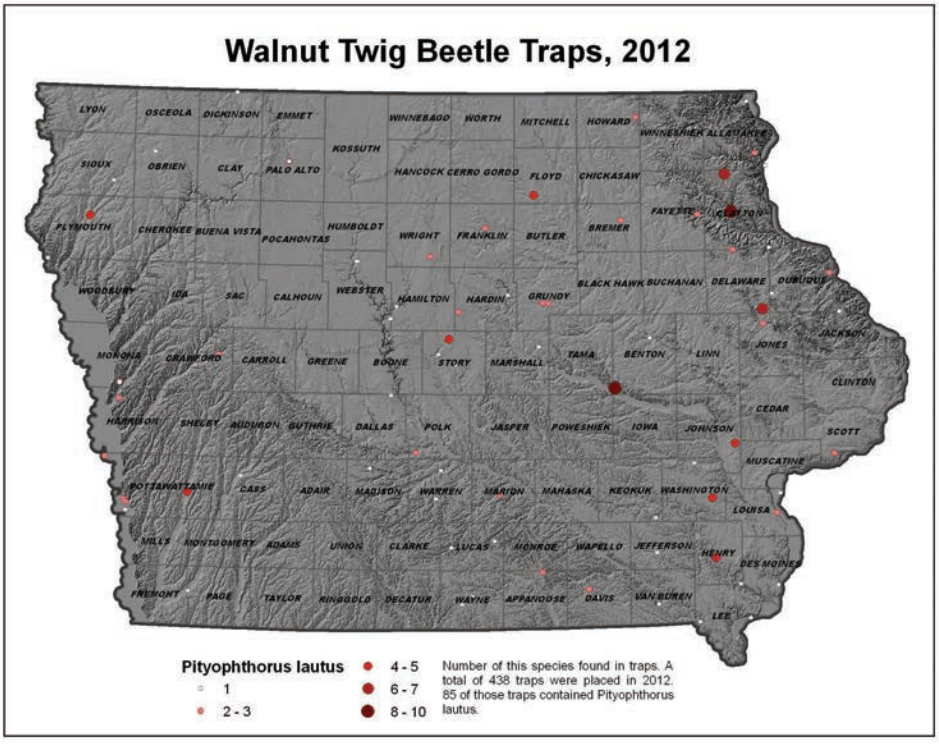


Figure 38. Pictured below is the locations where *Pityopthorus* crinalis (not *P. juglandis*) was captured, showing the success of the funnel traps. (Image: Tivon Feeley, IDNR)

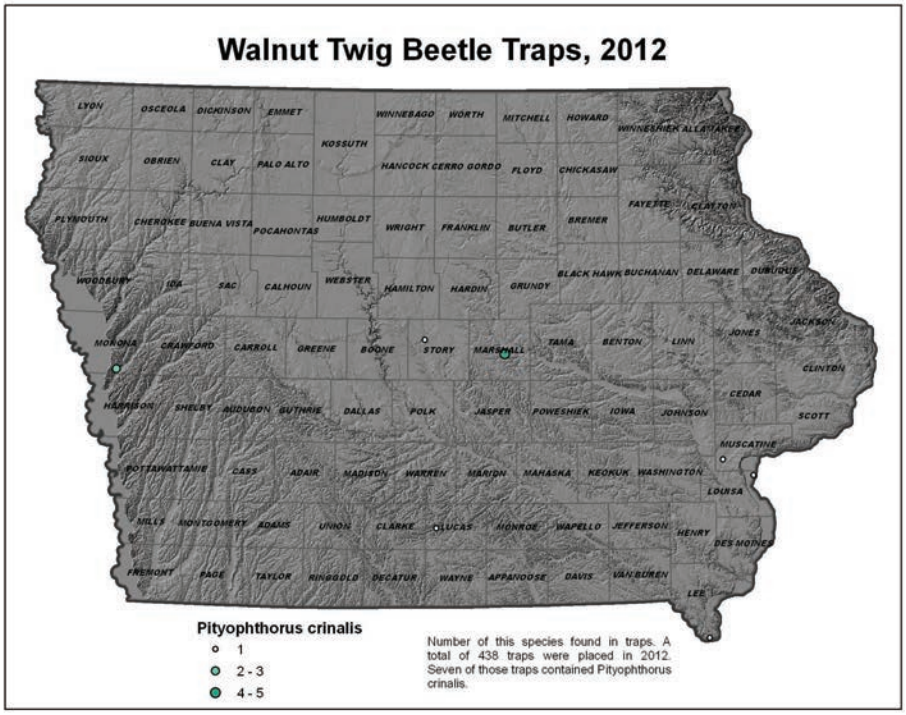
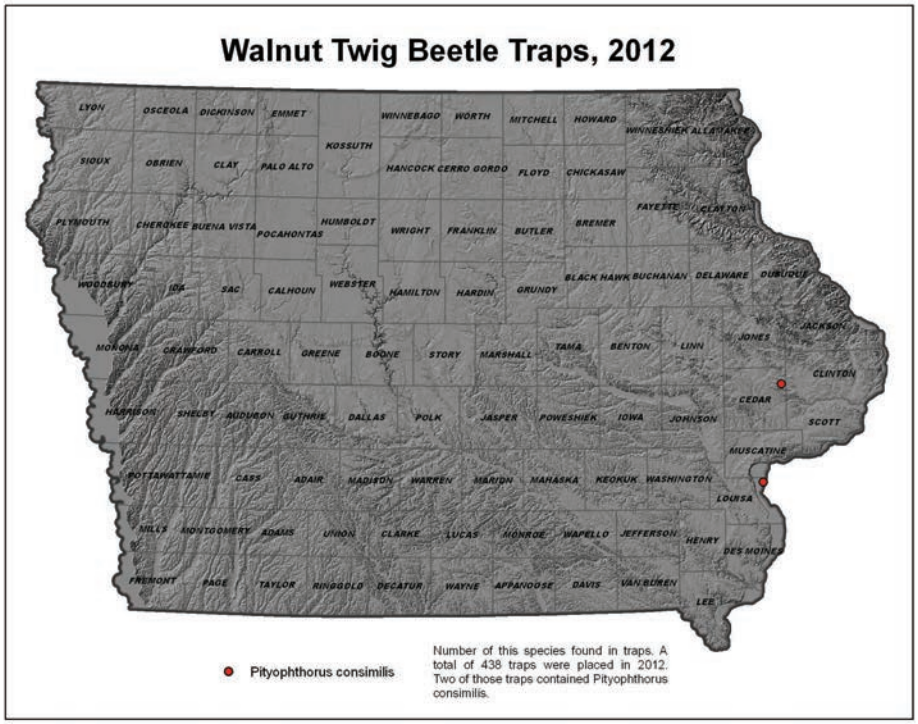


Figure 39. Pictured below is the locations where *Pityopthorus* consimilis (not *P. juglandis*) was captured, showing the success of the funnel traps. (Image: Tivon Feeley, IDNR)



Twenty Major Forest Insects and Diseases: Blister Rust

Year 2012
State: Iowa

Forest Pest

Common Name: White Pine Blister Rust
Scientific Name: *Cronartium ribicola*

Hosts: White Pine

Setting: N/A

Counties: N/A

Survey Methods: N/A

Acres Affected: Unknown

Narrative: White pine blister rust has been identified in Iowa, and is a pest that can occur throughout the native white pine range in Iowa. No additional funds were available to conduct survey work. No suspect samples were submitted to IDNR or the ISU Plant Diagnostic Clinic. No other survey work was conducted for white pine blister rust. If a landowner suspects white pine blister rust they should contact the ISU Plant Diagnostic Clinic at 515-294-0581.

http://na.fs.fed.us/spfo/pubs/howtos/ht_wpblister/toc.htm

Figures 40 and 41. The range map for known areas of white pine blister rust and the rust spores on an infected tree. (Map: USFS Morgantown. Image: Brian Geils, USDA Forest Service, Bugwood.org)

Additional Pest Surveyed: Pine Shoot Beetle Background:

The pine shoot beetle (*Tomicus piniperda* L.) is an introduced pest that attacks 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 of the beetle 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.

Figure 42. The picture below shows the pine shoot beetle and the damage it causes to branches. (Images: Steve Passoa, USDA APHIS PPQ, Bugwood.org)

Twenty Major Forest Insects and Diseases: Pine Shoot Beetle

Year 2012
State: Iowa

Forest Pest

Common Name: Pine Shoot Beetle
Scientific Name: *Tomicus piniperda*

Hosts: All Pines

Setting: Rural Forests, Nursery, and Urban

Counties: Statewide

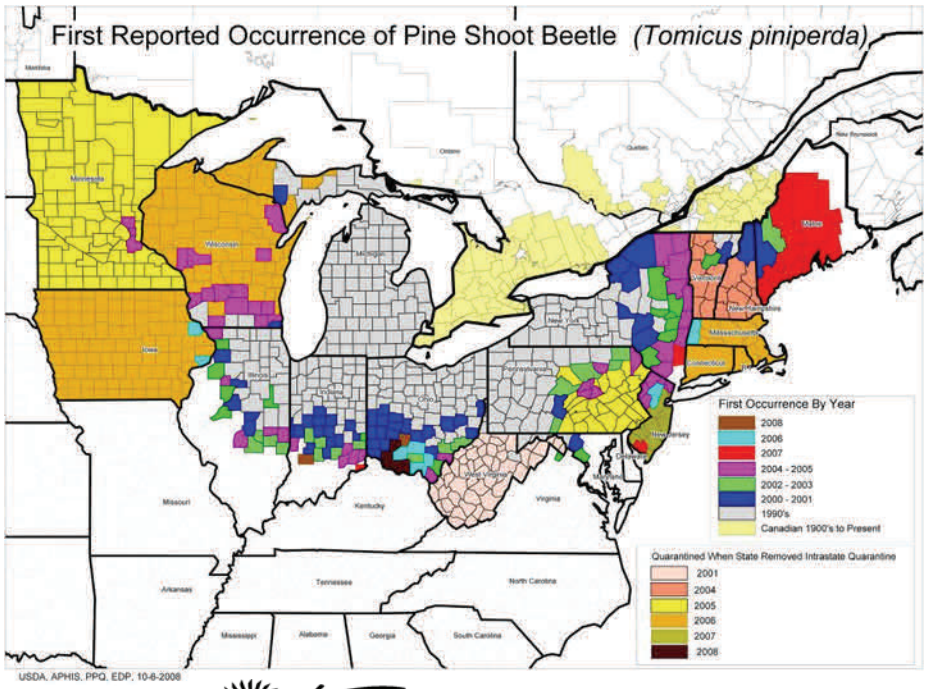
Survey Methods: N/A

Acres Affected: Unknown

Narrative: Pine Shoot Beetle was identified September 18, 2006 and all counties in Iowa were quarantined for pine shoot beetle. Since the entire state is quarantined, no further monitoring has been needed. If a landowner needs assistance with management options for the pine shoot beetle, please contact the ISU Plant Diagnostic Clinic at 515-294-0581.

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

Figure 43. The map below shows the quarantined areas for pine shoot beetle. (Image: byUSDA-APHIS-PPQ, http://www.aphis.usda.gov/plant_health/plant_pest_info/psb/index.shtml).



Additional Pest Surveyed:

Bur Oak Blight

Year 2012
State: Iowa

Forest Pest

Common Name: Bur Oak Blight
Scientific Name: *Tubakia iowensis*

Hosts: Bur oak

Setting: Rural Forests, Nursery, and Urban

Counties: Statewide

Survey Methods: Aerial, Ground, General Observation, and Culturing

Acres Affected: Approximately 3,500 acres

Narrative: Bur oak blight has been recognized in Iowa for only the last 8 years. However, it is suspected that the fungus that causes the disease has probably been here much longer. Theories on why bur oak blight has increased include: a shift in climate temperatures, more frequent rain events, older mature trees might be more susceptible, and that trees are more susceptible on sites that have a history of grazing or construction.

The disease can be found in most counties in Iowa, causing severe decline and mortality. Chemical injections with propiconazole (Alamo) seem to control bur oak blight. However, some chemical burning (phytotoxic effects of the chemical) does occur. This control method works well in urban settings.

Currently, control measures have not been identified for woodland trees. Severely declining bur oaks have been harvested (salvaged) before they die. The estimated acres affected reflect the approximate acres of woodland salvage cuts. This does not reflect the urban damage, which cannot be quantified at this time.

Research is being conducted on various native bur oaks that may have some tolerance to the bur oak blight fungus. Seeds have been collected from bur oaks that seem to show some resistance and are being grown and the IDNR State Forest Nursery in hopes to prevent further damage All samples of bur oak blight should be sent into the ISU Plant Diagnostic Clinic at 515-294-0581. http://na.fs.fed.us/pubs/palerts/bur_oak_blight/bob_screen.pdf

Bur Oak Blight Background:

Bur oak (Quercus macrocarpa) is common across Iowa. In 2011, bur oak ranked second among all tree species as measured in volume of saw timber on forest land. Bur oak provides substantial value for wood products and is an important source of wildlife habitat and mast (acorns) to many game and nongame species. Bur oak blight (BOB; Tubakia iowensis.) is a disease that can cause severe defoliation, leading to mortality of branches or entire trees.

Based on reports of BOB to the Iowa State Plant Insect and Disease Clinic in 2012, 86 counties in Iowa reported the presence of the disease. Those counties contain 90% of Iowa's bur oak.

Economic Impacts

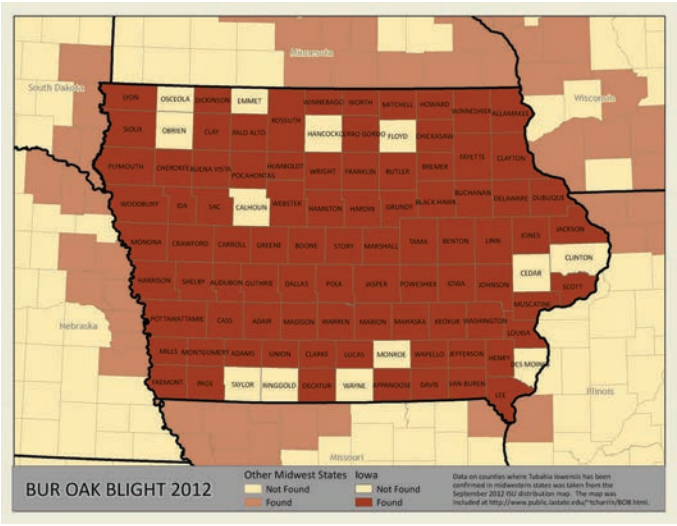
• The total impact of BOB to Iowa's forest landowners and wood products businesses is more than $19 million or an annualized loss of close to $770,000 in perpetuity for Iowa's economy.

• Other economic losses include non-timber products like nut production, reduced wildlife habitat and a $613 million cost for tree removal and tree replanting, along with the loss of community tree derived benefits such as energy savings, property value, storm water retention and carbon sequestration. Communities and homeowners will bear the cost burden of removing dead trees caused by BOB.

• The loss of bur oak within the oak-hickory forest type will negatively impact the economic contribution of $1.5 billion that fish and wildlife recreation provides to Iowa's economy.

Wildlife Impacts

Acorns produced by bur oaks are eaten by many species of birds and mammals. A reduction in the number of bur oak trees in Iowa's forests caused by bur oak blight will affect a wide variety of game and non-game species of wildlife. A primary fall and winter food for deer is acorns, composing around 54% of a deer's yearly diet during years acorn seed is available—otherwise the next preference is corn.



Management Solution

Proper woodland and community tree management have a critical role in creating healthy trees. The best insurance policy a landowner can have when managing their woodlands is by maintaining a diversity of tree species, while ensuring an appropriate number of trees are growing on each acre. The best course of action for communities is to have a tree inventory and a community tree resource plan. Good woodland and tree care under the direction of a forester or an arborist is the best defense against all forest health threats. (Images: Aron Flickinger, IDNR; Map: Created by IDNR based on locations provided by Dr. Harrington, ISU. A full map can be found here: http://www.public.iastate.edu/~tcharrin/BOB.html).

Additional Pest Surveyed:

Dutch Elm Disease

Year 2012
State: Iowa

Forest Pest

Common Name: Dutch Elm Disease
Scientific Name: *Ophiostoma ulmi or Ophiostoma novo-ulmi*

Hosts: Elm

Setting: Rural Forests and Urban

Counties: Statewide

Survey Methods: Ground, General Observation, and Culturing

Acres Affected: All native elm

Narrative: Dutch elm disease was introduced to North America in the 1930's and began killing millions of native elm trees. Dutch elm disease has been identified in all of Iowa's counties, and it's estimated that just over 95 percent of the urban elm trees have succumbed to this disease.

The fungus is native to Asia and was introduced to Europe shortly after World War I. From Europe, it traveled to North America in the 1930's in crates made from infected elm logs. The disease quickly infected elms across the United States since our native elms did not have natural resistance to the introduced pathogen.

Dutch elm disease was reported statewide in 2012. The 2012 season appeared to have a high occurrence of Dutch elm disease, which may be closely related to the severe drought.

http://na.fs.fed.us/spfo/pubs/howtos/ht_ded/ht_ded.htm

Figure 44. Areas were Dutch elm disease is generally known to occur. (Image: Tivon Feeley, IDNR.

Additional Pest Surveyed:

Hickory Decline

Year 2012
State: Iowa

Forest Pest

Common Name: Hickory Decline
Scientific Name: *Fusarium solani* and *Ceratocystis smalleyi*

Hosts: Bitternut Hickory and Occasionally Shagbark Hickory

Setting: Rural Forests and Urban

Counties: Statewide

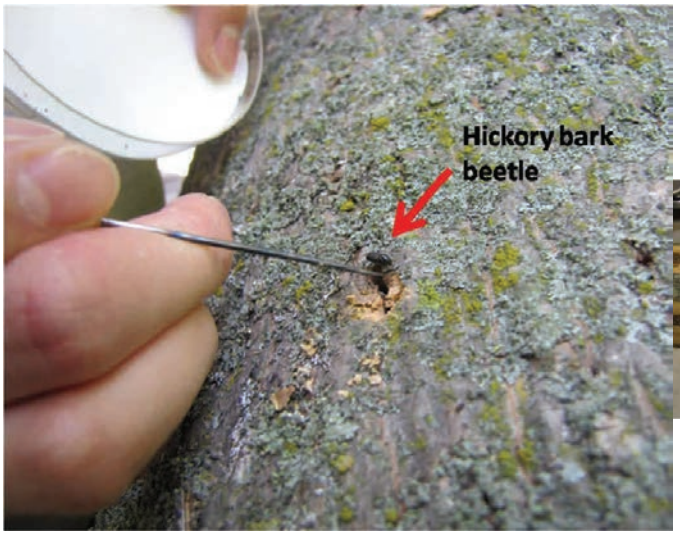
Survey Methods: General Observation

Acres Affected: Approximately 200 acres

Narrative: Hickories have continued to decline statewide. The diseases have become fairly common within the range of bitternut hickory making it difficult to track and estimate the acres impacted. If a landowner suspects hickory decline, they should contact the ISU Plant Diagnostic Clinic at 515-294-0581.

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

Figures 45 and 46. The pictures below shows the hickory bark beetle attack and associated cankers. (Image: Dr. Jennifer Juzwick, USFS).



Additional Pest Surveyed:

Forest Tent Caterpillar

Year 2012
State: Iowa

Forest Pest

Common Name: Forest Tent Caterpillar
Scientific Name: *Malacosoma disstria*

Hosts: Many tree species

Setting: Rural Forests and Urban

Counties: Allamakee, Winneshiek, Howard, Chickasaw, Fayette, Clayton, and Delaware

Survey Methods: Ground and General Observation

Acres Affected: Approximately 1,000 acres

Narrative: Iowa DNR started receiving reports of forest tent caterpillars in Northeast Iowa in late May. Forest tent caterpillars are native and commonly found throughout the United States. The forest tent caterpillars have regional outbreaks every 6 to 16 years.

This is the second year of outbreak of this pest. The populations appear to be dropping and are expected to be less in 2013.

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

Figure 47. The picture below shows the forest tent caterpillars on the main stem of a young tree. (Image: Robert Honeywell, IDNR)

Additional Pest Surveyed: Invasive Plants

Exotic 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, multifora rose, oriental bittersweet, autumn olive, Japanese hops, and Japanese knotweed. 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 2011 Oriental bittersweeet and Japanese knotweed were identified as upcoming threats to Iowa's Forest Health.

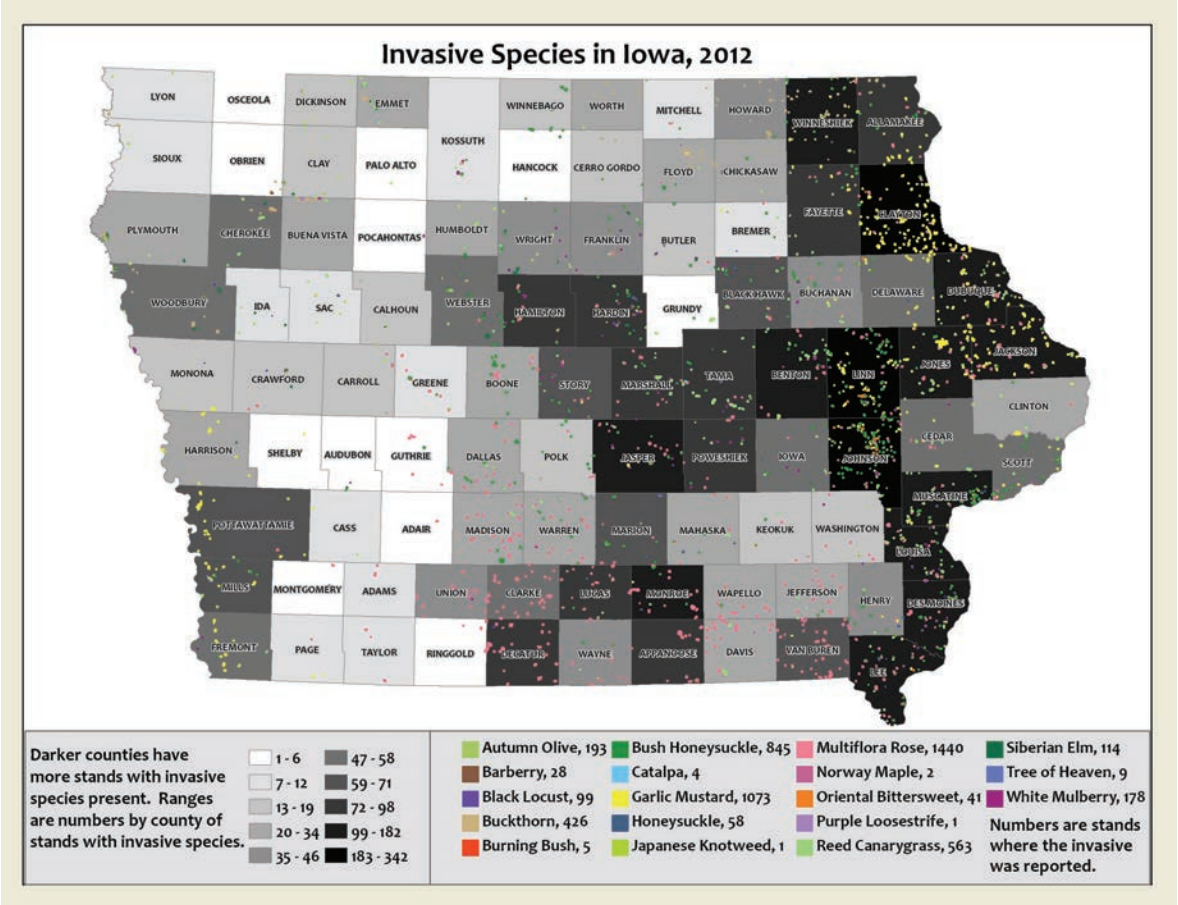
Known Invasive Plants in Iowa 2011

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/beibersteinii	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
Elauagnus angustifolia	Russian olive	I
Elaeagnus umbellate	autumn olive	LA
Euonymus alatus	burning bush	LA
Euphorbia esula	leafy spurge	W
Fallopia japonica	Japanese knotweed	LA
Frangula alnus/Rhamnus frangula	glossy buckthorn	I
Heracleum mantegazzianum	giant hogweed	NP
Hesperis matrionalis	dame's rocket	W
Humulus japonicus	Japanese hop	LA
Lespedeza cuneata	Sericea lespedeza	I

Ligusturm 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
Lonicera japonica	Japanese honeysuckle	LA
Lonicera maackii	Amur honeysuckle	W
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

Figure 48. The map below details the locations of invasive species as identified by DNR District-Foresters in 2012. (Image: Tivon Feeley, IDNR).

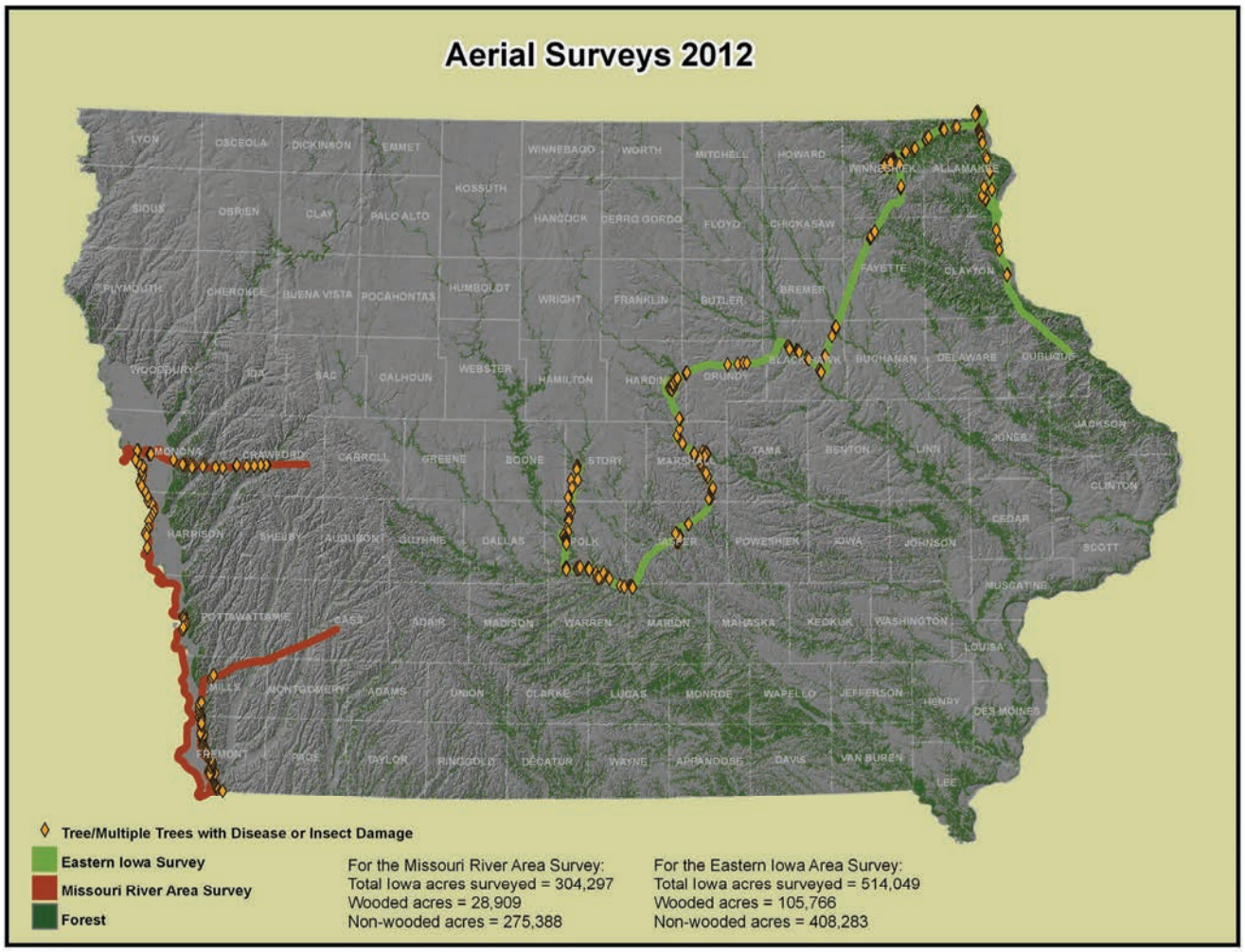


Aerial Survey

Each year the IDNR utilizes an airplane and a laptop with sketch mapping software on it to track forest health issue from above the tree canopy. A total of 683,671 acres of land were surveyed this year. The 2012 survey found severe tree damage and mortality along the Missouri River from the 2011 flooding event. Silver maple and cottonwood trees throughout the state showed chlorotic (yellowing) leaves that started to turn brown with the late summer drought.

Most counties along the route also showed signs of Dutch elm disease and bur oak blight. A large population of lace bugs caused oak leaves to look discolored in late July. Scattered trees with lace bug damage were noticed throughout the state, with most of the tree damage occurring in Eastern Iowa. The aerial flights found the same levels of pine wilt and much higher levels of oak wilt than those that were noted in the 2011 aerial survey. In addition, the aerial flight continued to find large pockets of aspen continuing to decline in NE Iowa. The cause of the aspen decline is unknown at this time.

Figure 49. The map below shows the flight lines where the aerial mapping took place. (Image: Tivon Feeley, IDNR).



Review of Missouri River Flooding:

The Missouri River floods of 2011 lasted from early June through August, with soil saturation lasting well into the fall of the same year. It became clear that many of the native trees would live through spring, but much of the potential native natural regeneration would not survive the extreme drought of 2012. White mulberry, Japanese hops, reed canary grass, and other invasive plants took advantage of the open areas, making it very difficult to impossible for natural regeneration to occur.

Creating clearings to allow for natural regeneration failed to work because of the level of invasive species in the area. To date there has been 71,639 board feet of salvage cuts that IDNR has assisted landowners in conjunction with a management plan. The current market price in the area is 3 cents per board foot. This minimal revenue could go back into managing the invasive plants and replanting.

The current management recommendations are to kill off the invasive plants, create openings, plant seedlings (non cottonwood), and control the invasive plants into the future until the trees can get established. The recommended species to replant include sycamore, silver maple, swamp white oak, and willow. Cottonwood, elm, and boxelder will likely reseed over a few years. Seedlings can be purchased at IDNR State Forest Nursery http://www.iowadnr.gov/Environment/Forestry/StateForestNursery.aspx.

The greatest challenge for forest reestablishment in 2013 comes from the invasive plant pressure and extreme drought condition that the state is already in. It is of utmost importance that the invasive plants be managed as soon as they are found after replanting. Contact you District Forester for management plan assistance http://www.iowadnr.gov/Environment/Forestry/ForestryLandownerAssistance/DistrictForesterContacts.aspx.

Figure 50. The picture below is an example of one of the early finds of Japanese hops after the flood. (Image: Lindsey Barney, IDNR).

Review of Missouri River Flooding Continued:

Figure 51 . The picture below shows how quickly the Japanese hops can take over an area without management. It is extremely important to chemically treat the small plants as they are identified in the plantings. (Image: Lindsey Barney, IDNR).

Figure 52 . The picture below shows how quickly reed canary grass can take over an area with disturbance. (Image: Lindsey Barney, IDNR).

Review of Missouri River Flooding Continued:

Figure 53 . The picture below shows the post salvage cut mortality on Wilson Island State Park. Many cottonwoods continued to decline and die out during the summer. (Image: Shane Donegan, IDNR).

Figure 54 . The picture below shows the amount of sediment deposits left in August 2012. The winds had already blown several feet of sediment off Wilson Island into the Loess Hills. (Image: Shane Donegan IDNR).

Conclusion:

Management plays an important role in creating a healthy Iowa forest. The best insurance a person can have when managing their woodlands is diversity of tree species with the appropriate number of trees per acre. These simple management strategies may help prevent excessive tree loss from a single pest and help maintain the trees' vigor, which may make them more resistant to potentially destructive insects and diseases. The best management plan for community forests is to not have more than 10% of any one species represented. Iowa forests play an important role by providing abundant forest products and amenities, including outdoor recreation opportunities, wildlife habitat, water quality, and the economic benefits of a vast array of wood and wood fiber products.

Iowa's forests are facing an unprecedented level of invasive pests, chemical damage, wildlife pressure, and improper management. Emerald ash borer, gypsy moth, bur oak blight, and thousand cankers disease on walnut could have a 91.6 billion dollar impact on Iowa's woodlands and community trees. No longer will passive management allow for woodlands to be "preserved" in the condition that 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/Environment/Forestry/ForestryLandownerAssistance/DistrictForesterContacts.aspx.

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 2012, and plans are in place for a similar continued vigorous forest health program operation in 2013. However, budget constraints prevented further research of oak tatters, aspen decline, additional oak wilt pockets, and community assistance in managing flood damaged trees along the Missouri River. Additional funds are needed for these important forest health issues to be addressed in 2013.

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

What an irony it is that these living beings whose shade we sit in, whose fruit we eat, whose limbs we climb, whose roots we water, to whom most of us rarely give a second thought, are so poorly understood. We need to come, as soon as possible, to a profound understanding and appreciation for trees and forests and the vital role they play, for they are among our best allies in the uncertain future that is unfolding."
— Jim Robbins, *The Man Who Planted Trees: Lost Groves, Champion Trees, and an Urgent Plan to Save the Planet*

Useful Phone Numbers and Websites

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We're on the Web!
See us at:
www.iowadnr.gov

IDNR Forestry Bureau has an updated forest health page. Check us out on the web http://www.iowadnr.gov/Environment/Forestry/ForestHealth.aspx.

IDNR maintains an emerald ash borer resource page available at http://www.iowadnr.gov/Environment/Forestry/ForestHealth/EmeraldAshBorer.aspx.

Iowa Department of Agriculture and Land Stewardship Tree Health Page http://iowatreepests.com/.

Iowa State University's Pest Management and the Environment page host information on emerald ash borer, gypsy moth and much more http://www.extension.iastate.edu/pme/.

The Iowa State University Plant Disease Clinic has been assisting Iowa for nearly 50 years and is still available to answer plant disease questions. From flowers to trees they are ready to help. Contact them at 515-294-0581 or check them out on the web at http://www.extension.iastate.edu/Pages/plantpath/pdcintro.html.

For the creepy and crawling things on your plants, don't forget to contact Iowa State University Extension Entomology. They can help you identify the insect and discover the best control measures. Contact them 515-294-1101 or on the web at http://www.ent.iastate.edu/clinic/.

IDNR landowner assistance web page is located here http://www.iowadnr.gov/Environment/Forestry/ForestryLandownerAssistance.aspx.

Be sure to look at the updated Iowa DNR website at http://www.iowadnr.gov/.

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