December 2014

Iowa's Forest Health Highlights

IDNR, Forestry Bureau 515-725-8453

Special Interest Articles:

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

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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 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 2014 Forest Health Highlights will focus first on the Forest Service's Major Forest Pest List (Page 4) and then cover the additional damaging agents that IDNR surveyed.

Weather Review:

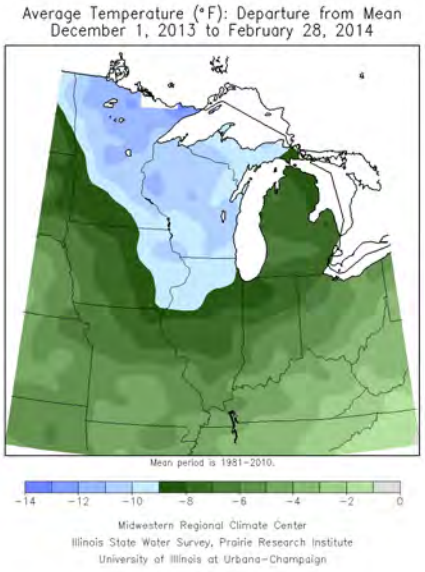
This winter brought about several challenges for Iowa with colder than average temperatures and slightly lower precipitation. The colder temperature (5-10° colder than average) was occasionally broken by several days in January that went above freezing, which caused many conifers to break winter dormancy. The repeated breaks in winter dormancy allowed for winter desiccation and eventual tree death in many conifer species throughout the state.

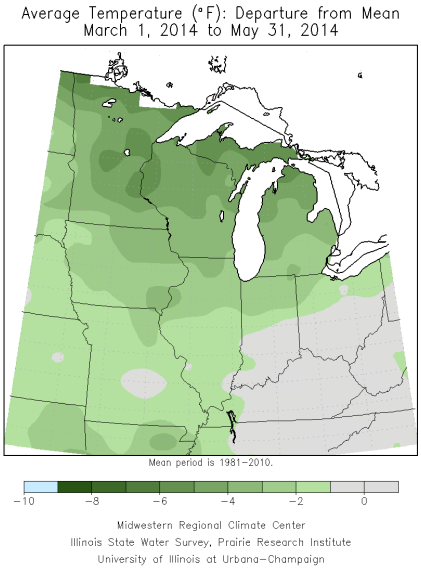
The entire state experienced a much cooler than normal spring with most all of Iowa receiving normal rainfall events. The cooler spring helped encourage the occurrence of Anthracnose (a fungal leaf disease) on sycamore and maple throughout the state.

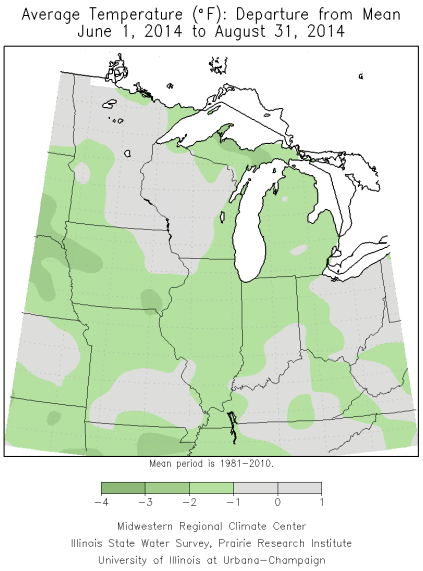
Most of the state experienced slightly cooler than normal summer temperatures and summer rainfall events were much higher than normal statewide. The prior year's drought conditions were broke in June by heavy statewide rainfall (125-175% more rainfall). These extreme moist conditions seem to have intensified the development of a variety of benign fungal leaf diseases.

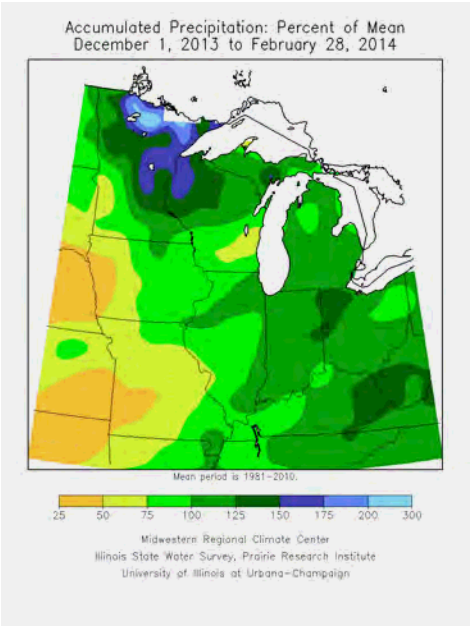
IDNR will continue to monitor the winter effects on the conifers in Iowa. Utilizing deciduous trees in windbreaks instead of conifers may be more successful in the long term based on the past five Forest Health Highlight's weather review, potential impacts from insects, and potential impacts from needle blights and other fungi. The conifers appear to do better as a single specimen yard tree that is protected from the elements and has adequate airflow to reduce the fungal diseases. Deciduous trees tend to have less environmental problems, grow faster, and can provide benefits sooner than the

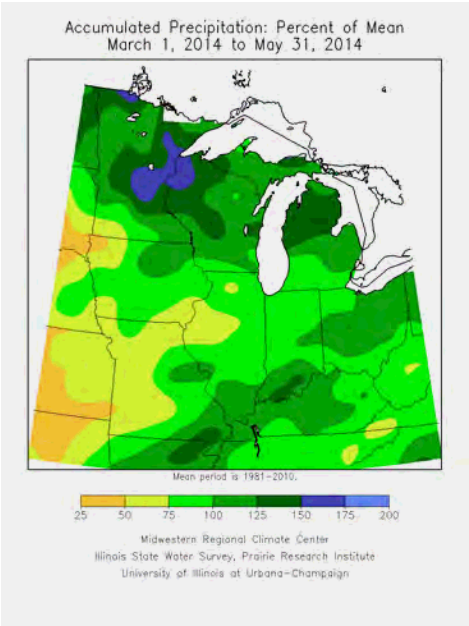
Weather Review Continued:

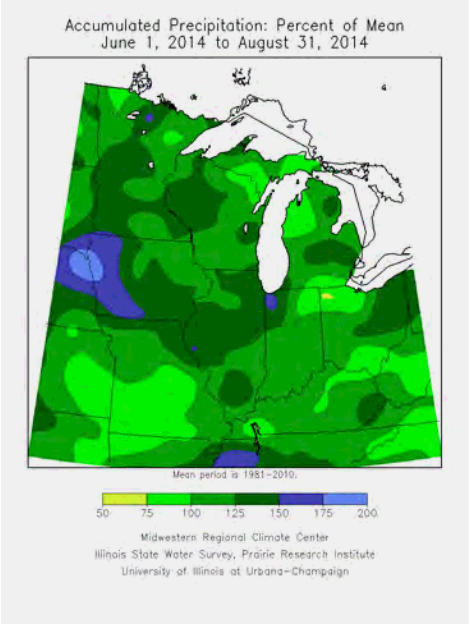






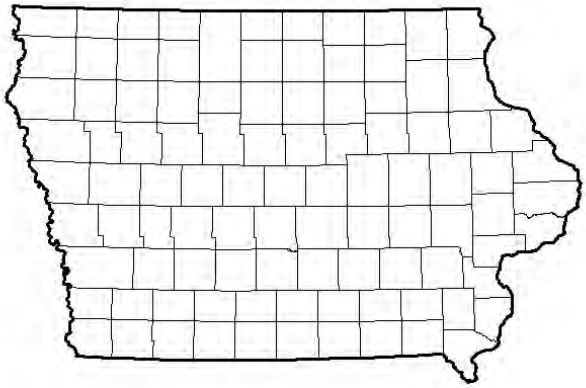






Images provided by Midwest Climate Watch http://mcc.sws.uiuc.edu/cliwatch/watch.htm.

Weather Review Continued:



U.S. Drought Monitor
Iowa

November 4, 2014
(Released Thursday, Nov. 6, 2014)
Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	100.00	0.00	0.00	0.00	0.00	0.00
Last Week 10/28/2014	100.00	0.00	0.00	0.00	0.00	0.00
3 Months Ago 8/5/2014	99.13	0.87	0.00	0.00	0.00	0.00
Start of Calendar Year 12/31/2013	23.40	76.60	52.56	19.70	0.00	0.00
Start of Water Year 9/30/2014	99.99	0.01	0.00	0.00	0.00	0.00
One Year Ago 11/5/2013	11.23	88.77	68.27	27.26	1.76	0.00

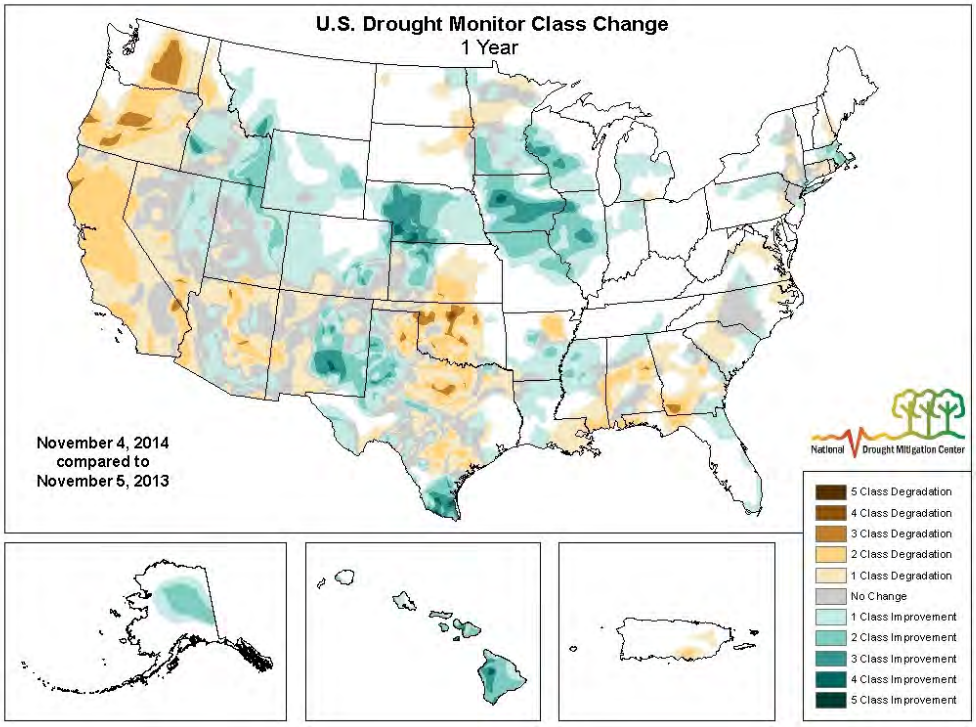
Intensity:

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

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

Author:
Matthew Rosencrans
CPC/NCEP/NWS/NOAA

http://droughtmonitor.unl.edu/



http://droughtmonitor.unl.edu

Land Characteristics:

Iowa has approximately 2.96 million acres of forested land representing a decrease from 3.1 million acres in 2012. 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 1.06 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 7,500 acres of red and white oak from 2003-2013 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*.

This project was funded in part through a grant awarded by the USDA, Forest Service, Northeastern Area State and Private Forestry. The USDA is an equal opportunity employer.

United States Forest Service Major Pests List

(This is a national list, pests highlighted in red do not pertain to Northeastern Area and do not need to be reported on.) (The items in blue have no known impact in Iowa at this time.)

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 longhorned beetle

Year 2014
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: Ground

Acres Affected: N/A

Narrative: Asian long-horned beetle has not been identified in Iowa. State Legislative Funds allowed IDNR to follow up on 1,418 maples that were identified in 2010, 2011, 2012 and 2013 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).

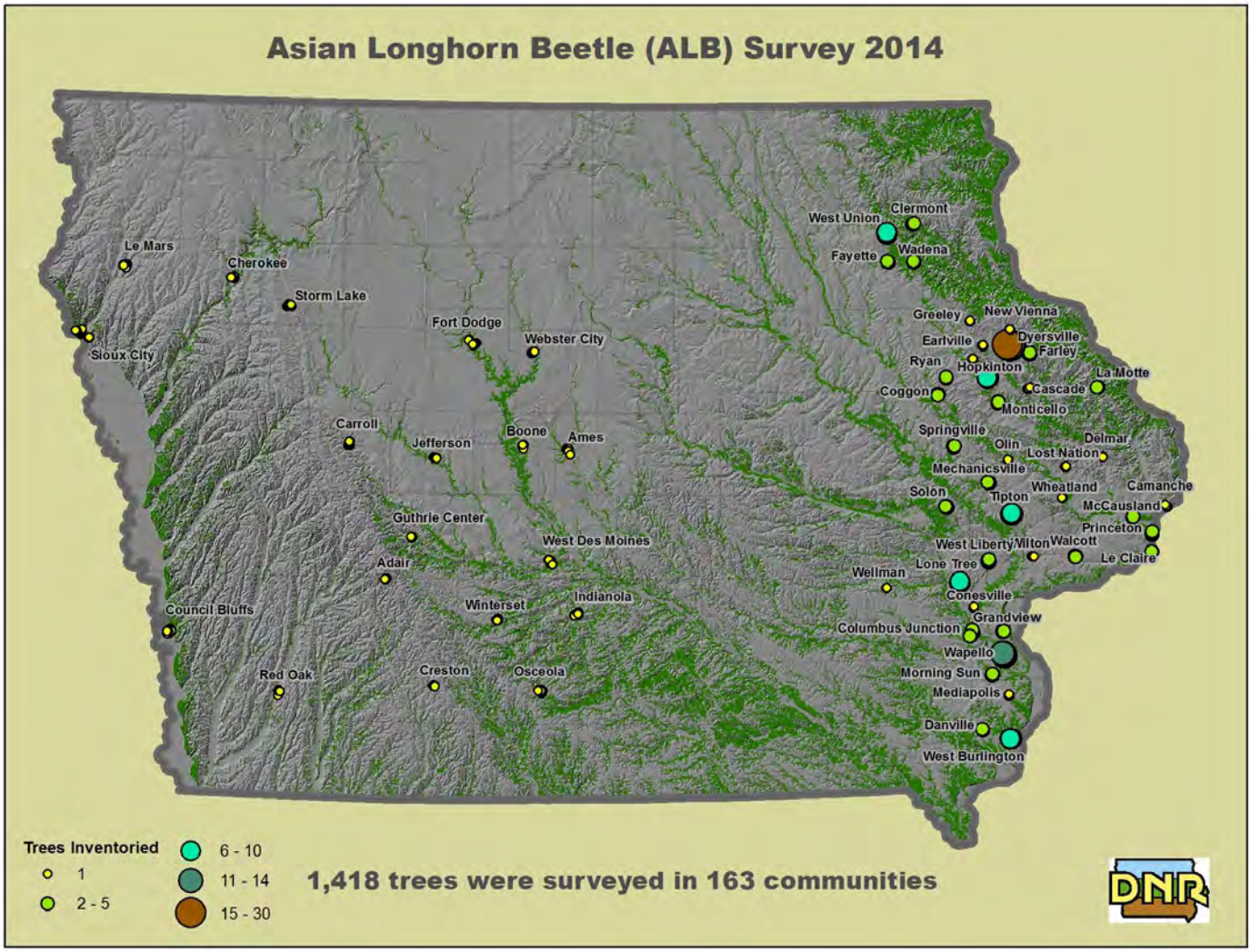
All 1,418 maples were visually examined for ALB exit hole using binoculars. Branches from suspect trees were removed and destructively sampled. No indications of ALB were found any of the surveyed trees in 2014.

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 long-horned beetle Continued:

Figure 2. Survey location where the 1,418 declining maples were examined for Asian longhorned beetle exit holes.



Twenty Major Forest Insects and Diseases: Butternut Canker

Year 2014
State: Iowa

Forest Pest

Common Name: Butternut Canker
Scientific Name: *Ophiognomonia 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 has previously 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 2014.

No formal survey work was conducted on butternut canker in 2014. No suspect samples were submitted to IDNR. No damage was reported in 2014.

If a landowner needs assistance with butternut canker, please contact Tivon Feeley (IDNR Forest Health Program Leader) at 515-275-8453 or the ISU Plant Diagnostic Clinic at 515-294-0581.

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

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: Emerald Ash Borer

Year 2014
State: Iowa

Forest Pest

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

Hosts: All Ash (*Fraxinus)* species

Setting: Rural Forest, Nursery, Urban

Counties: Allamakee, Appanoose, Cedar, Bremer, Black Hawk, Boone, Cedar, Des Moines, Henry, Jasper, Jefferson, Johnson, Lucas, Mahaska, Marion, Monroe, Muscatine, Story, Union, and Wapello.

Survey Methods: Ground, General Observation, and Trapping

Acres Affected: Approximately 19,000 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 in Appanoose, Cedar, Bremer, Black Hawk, Boone, Cedar, Des Moines, Henry, Jasper, Jefferson, Johnson, Lucas, Mahaska, Marion, Monroe, Muscatine, Story, Union, and Wapello counties. Since the insect was already widespread, a statewide quarantine was issued February 4, 2014.

IDNR visually inspected 321 ash trees in 21 counties in 2014. The surveys found EAB in Boone, Cedar, and Jefferson Counties.

Unlike previous years, purple traps were not placed on a grid by PPQ. Instead, they were made available to IDNR and IDALS to place on suspect trees to help determine if EAB is present. This tool helped confirm that EAB was in Boone county this year.

If a landowner has an ash tree that they believe has emerald ash borer please contact Tivon Feeley (IDNR Forest Health Program Leader) at 515-7255-8453 or Robin Pruisner (State Entomologist) at 515-725-1465.

http://www.emeraldashborer.info/

http://www.iowadnr.gov/eab

Emerald Ash Borer Background:

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 look similar to white grubs 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 percent 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 2012 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 EAB killed trees 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 **$4.1 billion** loss of community tree derived benefits such as energy savings, property value, storm water retention, carbon sequestration and tree removal and replacement costs. 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. Locations of the emerald ash borer infestations as of December 2014. Please note that the entire State of Iowa is now quarantined for EAB. The target circles around each infestation represents a 15 miles radius. The current recommendations from the Iowa EAB Team is not to chemically treat an ash tree until that tree is within 15 miles of a known infestation. The target circles are done to assist landowners that are considering chemical treatments in making a decision. The red asterix indicates that an adult beetle was found in Johnson County, but an infestation has not yet been identified. (Image: Tivon Feeley, IDNR).

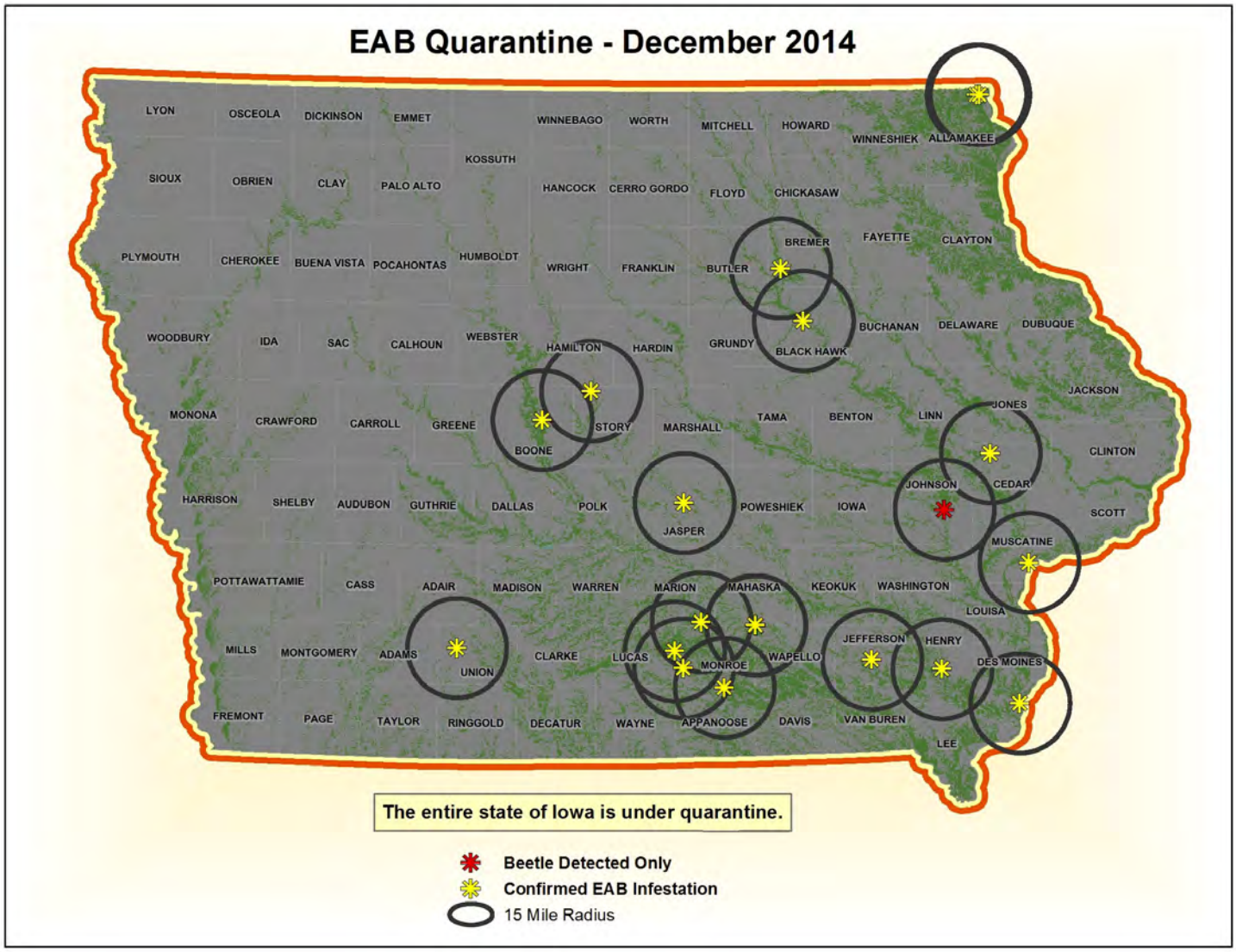


Figure 9. Locations of the current quarantined counties or states for emerald ash borer. IDNR and partners will continue to trap and monitor the state through 2015.

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

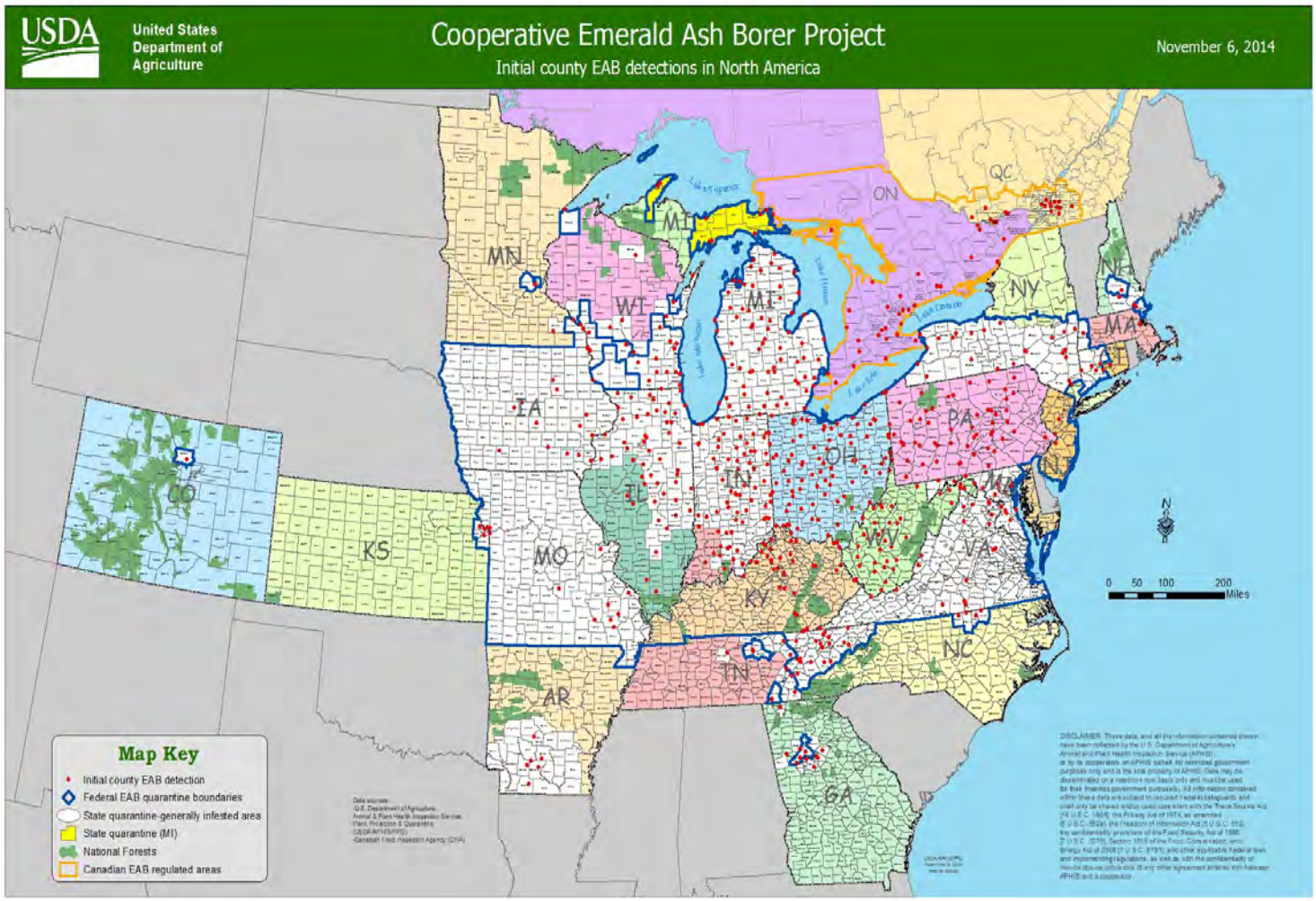


Figure 10. The map below details the locations where the community street tree inventories have been conducted. Every publicly owned ash street tree was inspected for signs and symptoms of emerald ash borer following the US Forest Service's Emerald Ash Borer Survey Guidelines. A total of 250 communities of the 302 inventoried have received urban forest management plans that include ash phloem reduction and tree diversification. (Image: Tivon Feeley, IDNR).

Twenty Major Forest Insects and Diseases: Gypsy Moth

Year 2014
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 269 male moths in 2013, 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 46 male moths is low and the moth captures were not concentrated. No mating disruption treatments will occur in 2015.

Iowa participates in a National "Slow the Spread: project that evaluates the moth captures and recommends treatment options. The computer algorithm did not assign any treatment blocks for 2015. The algorithm did identify four area to delimit (add more traps) and monitor during the 2015 trapping season. Overall, this was the lowest gypsy moth capture in the state since 2006.

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 midwest.
- 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 occurring in generally infested areas, the STS project focuses on populations in the area between that of general infestation and generally uninfestation. 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:

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.

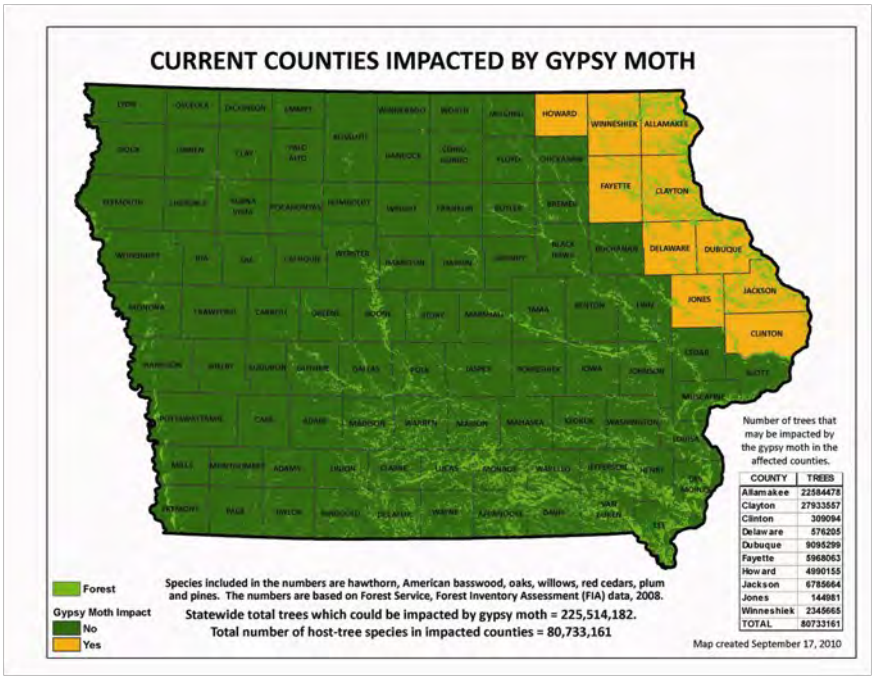
ECONOMIC IMPACTS

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 **$6.8 billion** loss of community tree derived benefits such as energy savings, property value, storm water retention, carbon sequestration and tree removal and replacement costs. 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 and non-game species of wildlife. A primary fall and winter food for deer is acorns, composing around 54 percent of a deer's yearly diet during years acorn seed is available—otherwise the next preference is corn.

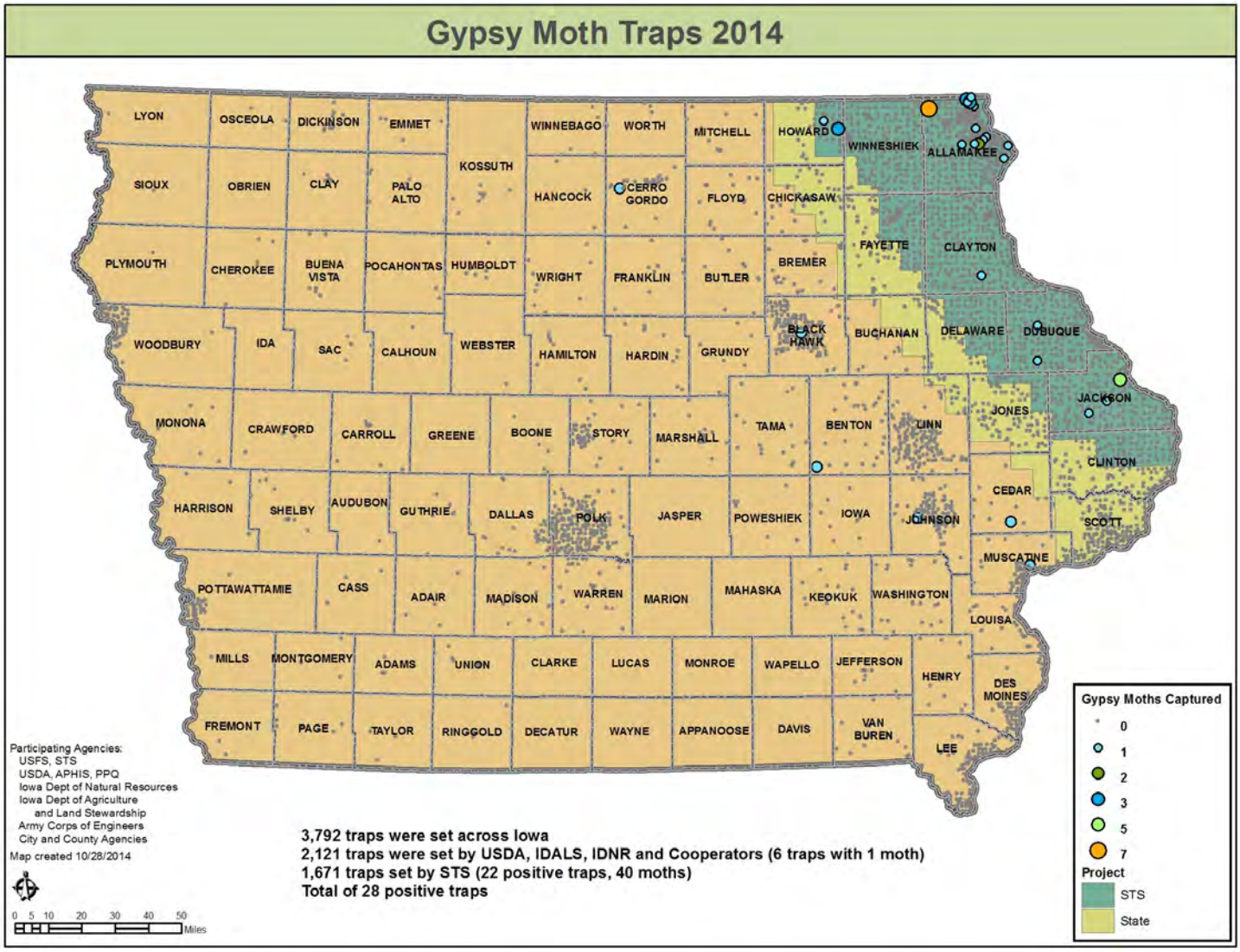


COUNTY	TREES
Allamakee	22584478
Clayton	27933557
Clinton	309094
Delaware	576205
Dubuque	9095299
Fayette	5968063
Howard	4990155
Jackson	6785664
Jones	144981
Winneshiek	2345665
TOTAL	80733161

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: USDA APHIS PPQ, Bugwood.org, and Tivon Feeley, IDNR).

Figure 11. The map below details the locations of all the gypsy moth traps and the number of moths captured in them during the 2014 trapping season. The total male moth capture was 46 male moths. This number is down from the 2013 capture of 269 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. (Image: Tivon Feeley, IDNR).



Twenty Major Forest Insects and Diseases: Heterobasidion Root Disease

Year 2014
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 State Forest. 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 12 Example of heterobasidion root disease. (Image: William Jacobi, Colorado State University, Bugwood.org)

Twenty Major Forest Insects and Diseases: Oak Wilt

Year	2014
State:	Iowa

Forest Pest

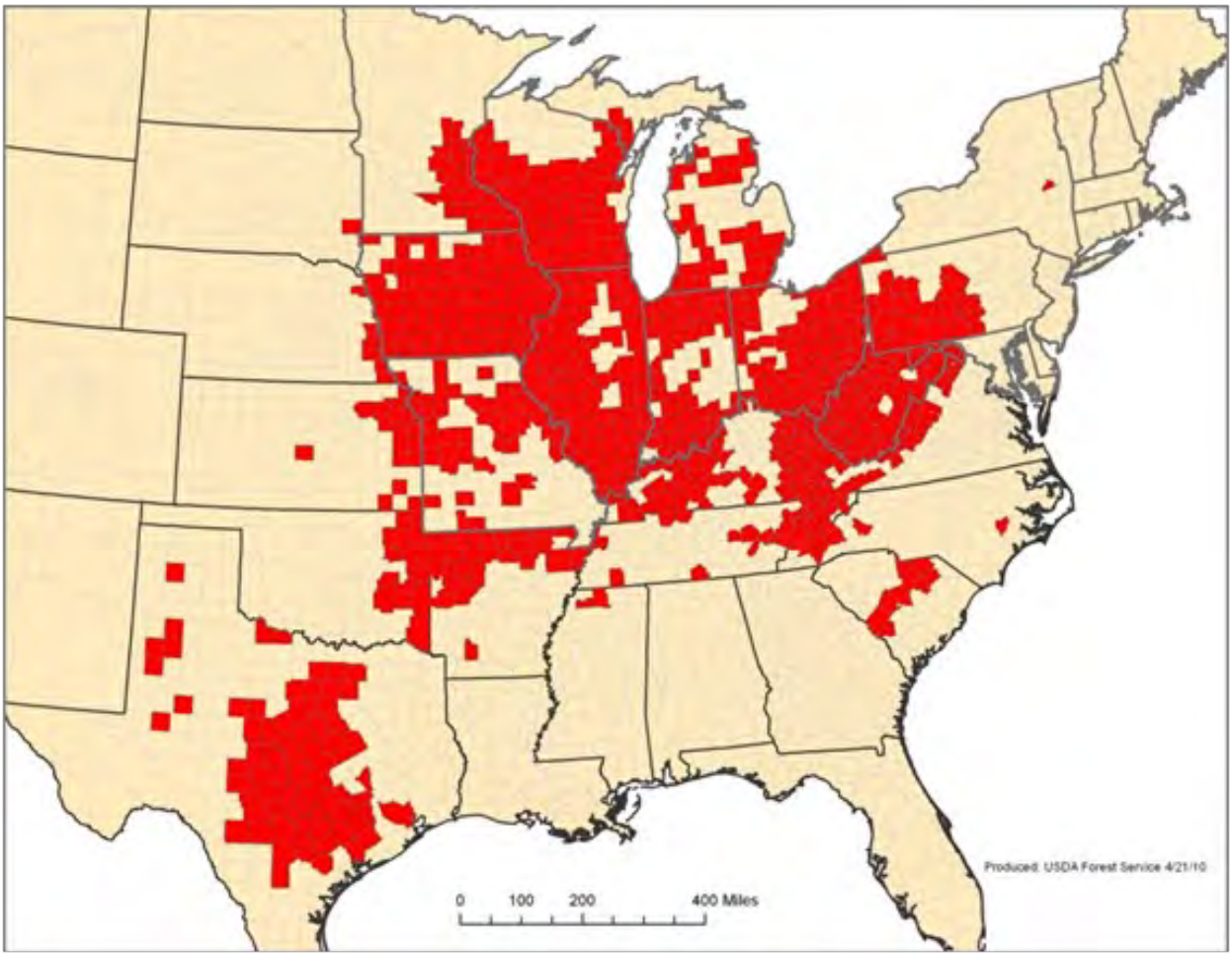
Common Name: Oak Wilt
Scientific Name: *Ceratocystis fagacearum*

Hosts:	All Oak Species
Setting:	Woodlands and Urban
Counties:	Statewide
Survey Methods:	Aerial and Ground
Acres Affected:	3,958 ground acres
Narrative:	IDNR received very few oak wilt samples this year. There were a total of 61 oaks tested for oak wilt and only 29 trees were positive for oak wilt. All trees were cultured and oak wilt was confirmed by fungal morphology. The majority of the samples came from the southern half of Iowa. IDNR helped develop two management plans in 2014. IDNR followed up on the management plans implemented in 2013 and found very little evidence of oak wilt spread. At this time, it appears that the control efforts works have prevented the spread of oak wilt. IDNR will continue to monitor these plots in 2015 to ensure that oak wilt remains under control. 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

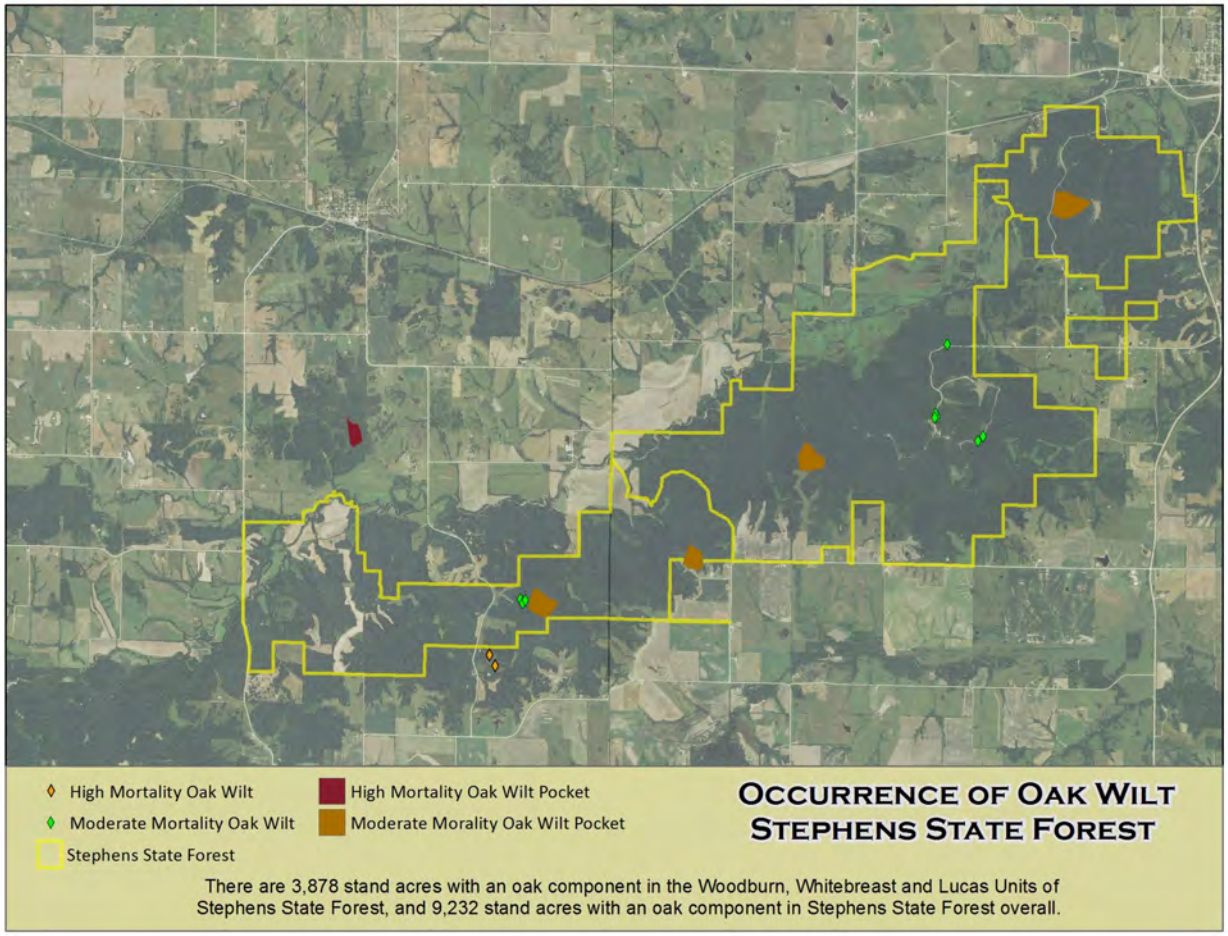
Twenty Major Forest Insects and Diseases: Oak Wilt Continued:

Figure 13. 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: Oak Wilt Continued:

Figure 14. The map below details the occurrence of wilt as diagnosed by the IDNR Lab at the Stephens State Forest. A variety of management plans including salvage cuts, trenching, and chemical girdling have been developed. IDNR will follow up in 2015 to determine the success of controlling oak wilt at the Stephens State Forest. (Image: Tivon Feeley, IDNR).



Twenty Major Forest Insects and Diseases: Sudden Oak Death

Year 2014
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

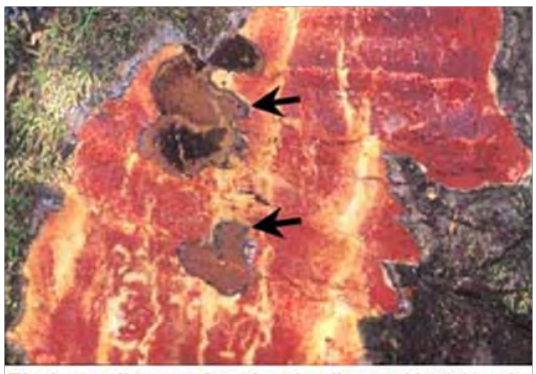
Narrative: Iowa received notice of several "trace forward" of suspected sudden oak death in 2014, meaning that potentially infected plant material had been shipped to Iowa. The areas included Ames, Ankeny, Burlington, Coralville, Davenport, Dubuque, Kalona, Waterloo, and West Des Moines areas. PPQ conducted plant testing that was all negative. Stream baiting, to test for sudden oak death was not conducted in 2014 and is not planned for 2015. The plant testing and early detection results indicate that there is no threat at this time.

If a landowner suspects that they sudden oak death, please contact Tivon Feeley (IDNR Forest Health Program Leader) at 515-725-8453 or Robin Pruisner (State Entomologist) at 515-725-1465.

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

Figures 15 and 16. 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: Thousand Canker Disease

Year 2014
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 1,125 walnut trees were selected for the 2014 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 species 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*. Two undescribed subspecies of *Pityophthorus lautus* were collected this year. There were a total of 8,307 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 decreased after those months despite the lack of drought conditions. Further trapping in 2015 will help determine the trapping trends in Iowa. No walnut twig beetles were identified. In addition to *Pityophthorus juglandis,* a weevil *Stenomimus pallidus* has now been associated with Thousand Cankers Disease. It is not know if this weevil occurred in any of the traps during 2014. 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:

BACKGROUND

Since the 1990's, black walnut has been dying in 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 had been 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 (979 million 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 **$547 million** or an annualized loss of **$43 million** in perpetuity for Iowa's economy.

Other economic losses would include non-timber products like nut production, reduced wildlife habitat and a **$1.3 billion** loss of community tree derived be fits such as energy savings, property value, storm water retention, carbon sequestration and tree removal and replacement costs. 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 17. 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 18. 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 19. 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)

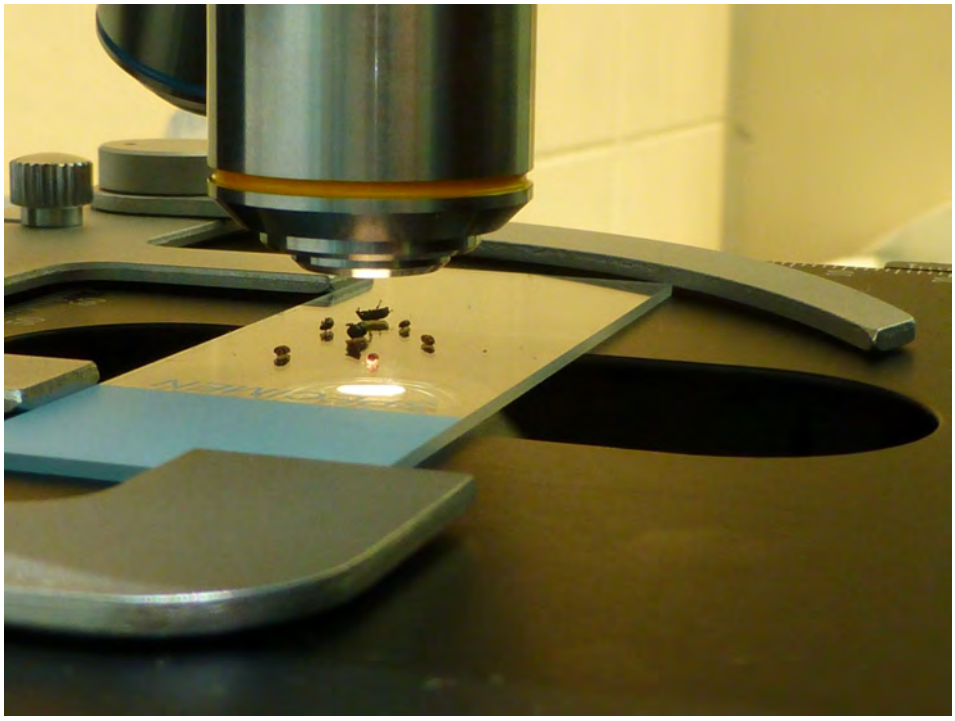


Figure 20. Pictured below is a *Pityopthorus* sp. (not *P. juglandis*) that was captured and sent in for identification. (Image: Shane Donegan, IDNR)

Figure 21. The locations of the 92 survey traps and total ambrosia and *Pityopthorus* sp. (<u>not</u> *P. juglandis*) beetles per trap. (Image: Tivon Feeley, IDNR)

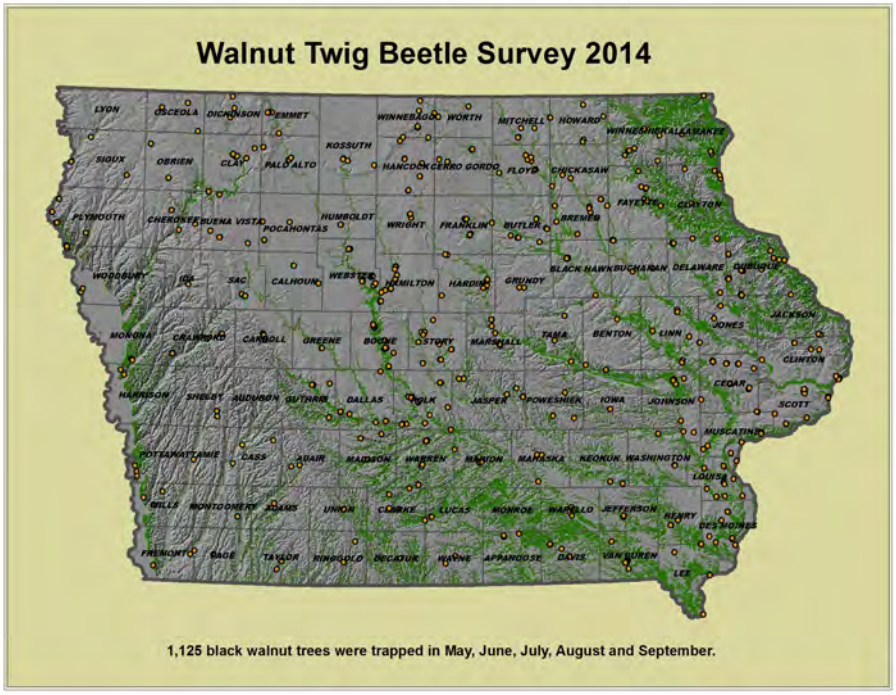


Figure 22. Pictured below is the locations where *Pityopthorus* lautus (<u>not</u> *P. juglandis*) was captured, showing the success of the funnel traps. (Image: Tivon Feeley, IDNR)

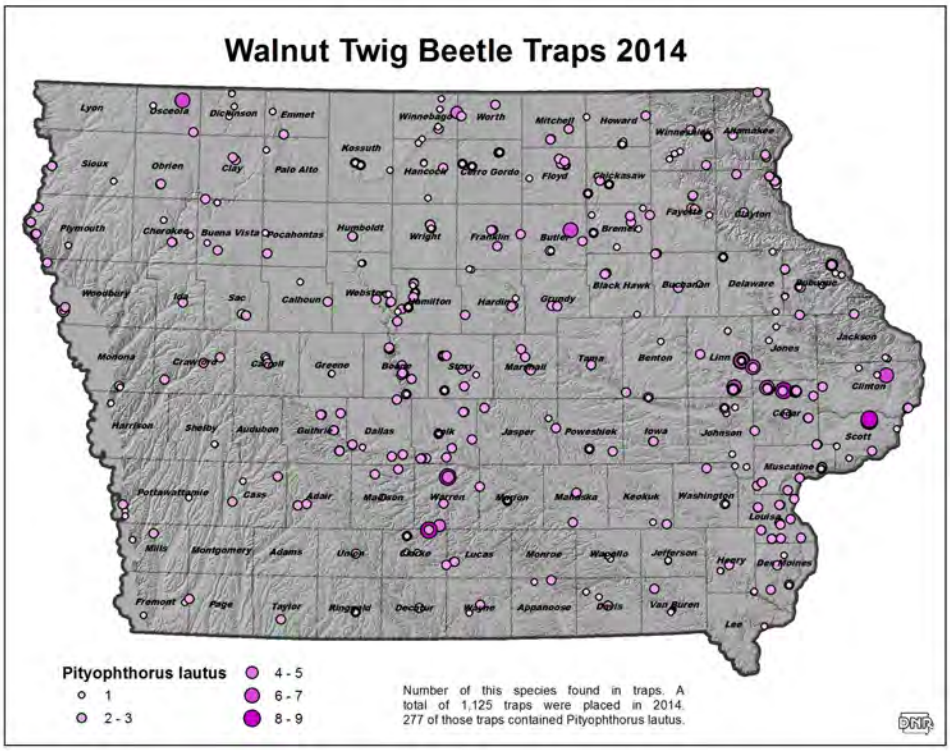


Figure 23. Pictured below is the locations where *Pityopthorus* crinalis (not *P. juglandis*) was captured, showing the success of the funnel traps. (Image: Tivon Feeley, IDNR)

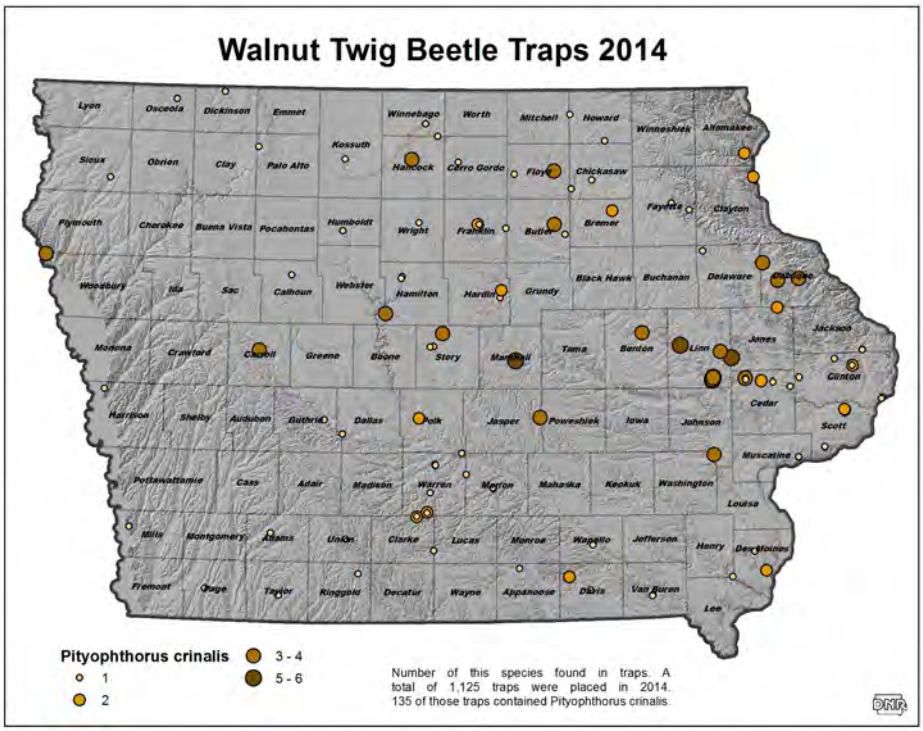
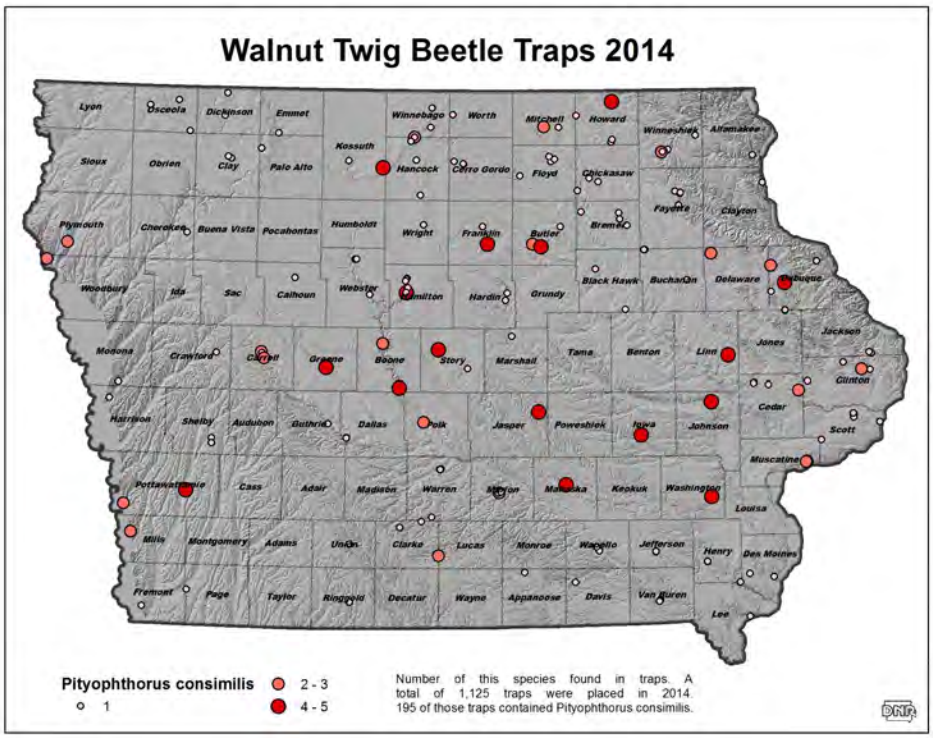


Figure 24. Pictured below is the locations where *Pityopthorus* consimilis (not *P. juglandis*) was captured, showing the success of the funnel traps. (Image: Tivon Feeley, IDNR)



Twenty Major Forest Insects and Diseases: Blister Rust

Year 2014
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 25 and 26. 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

Year 2014
State: Iowa

Forest Pest

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

Hosts: All Pines

Setting: Rural Forests, Nursery, and Urban

Counties: Statewide

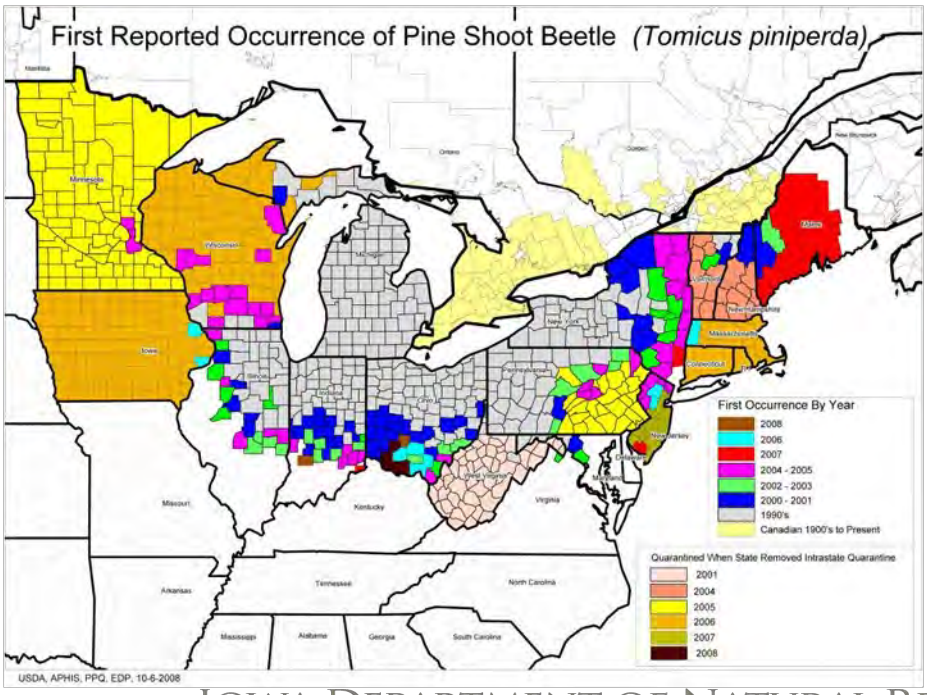
Survey Methods: N/A

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



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

Additional Pest Surveyed:

Bur Oak Blight

Year 2014
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 2,000 acres

Narrative: Bur oak blight has been recognized in Iowa for only the last 10 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:

BACKGROUND

Bur oak (*Quercus macrocarpa*) is common across Iowa. In 2008, 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 non-game species. Bur oak blight (BOB; *Tubakia spp.*) is a newly named disease that can cause severe defoliation, leading to mortality of branches or entire trees. Bur oak blight is caused by an undescribed species of the fungus Tubakia.

Based on reports of BOB to the Iowa State Plant Insect and Disease Clinic in 2013, 87 counties in Iowa reported the presence of the disease. Within these counties there are over 8.7 million bur oaks out of Iowa's over 32 million bur oak trees growing. However, the disease has been observed by DNR foresters across the state.

ECONOMIC IMPACTS

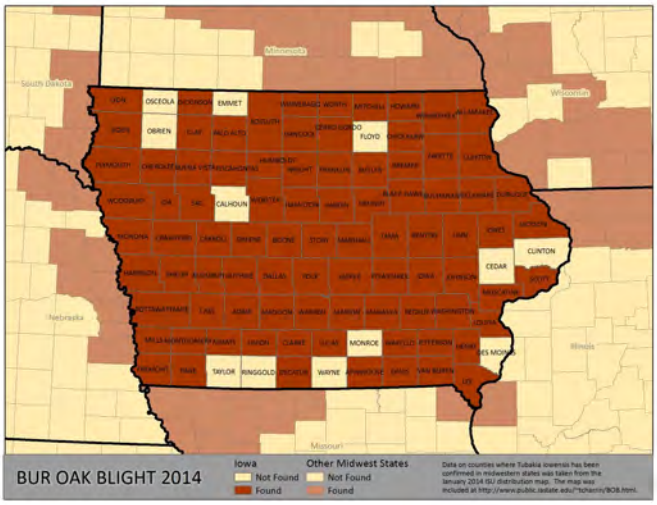
The total impact of BOB to Iowa's forest landowners and wood products businesses is more than **$19 million** or an annualized loss of close to **$770,000** in perpetuity for Iowa's economy.

Other economic losses include non-timber products like nut production, reduced wildlife habitat and a **$964 million** loss of community tree derived benefits such as energy savings, property value, storm water retention, carbon sequestration and tree removal and replacement costs. 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 percent 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 2014
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 2014. The 2014 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

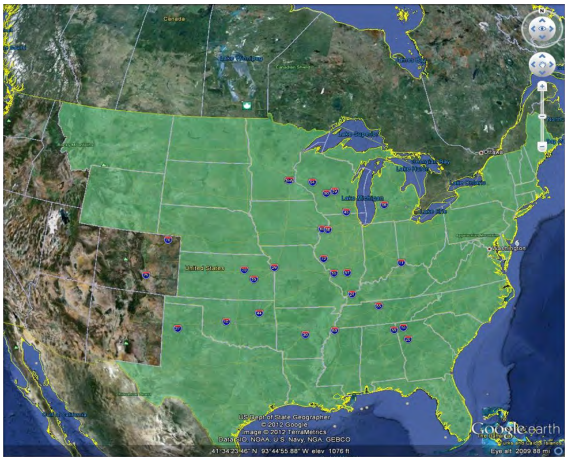


Figure 29. Areas were Dutch elm disease is generally known to occur within the continental United States. (Image: Tivon Feeley, IDNR).

Additional Pest Surveyed:

Hickory Decline

Year 2014
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

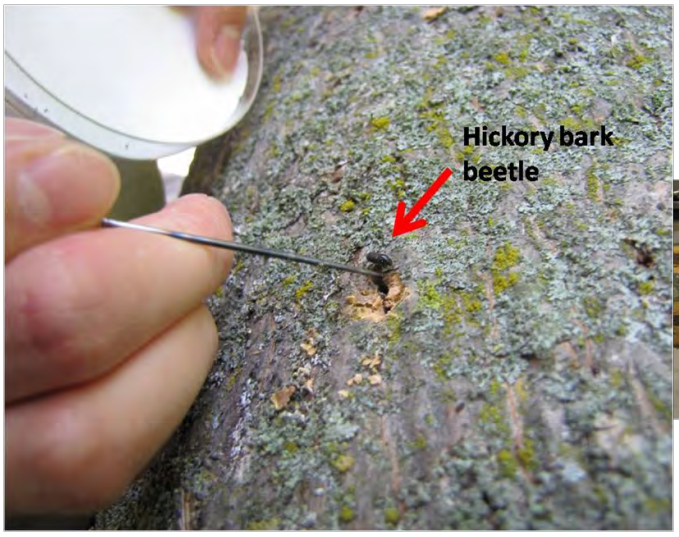
Survey Methods: General Observation

Acres Affected: Approximately 400 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 30 and 31. The pictures below shows the hickory bark beetle attack and associated cankers. (Image: Dr. Jennifer Juzwick, USFS).



Additional Pest Surveyed:

Forest Tent Caterpillar

Year 2014
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 200 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 third year of outbreak of this pest. The populations appear to be dropping and are expected to be minimal in 2015.

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

Figure 32. The picture below shows 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 2013 Oriental bittersweet, Japanese knotweed, garlic mustard, and Japanese hops were made illegal to distribute in the State of Iowa.

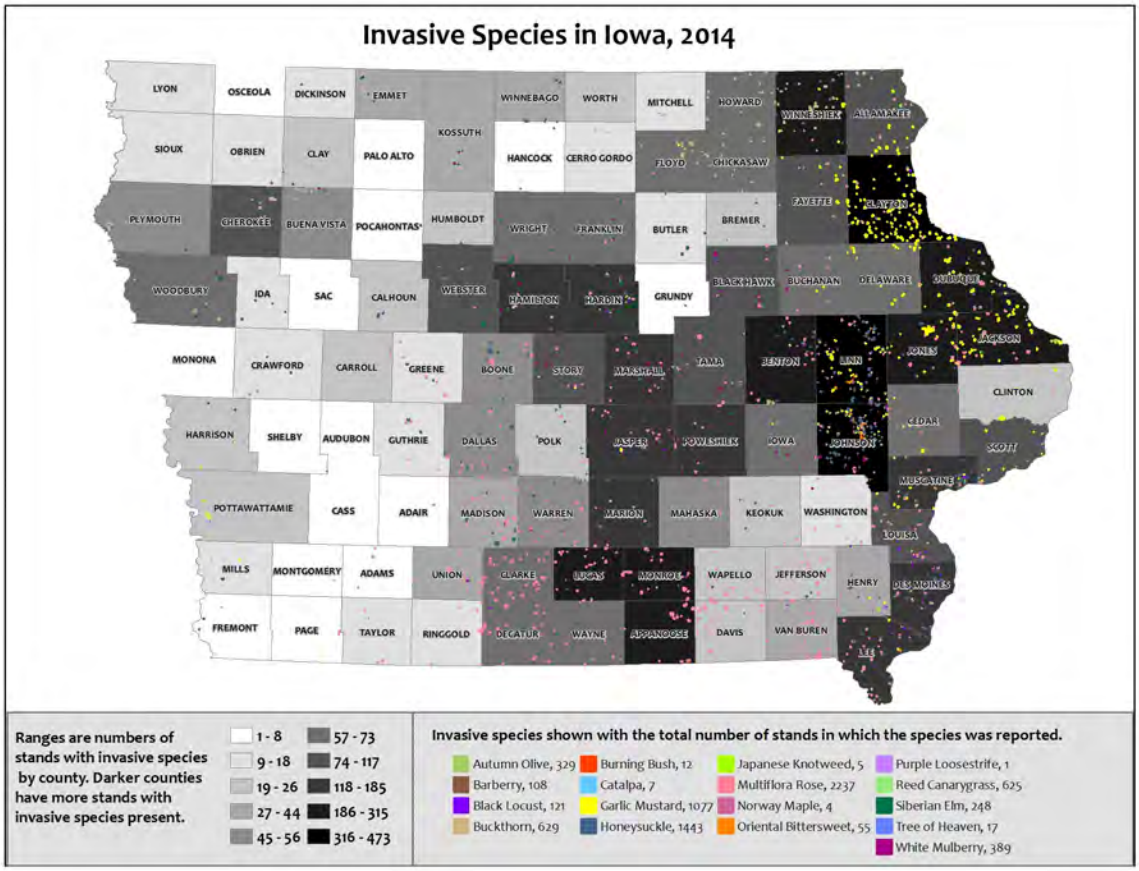
Known Invasive Plants in Iowa 2014

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 33. The map below details the locations of invasive species as identified by DNR District Foresters and the Forest Health Program Leader in 2014. (Image: Tivon Feeley, IDNR).



State of Iowa

Executive Department

IN THE NAME AND BY THE AUTHORITY OF THE STATE OF IOWA

PROCLAMATION

WHEREAS, millions of dollars, both public and private, are spent each year for the control of invasive plants, insects, diseases, and animal species in Iowa's woodlands; and

WHEREAS, invasive species, such as emerald ash borer and oriental bittersweet, threaten Iowa's ecosystem by competing with and destroying native trees, and by disrupting the natural complex habitat system; and

WHEREAS, Iowa's woodlands, wildlands, and waterways draw hundreds of thousands of tourists and recreational users each year; and

WHEREAS, Iowa's woodlands and wild lands are vital to the economic livelihood and health of the state's citizens; and

WHEREAS, awareness of invasive species is an important first step towards behavior change, which can prevent the introduction and spread of invasive species; and

WHEREAS, Invasive Species Awareness Month is an opportunity for government to join forces with business, industry, conservation groups, recreation groups, community organizations, and citizens to take action against the introduction and spread of invasive species:

NOW, THEREFORE, I, Terry E. Branstad, Governor of the State of Iowa, do hereby proclaim the month of June, 2014 as

INVASIVE SPECIES AWARENESS MONTH

in Iowa.

IN TESTIMONY WHEREOF, I HAVE HEREUNTO SUBSCRIBED MY NAME AND CAUSED THE GREAT SEAL OF THE STATE OF IOWA TO BE AFFIXED. DONE AT DES MOINES THIS 17th DAY OF MAY IN THE YEAR OF OUR LORD TWO THOUSAND FOURTEEN.

TERRY E. BRANSTAD
GOVERNOR OF IOWA

ATTEST:

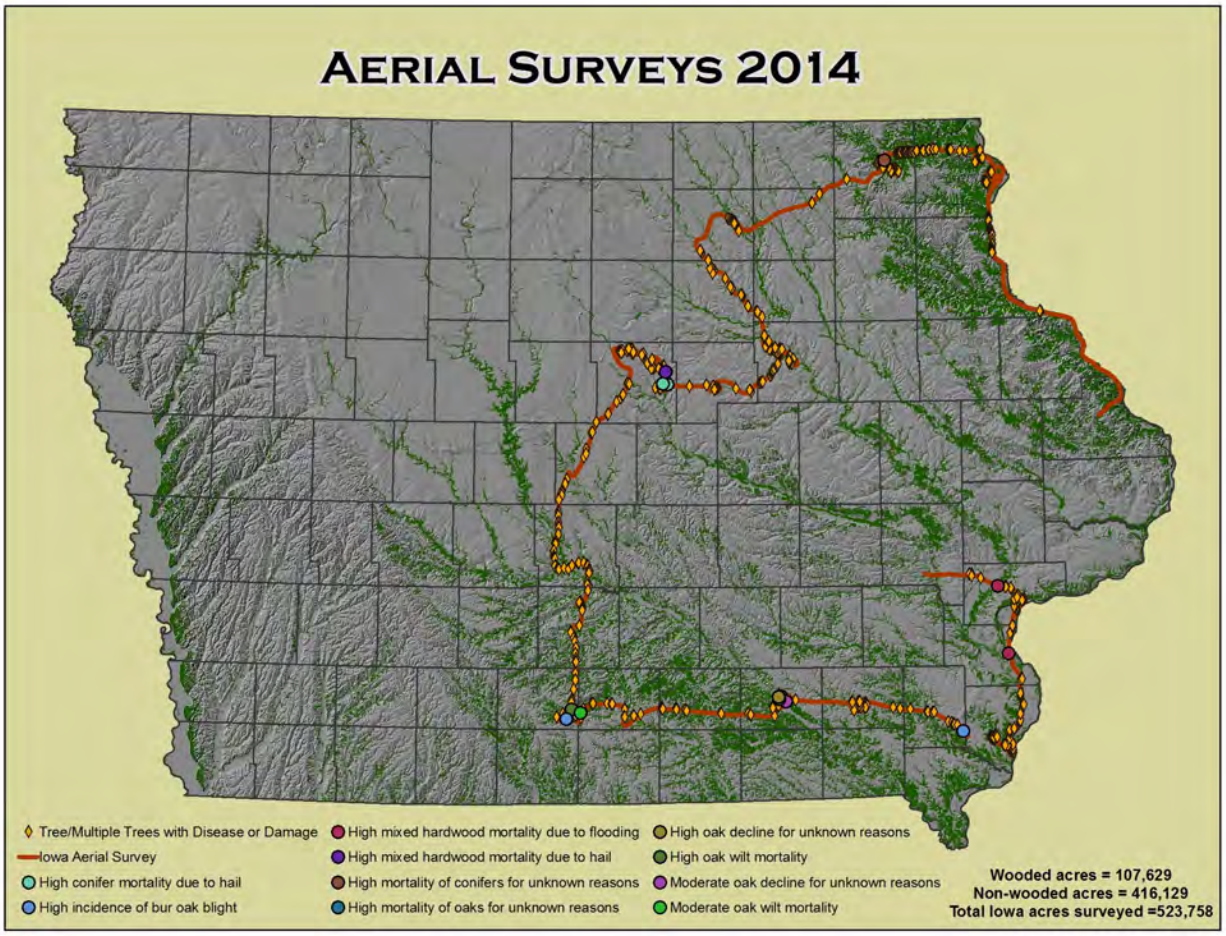
MATT SCHULTZ
SECRETARY OF STATE

Aerial Survey

Each year the IDNR utilizes an airplane and a laptop with sketch mapping software on it to track forest health issues from above the tree canopy. A total of 523,758 acres of land were surveyed this year. The 2014 survey found silver maple and cottonwood trees throughout the state continued showing chlorotic (yellowing) leaves. It does not appear that this condition is solely drought related. Soil samples are planned for 2015 to determine if this is a nutrient deficiency.

Most counties along the route also showed signs of Dutch elm disease and bur oak blight. 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 lower levels of oak wilt than those that were noted in the 2013 aerial survey. The aerial flight continued to find large pockets of aspen declining in NE Iowa, that has been the trend for the past three years. The cause of the aspen decline is unknown at this time. This is the first year that ash decline and mortality associated with EAB has been observed in the aerial surveys. This occurred only in areas where EAB was known to be established. Numerous conifers suffered severe winter desiccation, as detailed in the introduction. Overall, there were slightly higher forest health issues that were observed in the 2014 aerial survey.

Figure 34. The map below shows the flight lines where the aerial mapping took place.



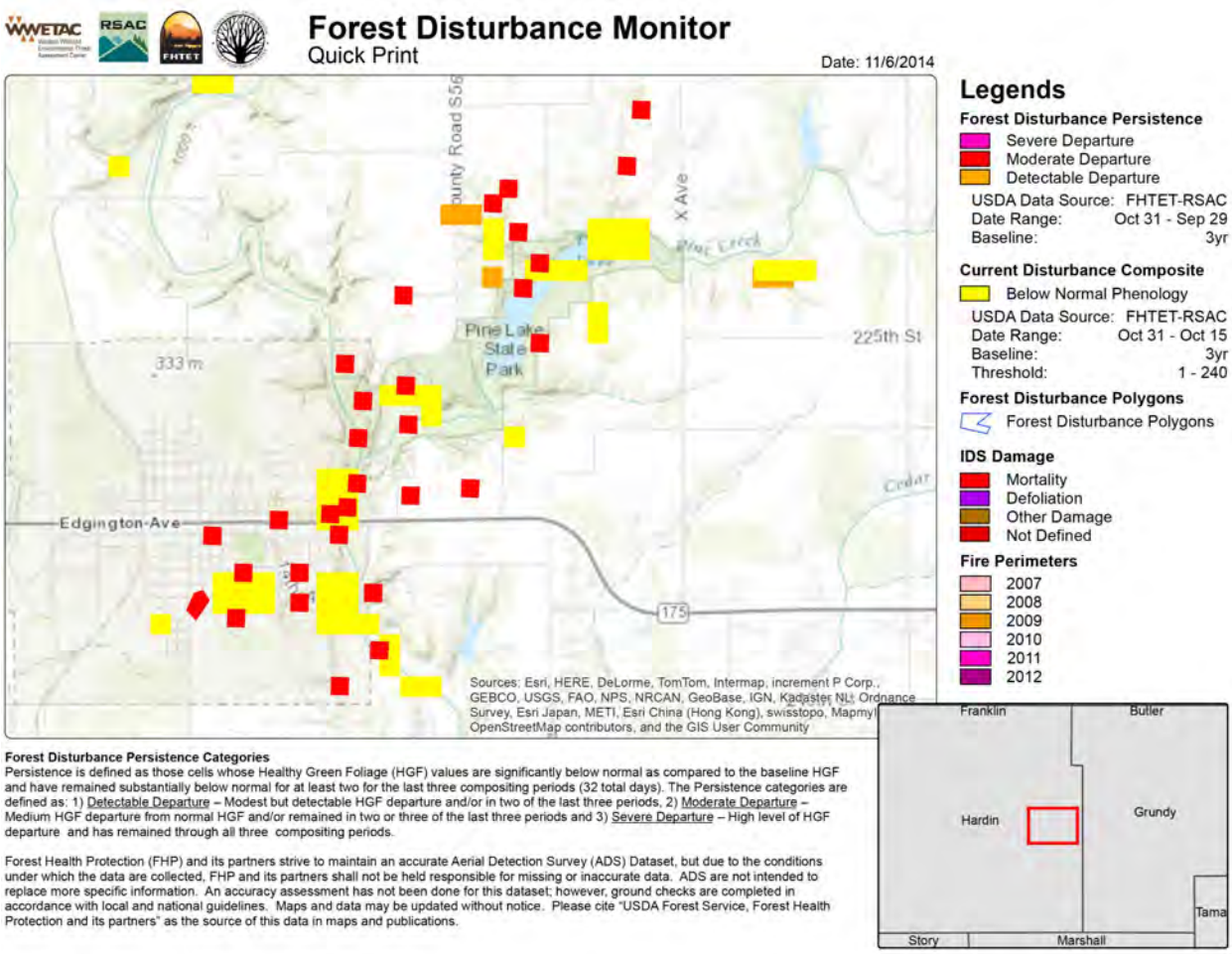
Aerial Survey Continued

Over the past several years, IDNR has followed the impacts of the August 2009 hail storm on Pine Lake State Park and the town of Eldora, Iowa. The USFS has designed a series of useful tools to look at various biotic and abiotic pests causing changes in the forest landscape, the Forest Disturbance Monitor (FDM). FDM was designed and produced by the Forest Health Technology Enterprise Team (FHTET).

This valuable tool can be used to generate maps and display the disturbance from storms, fire, insects, diseases, and more. The figure below details the changes that occurred in the forest landscape from 2009 to 2014. This tool can be used in both woodland and urban settings, and is free to the public to view and use.

http://foresthealth.fs.usda.gov/portal

Figure 34. The map below shows disturbances that took place to the forest type after the hail storm. (Image: USFS, FHTET).



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, human health, 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 2014, and plans are in place for a similar continued vigorous forest health program operation in 2015. Those programs existed in part from funding received by USFS grants and the State of Iowa Woodland Health Appropriation.

However, budget constraints limit the amount of work for important matters such as: oak tatters, aspen decline, additional oak wilt pockets, and the much needed additional community assistance in managing new emerald ash borer infestations. Additional funds are needed for these important forest health issues to be addressed in 2015.

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.

"The planting of a tree, especially one of the long-living hardwood trees, is a gift which you can make to posterity at almost no cost and with almost no trouble, and if the tree takes root it will far outlive the visible effect of any of your other actions, good or evil."

George Orwell, 1946

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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/EAB

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

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