



IOWA DEPARTMENT OF NATURAL RESOURCES

Iowa's 2019 Forest Health Highlights



December 2019

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Contents

Introduction	2
Weather Review.....	2
Land Characteristics	5
United States Forest Service Major Pests List.....	6
United States Forest Service Major Pests List: Armillaria Root Disease	7
United States Forest Service Major Pests List: Asian long-horned beetle.....	8
United States Forest Service Major Pests List: Bur Oak Blight.....	9
United States Forest Service Major Pests List: Butternut Canker.....	11
United States Forest Service Major Pests List: Emerald Ash Borer	12
United States Forest Service Major Pests List: Forest Tent Caterpillar	15
United States Forest Service Major Pests List: Gypsy Moth	16
United States Forest Service Major Pests List: Heterobasidion Root Disease.....	20
United States Forest Service Major Pests List: Oak Wilt.....	21
United States Forest Service Major Pests List: Sudden Oak Death.....	23
United States Forest Service Major Pests List: Thousand Cankers Disease.....	24
United States Forest Service Major Pests List: Blister Rust	28
Additional Pest Surveyed: Pine Shoot Beetle	29
Additional Pest Surveyed: Dutch Elm Disease	31
Additional Pest Surveyed: Hickory Dieback	32
Additional Pest Surveyed: Invasive Plants	33
Additional Pest Surveyed: White Oak Mortality	37
Additional Pest Surveyed: Oak Tatters	40
Conclusion.....	43
Useful Phone Numbers and Websites	44

This project was funded in part through a grant awarded by the USDA, Forest Service, Northeastern Area State and Private Forestry.

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Iowa's Forest Health Highlights

Introduction

Each year the Iowa DNR 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 Section 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 2019 Forest Health Highlights will focus first on the Forest Service's Major Forest Pest List (Page 6) and then cover the additional damaging agents that DNR surveyed.

Weather Review

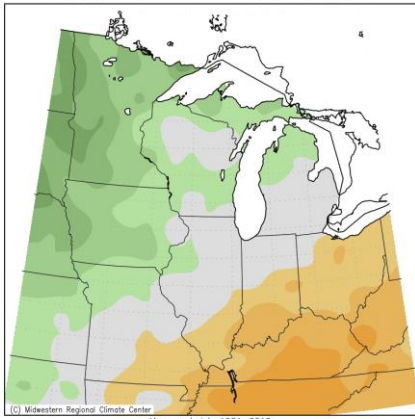
This winter brought about several challenges for Iowa with cooler than average temperatures and higher levels of precipitation. Despite being a cooler winter, there were several days in January that went above freezing, which caused many conifers to break winter dormancy. The repeated breaks in winter 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 cool wet spring helped encourage the occurrence of Anthracnose (a fungal leaf disease) on sycamore and many other benign fungal leaf diseases throughout the state. Many Tubakia and other leaf spot fungi were reported on oaks throughout the summer months.

Most of the state experienced normal summer temperatures and rainfall events statewide. Numerous reports of bur oak blight were made, in addition to frequent benign fungal leaf diseases that were being reported, in Eastern Iowa.

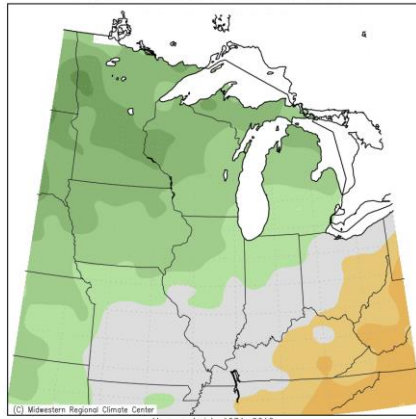
DNR will continue to monitor the winter effects on the conifers in Iowa. The reports of winter desiccation have remained steady since first reported in the 2016 Forest Health Highlights, despite the cooler winter. Many conifers are unable to maintain dormancy during the winter months with temperatures fluctuating above and below freezing. The problem of winter desiccation, commonly called winter burn, is likely to continue into the future with non-native conifers or conifers planted on poor sites. Arborvitae, also known as white cedar, is an example of a conifer that tends to be impacted by the fluctuating weather patterns and winter desiccation is commonly reported with in the past several years.

Average Temperature (°F): Departure from Mean
December 1, 2018 to February 28, 2019



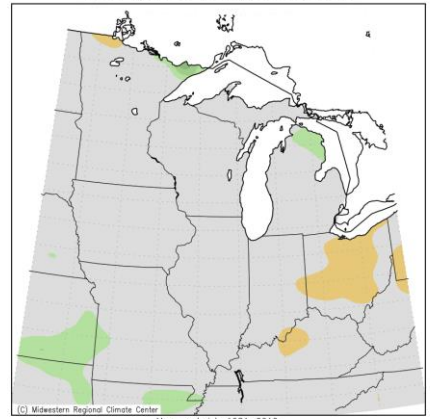
Midwestern Regional Climate Center
Illinois State Water Survey, Prairie Research Institute
University of Illinois at Urbana-Champaign

Average Temperature (°F): Departure from Mean
March 1, 2019 to May 31, 2019



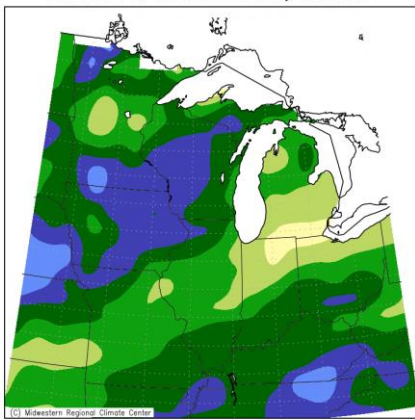
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Illinois State Water Survey, Prairie Research Institute
University of Illinois at Urbana-Champaign

Average Temperature (°F): Departure from Mean
June 1, 2019 to August 31, 2019



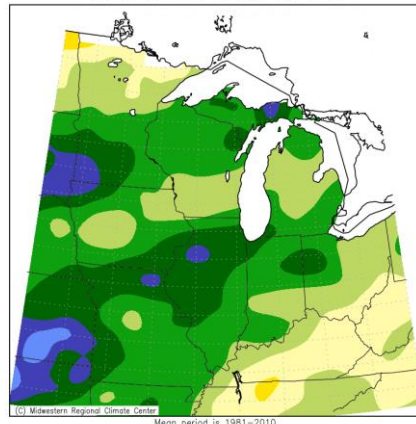
Midwestern Regional Climate Center
Illinois State Water Survey, Prairie Research Institute
University of Illinois at Urbana-Champaign

Accumulated Precipitation: Percent of Mean
December 1, 2018 to February 28, 2019



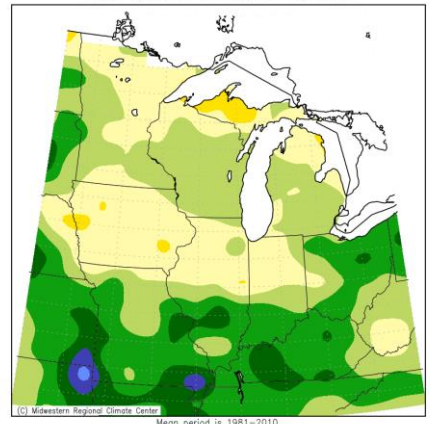
Midwestern Regional Climate Center
Illinois State Water Survey, Prairie Research Institute
University of Illinois at Urbana-Champaign

Accumulated Precipitation: Percent of Mean
March 1, 2019 to May 31, 2019



Midwestern Regional Climate Center
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Accumulated Precipitation: Percent of Mean
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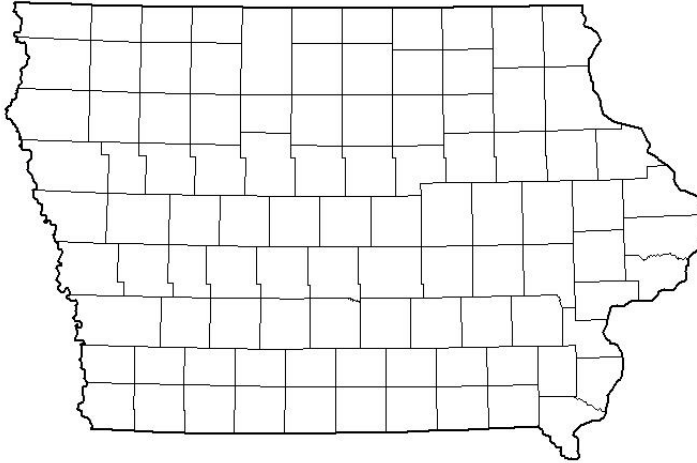


Midwestern Regional Climate Center
Illinois State Water Survey, Prairie Research Institute
University of Illinois at Urbana-Champaign

[Images provided by Midwest Climate Watch](#)

U.S. Drought Monitor
Iowa

November 19, 2019
(Released Thursday, Nov. 21, 2019)
Valid 7 a.m. EST



Intensity:

- None
- 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. For more information on the Drought Monitor, go to <https://droughtmonitor.unl.edu/About.aspx>

Author:

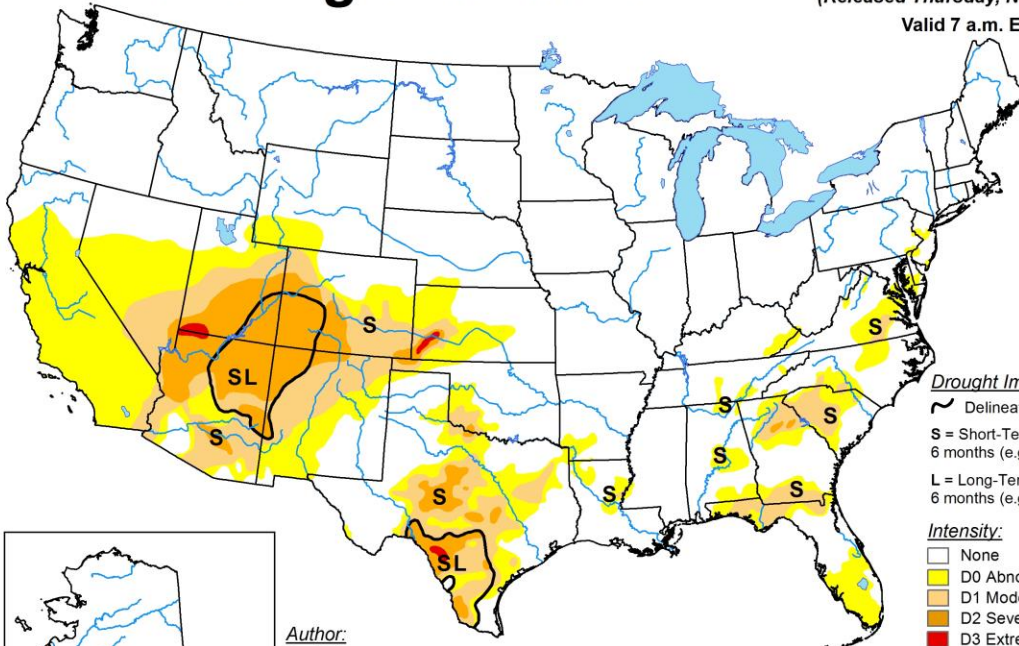
Brad Rippey
U.S. Department of Agriculture



droughtmonitor.unl.edu

U.S. Drought Monitor

November 19, 2019
(Released Thursday, Nov. 21, 2019)
Valid 7 a.m. EST



Drought Impact Types:

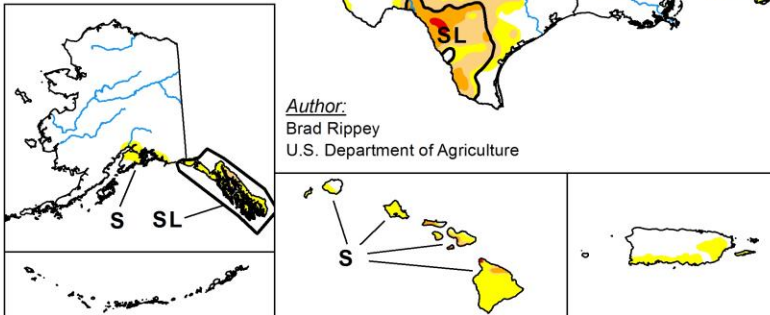
- Delineates dominant impacts
- S = Short-Term, typically less than 6 months (e.g. agriculture, grasslands)
- L = Long-Term, typically greater than 6 months (e.g. hydrology, ecology)

Intensity:

- None
- 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. For more information on the Drought Monitor, go to <https://droughtmonitor.unl.edu/About.aspx>

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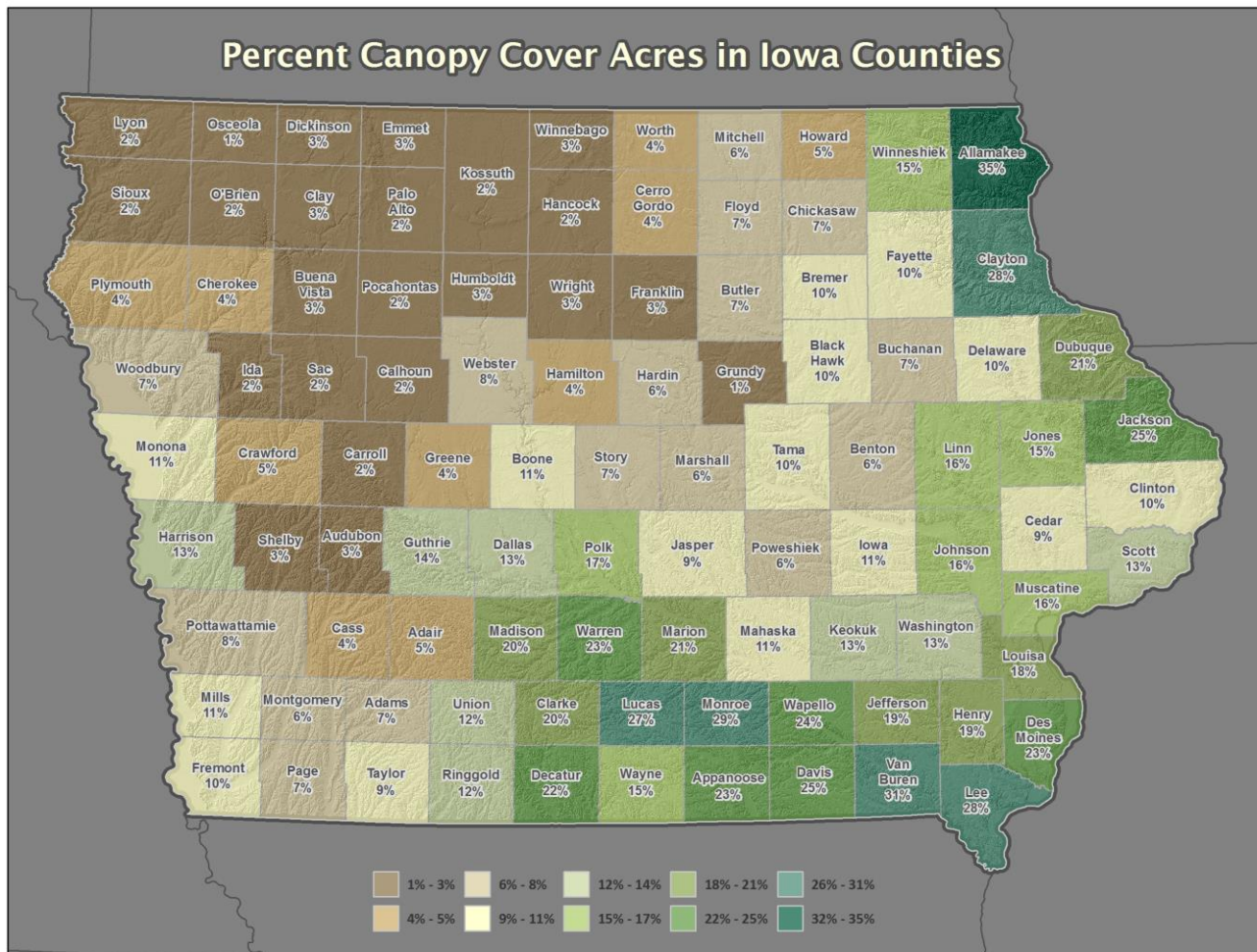
droughtmonitor.unl.edu

Land Characteristics

Iowa has approximately 2.85 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.

Nearly 95% of the Forest Inventory Analysis (FIA) plots found one or more invasive plants competing with natives. The data also showed that over half of trees in Iowa are the preferred tree species by the nonnative pest gypsy moth. In addition, the FIA report found that the average annual tree growth has declined while the average annual tree mortality has increased. Much of Iowa's small forests and trees that were along fencerows were cleared to allow for more profitable row cropping. The FIA data also indicated that succession to shade tolerant hardwoods (maples/ironwood) replacing shade intolerant hardwoods (oak/hickory) is continuing. These are alarming forest health trends. (Miles, P.D. Wed Mar 25 20:46:53 MDT 2016. [Forest Inventory EVALIDator](#) web-application version 1.6.0.01. St. Paul, MN: U.S. Department of Agriculture, Forest Service, Northern Research Station.)

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 Forest's Today](#).



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. 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
Browntail Moth
Butternut Canker
Dogwood Anthracnose
Emerald Ash Borer
Goldspotted Oak Borer*
Gypsy Moth
Hemlock Woolly Adelgid
Laurel Wilt
Oak Wilt
Sirex Woodwasp
Sudden Oak Death
Thousand Cankers Disease
White Pine Blister Rust
Winter Moth

Native Pests

Armillaria Root Disease
Aspen Leafminer
Bur Oak Blight
Douglas-Fir Beetle*
Douglas-fir Black Stain Root Disease*
Fir Engraver*
Forest Tent Caterpillar
Fusiform Rust
Heterobasidion Root Disease
Jack Pine Budworm
Jeffrey Pine Beetle*
Large Aspen Tortrix
Mountain Pine Beetle*
Northern Spruce Engraver
Pine Black Stain Root Disease
Polyphagous Shot Hole Borer*
Port-Orford-Cedar Root Disease*
Southern Pine Beetle
Spruce Beetle
Spruce Budworm
Subalpine Fir Mortality*
Western Five-Needle Pine Mortality*
Western Pine Beetle*
Western Spruce Budworm*
Yellow-Cedar Decline*

United States Forest Service Major Pests List:

Armillaria Root Disease

Year: 2019

State: Iowa

Forest Pest

Common Name: Armillaria Root Disease

Scientific Name: *Armillaria spp.*

Hosts: Hardwoods and Conifers

Setting: N/A

Counties: N/A

Survey Methods: Ground

Acres Affected: N/A

Narrative: Armillaria root disease is fairly common in Iowa. The crown symptoms consist of branch dieback and crown thinning. The fungus produces a mycelial fan in recently killed trees just underneath the inner bark that often have a strong “mushroom” odor. The most common signs are the rhizomorphs that are produced just under the bark, and sometimes just on the bark surface. The rhizomorphs look like “shoestring”, which is why this fungus is sometimes called the shoestring fungi.

If a landowner needs assistance with armillaria root disease, please contact Tivon Feeley (DNR Forest Health Program Leader) at 515-275-8453 or the ISU Plant Diagnostic Clinic at 515-294-0581. More information can be found [here](#).



Figure 1. Armillaria rhizomorphs under the bark. (Image: Robert L. Anderson, USDA Forest Service, Bugwood.org).

United States Forest Service Major Pests List: Asian long-horned beetle

Year: 2019

State: Iowa

Forest Pest

Common Name: Asian long-horned beetle

Scientific Name: *Anoplophora glabripennis*

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

Setting: Urban

Counties: Not Found: Audubon, Black Hawk, Buena Vista, Butler, Cass, Cedar, Clay, Clayton, Dallas, Delaware, Dickenson, Dubuque, Floyd, Greene, Grundy, Hancock, Hardin, Harrison, Howard, Humboldt, Iowa, Jasper, Jones, Keokuk, Linn, Lucas, Mahaska, Marion, Marshall, Montgomery, O'Brien, Page, Palo Alto, Pocahontas, Polk, Poweshiek, Scott, Shelby, Sioux, Tama, Taylor, Union, Wapello, Washington, Wayne, Winneshiek, and Wright.

Survey Methods: Ground

Acres Affected: N/A

Narrative: State legislative funds allowed DNR to conduct seven community inventories looking for invasive pests including Asian long horned beetle. Maples that had advanced dieback, dime-sized exit holes, or no obvious reason for the decline (e.g., girdling roots, construction damage, or planting depth) were destructively examined for Asian long horned beetle. All of the maples surveyed were healthy and did not have any evidence of Asian long horned beetle. A total of 36,054 maple were part of this survey effort.

Asian long-horned beetle has not been identified in Iowa. It is expected that survey work will resume in 2020. DNR asks all citizens to assist in the future monitoring efforts of this pest.

If beetles are found (Figure 1.) contact Rhonda Santos (USDA Public Information Officer) at 508-852-8044 and Robin Pruisner (State Entomologist) at 515-725-1465. Asian long-horned beetle information can be found [here](#).



Figure 2. Adult Asian long-horned Beetle (Image: Dennis Haugen, USDA Forest Service, Bugwood.org).

United States Forest Service Major Pests List: Bur Oak Blight

Year 2019

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 928 acres

Narrative: Bur oak blight has been recognized in Iowa for only the last 14 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. Spring chemical injections, as needed, 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.

There have been a few reports confirmed by the ISU NPDN Clinic of bur oak blight of swamp white oak. These appear to be true swamp white oak and not hybrids. The damage tends to be some venial necrosis and does not appear to be as severe on swamp white oak as it is on bur oak. These positive swamp white oak will be followed to determine if the disease progresses over the years as it does on bur oaks.

All samples bur oak blight should be sent to the ISU Plant Diagnostic Clinic, who can be reached at 515-294-0581.

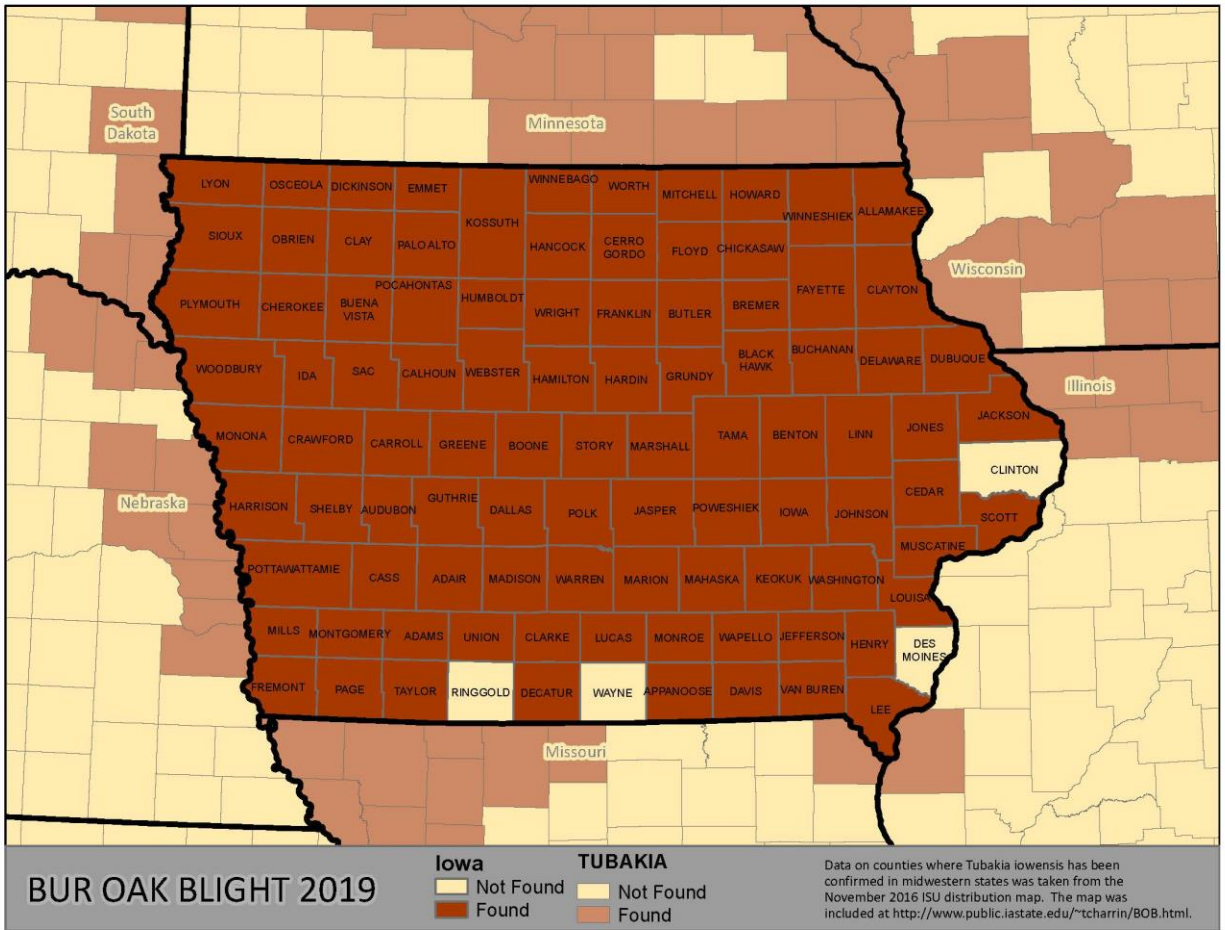


Figure 3. Current map of known locations of bur oak blight. (Image: Created by DNR based on locations provided by Dr. Harrington, ISU).

United States Forest Service Major Pests List: Butternut Canker

Year: 2019

State: Iowa

Forest Pest

Common Name: Butternut Canker

Scientific Name: *Ophiognomonia clavignenti-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.

No formal survey work was conducted on butternut canker in 2019. No suspect samples were submitted to DNR. No damage was reported in 2019.

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



Figure 4. Examples of canker found on butternut trees (Image: Minnesota Department of Natural Resources Archive, Minnesota Department of Natural Resources, Bugwood.org).

United States Forest Service Major Pests List: Emerald Ash Borer

Year: 2019

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, Des Moines, Jefferson, Cedar, Union, Black Hawk, Bremer, Wapello, Jasper, Henry, Muscatine, Boone, Story, Appanoose, Lucas, Mahaska, Marion, Monroe, Keokuk, Clinton, Dallas, Polk, Scott, Davis, Poweshiek, Lee, Montgomery, Dubuque, Linn, Johnson, Winneshiek, Louisa, Washington, Van Buren, Harrison, Iowa, Adair, Adams, Clarke, Jackson, Clayton, Greene, Wayne, Fayette, Madison, Floyd, Benton, Warren, Howard, Buena Vista, Butler, Ringgold, Decatur, Marshall, Tama, Taylor, Carroll, Buchanan, Hamilton, Hardin, Pottawattamie, Crawford, Delaware, Page, Grundy, Cass, Chickasaw, Franklin, and Jones counties.

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

Acres Affected: 1,012,598 aerial 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 69 counties. Since the insect was already widespread, a statewide quarantine was issued February 4, 2014.

DNR visually inspected 12 ash trees in eight counties in 2019. The DNR surveys found EAB in Chickasaw and Franklin Counties, and the additional county finds were discovered by IDALS.

If a landowner has an ash tree that they believe has emerald ash borer please contact Tivon Feeley (DNR Forest Health Program Leader) at 515-725-8453 or Mike Kintner (IDALS EAB Coordinator) at 515-725-2877. Emerald ash bore information can be found at [Emerald Ash Borer Info](#) and the [Iowa DNR](#).

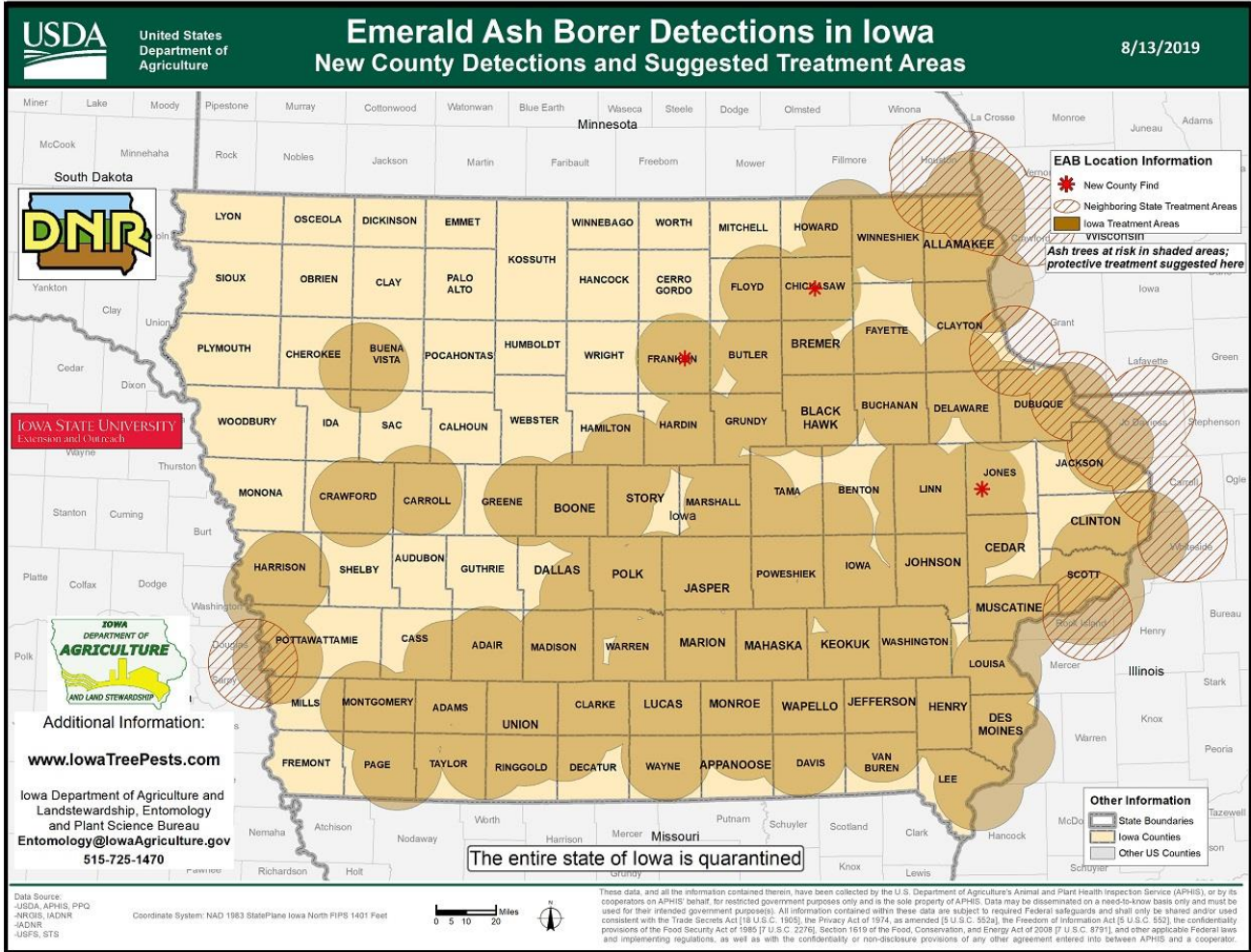


Figure 5. Locations of the emerald ash borer infestations, as of November 2019. Please note that the entire State of Iowa is now quarantined for EAB. The brown circles around each infestation represent a 15 miles radius. The brown circles are done to assist landowners that are considering chemical treatments. The current recommendations from the Iowa EAB Team are not to chemically treat an ash tree until your property is within one of the brown circles. (Image: Tivon Feeley, DNR)



Figure 6. Locations of the current quarantined counties or states for emerald ash borer. DNR and partners will continue to trap and monitor the state through 2019. (Image provided by USDA-APHIS-PPQ)

United States Forest Service Major Pests List: Forest Tent Caterpillar

Year 2019

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 45 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 eighth year of outbreak of [forest tent caterpillars](#). The populations have dropped as expected in 2019.



Figure 7. The picture above shows forest tent caterpillars on the main stem of a young tree. (Image: Robert Honeywell, DNR).

United States Forest Service Major Pests List: Gypsy Moth

Year 2019

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 through trapping and mating disruption. Feeding damage has not occurred to Iowa's trees.

During the 2019 trapping season, 35 male moths were captured. Two areas will be delimited and trapped in 2020 to determine whether Iowa has an isolated early infestation. There is one treatment block identified in Allamakee County for 2020 using mating disruption. The proposed treatment block totals 230 polygon acres.

The 2019 mating disruption treatments in Jackson and Allamakee County were successful with no male moths caught within the treatment areas. No egg masses were found during the fall survey.

More information on the gypsy moth spray program can be found [here](#).

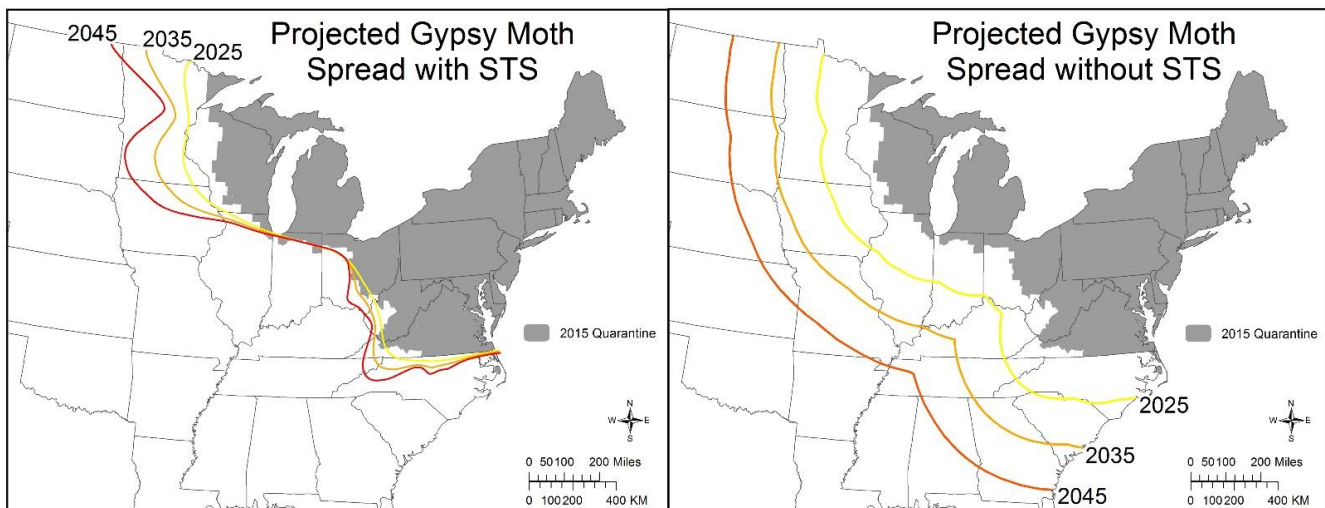
The Gypsy Moth Slow the Spread Foundation establishes a formal framework for cooperation among the ten states (listed at the bottom of page) who work with each other and the USDA to slow the spread of gypsy moth. Together they have achieved their goal of reducing spread of this destructive pest by more than 60%, which has prevented infestation of more than 140 million acres in 15 years.

The Threat: Gypsy moth is a destructive, exotic forest pest that feeds on over 300 species of trees. It was accidentally introduced into the United States in 1869 and is currently established throughout the northeast and parts of the upper mid-west (gray shaded area on maps), where it has defoliated 80 million acres since 1970.

- It feeds on over 300 species of trees but oaks are most preferred.
- Defoliation causes extensive tree mortality, reduces property values, adversely affects commerce and causes allergic reactions in sensitive individuals that come in contact with the caterpillars.
- Most of the susceptible hardwood forests in the United States are not yet infested and are still at risk.

The Benefits:

- Prevents invasion of more than 300 million acres over the next 30 years (compare maps).
- Protects the extensive urban and wild land hardwood forests in the south and upper mid-west while also protecting the environment through use of gypsy moth specific strategies.
- Yields a benefit to cost ratio of 3 to 1 by delaying the onset of impacts that occur as gypsy moth invades new areas. The 20-year net present value after subtracting costs ranges from 184 to 348 million dollars.
- Delays impacts associated with gypsy moth quarantines on intra- and inter-state commerce.
- Unifies the partners and promotes a coordinated, region-wide action based on biological need.



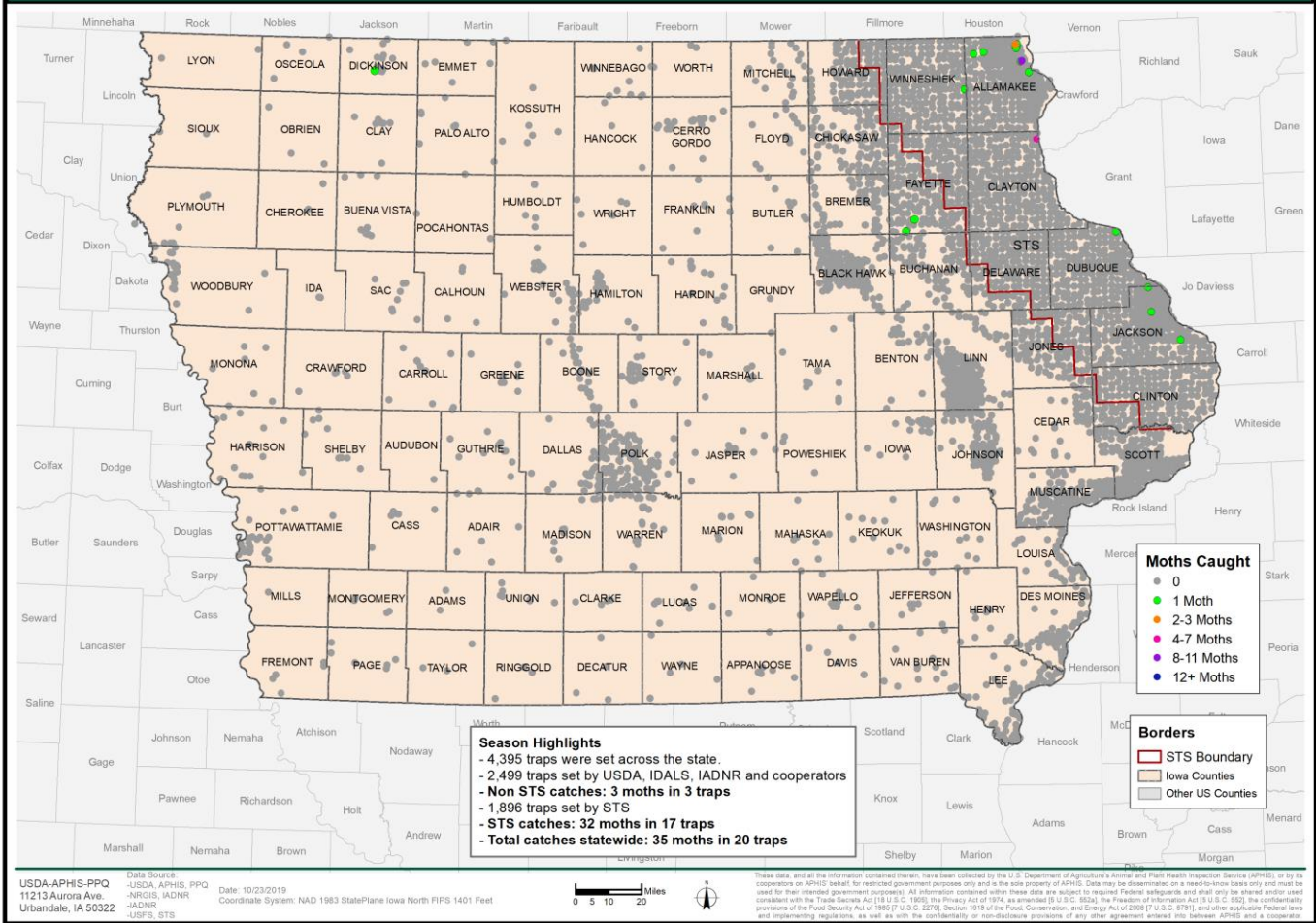


Figure 8. The map above details the locations of all the gypsy moth traps and the number of moths captured in them during the 2019-trapping season. The total male moth capture was 35 male moths. (Image: Mark Hollister, PPQ).

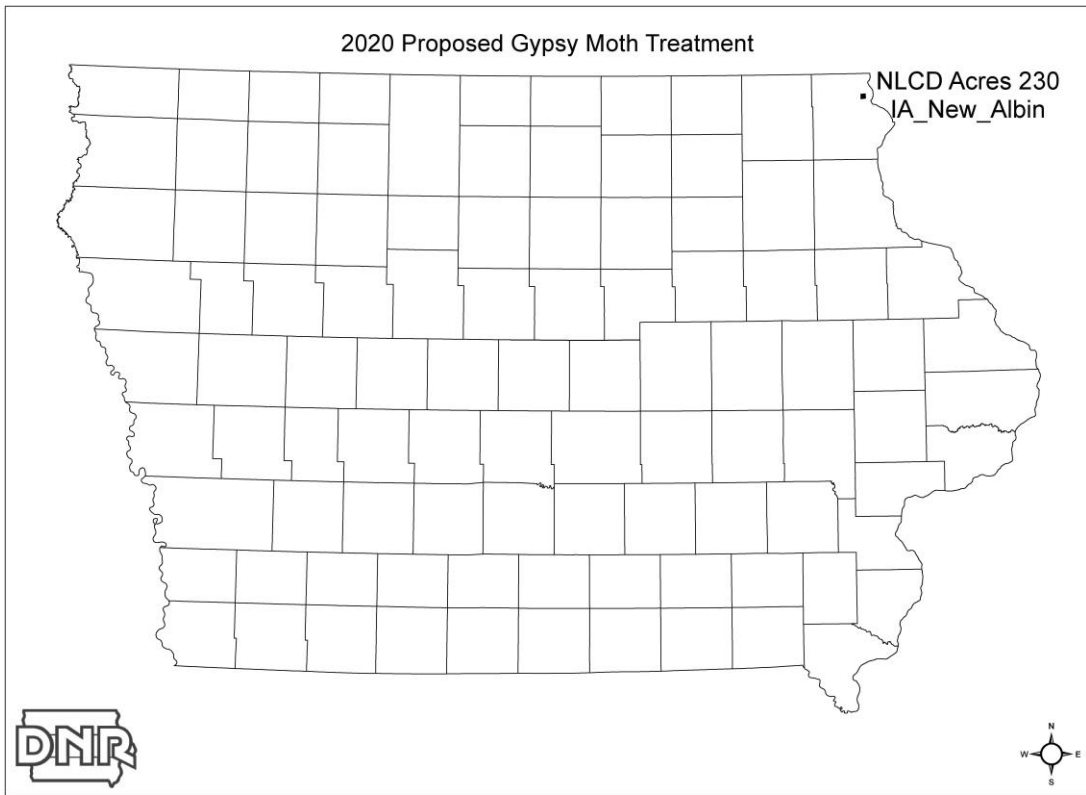


Figure 9. The maps above details the location of the mating disruption treatment block in Iowa totaling an estimated 230 treatable acres to be treated in June of 2020. (Image: Tivon Feeley, DNR).

United States Forest Service Major Pests List: Heterobasidion Root Disease

Year 2019

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. Survey work was conducted at Yellow River State Forest for Heterobasidion root disease. Heterobasidion root disease has not yet been identified at Yellow River State Forest. If a landowner suspects Heterobasidion root disease, please contact the ISU Plant Diagnostic Clinic at 515-294-0581.



Figure 10. Example of heterobasidion root disease. (Image: William Jacobi, Colorado State University, Bugwood.org)

United States Forest Service Major Pests List: Oak Wilt

Year 2019

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: 200 acres

Narrative: DNR received very few oak wilt samples this year. There were 31 oaks tested for oak wilt and only three trees were positive for oak wilt. All submitted samples were cultured and oak wilt was confirmed by fungal morphology.

The majority of the samples came from the southern half of Iowa. DNR followed up on the management plans implemented in 2015 and found no oak wilt positive tree at this time. At this time, it appears that the control efforts works have prevented the spread of oak wilt. DNR will continue to monitor these plots in 2020 to ensure that oak wilt remains under control. This will be the last year to monitor those plots.

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

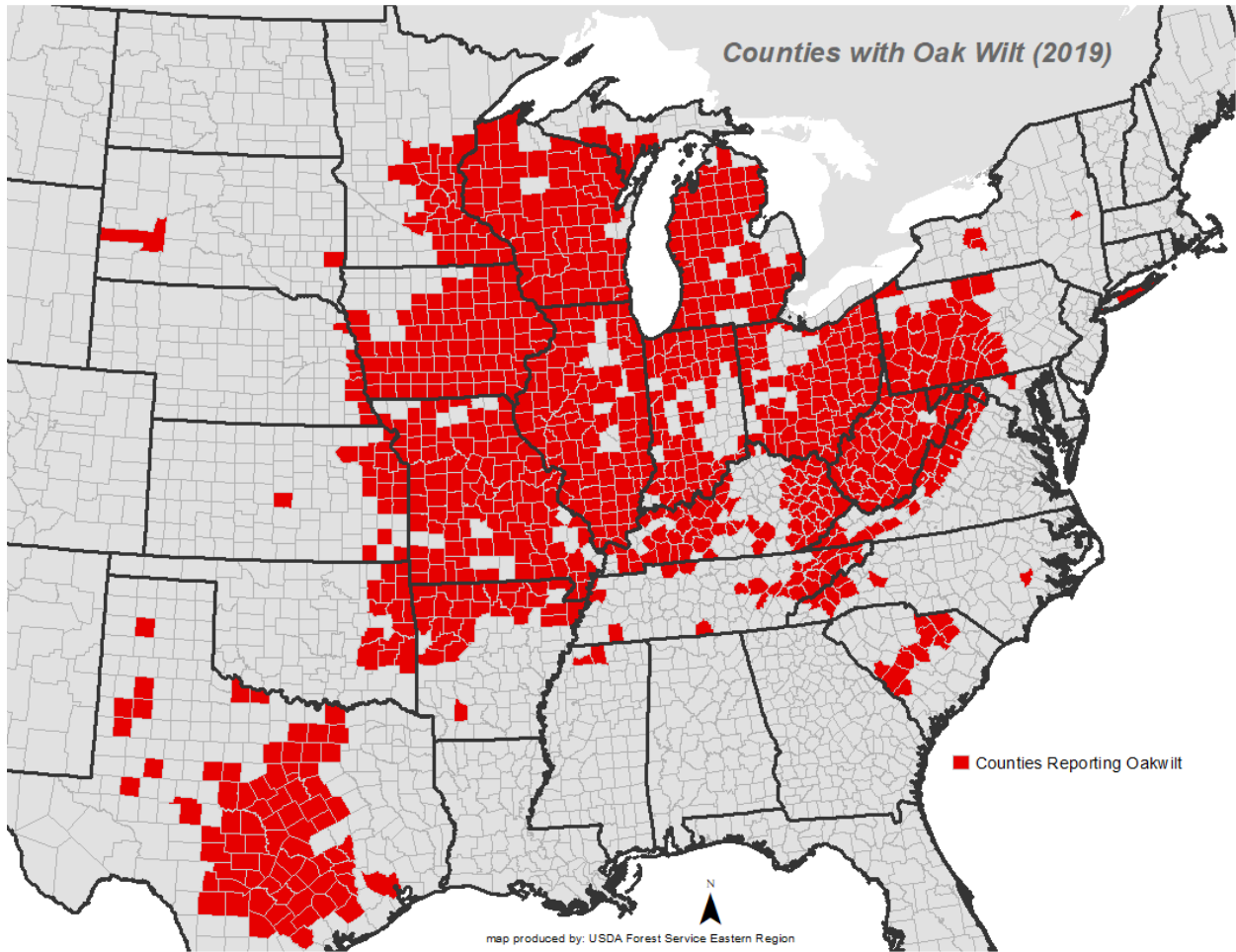


Figure 11. The map above details the counties in Iowa with confirmed oak wilt. Oak wilt may occur in the non-red counties, but has not been confirmed by the ISU Diagnostic Clinic. (Image: Quinn Chavez, USFS).

United States Forest Service Major Pests List:

Sudden Oak Death

Year: 2019

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: N/A

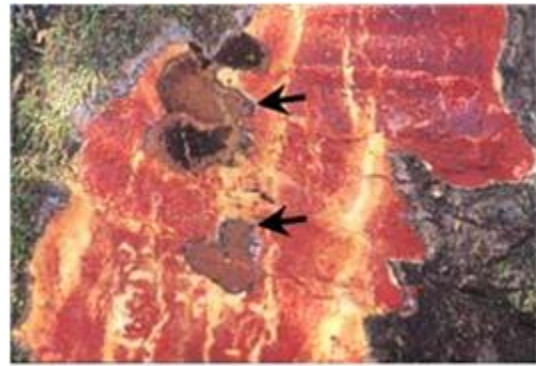
Acres Affected: N/A

Narrative: Iowa did receive numerous notices of “trace forward” of suspected sudden oak death in 2019, meaning that potentially infected plant material had been shipped to Iowa. The notices were received too late in the season and the plants had been sold. Iowa’s weather conditions make it extremely unlikely for sudden oak death to survive. Stream baiting, to test for sudden oak death was not conducted in 2019 and is not planned for 2020 at this time.

If a landowner suspects that their plants have [sudden oak death](#), please contact Tivon Feeley (DNR Forest Health Program Leader) at 515-725-8453 or Robin Pruisner (State Entomologist) at 515-725-1465.



Ooze bleeds from a canker on an infected oak.



Black zone lines are found under diseased bark in oak.

Figure 12. Two examples 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)

United States Forest Service Major Pests List: Thousand Cankers Disease

Year 2019

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 604 walnut trees were selected for the 2019 walnut twig beetle survey. A Lindgren four funnel dry trap with the walnut twig beetle pheromone developed by Scotts Canada was placed in a declining walnut tree for each location in the survey.

The traps were left on the trees for three weeks before being moved to another tree during the months of April, May, and the first week in June.

The following beetles were collected during the survey: *Xyleborus atratus*, *Ambrosiodmus tachygraphus*, *Hylocurus rudis*, *Xylosandrus germanus*, *Xyleborinus saxeseni*, *Xyloterinus politus*, *Xylosandrus crassiusculus*, *Pityophthorus lautus* (and subspecies), *Pityophthorus crinalis*, and *Pityophthorus consimilis*. There were a total of 2,804 ambrosia beetles, Pityophthorus beetles, and weevils that were collected. **No walnut twig beetles were found during the survey.** There were numerous other beetles, not of concern, collected (i.e. Japanese beetle, June bugs, ect.) but not counted as part of the survey.

The highest beetle captures occurred during the months of May and June. Historically, the captures decreased after those months. These trends have been consistent over the last several years, indicating that the best time to capture *Pityophthorus* species in Iowa is May and the first week in June.

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



Figure 13. One of the Lindgren 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, DNR)



Figure 14. 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, DNR)

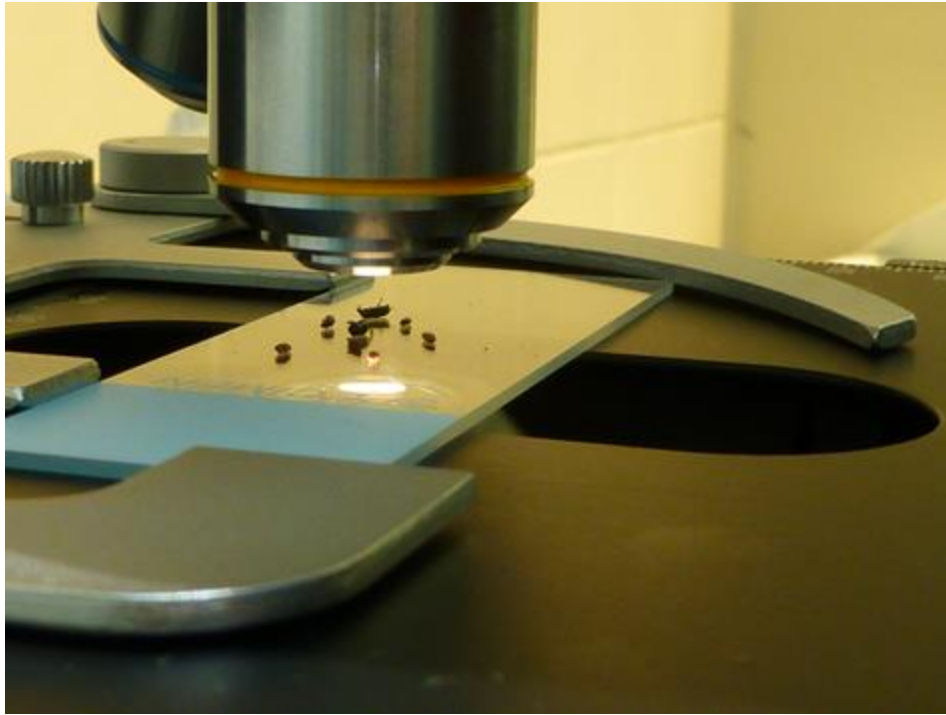


Figure 15. Microscopes were used to help identify the beetle captured. The walnut twig beetle is about 1/4 of an inch long.
(Image: Shane Donegan, DNR)



Figure 16. Pictured above is a *Pityophthorus* sp. (not *P. juglandis*) that was captured and sent in for identification. (Image: Shane Donegan, DNR)

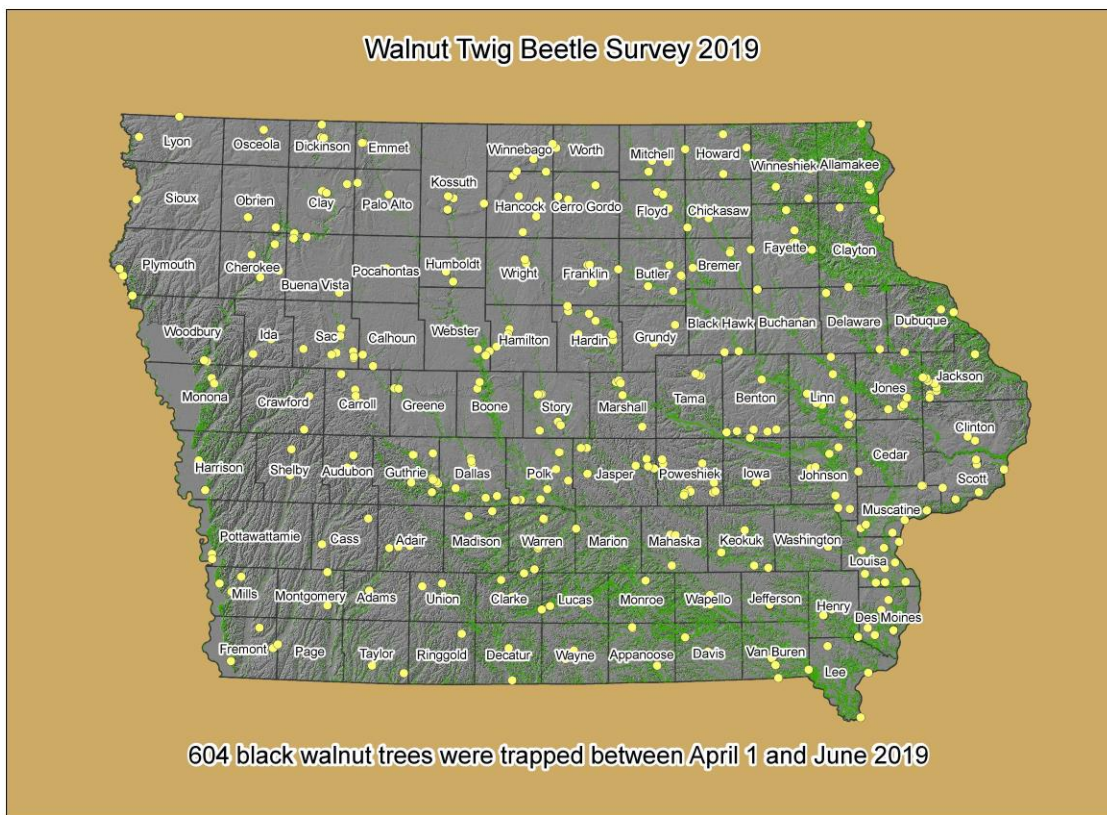


Figure 17. The locations of the 604 survey traps for walnut twig beetle throughout the state. (Image: Tivon Feeley, DNR)

United States Forest Service Major Pests List: Blister Rust

Year: 2019

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 DNR 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.

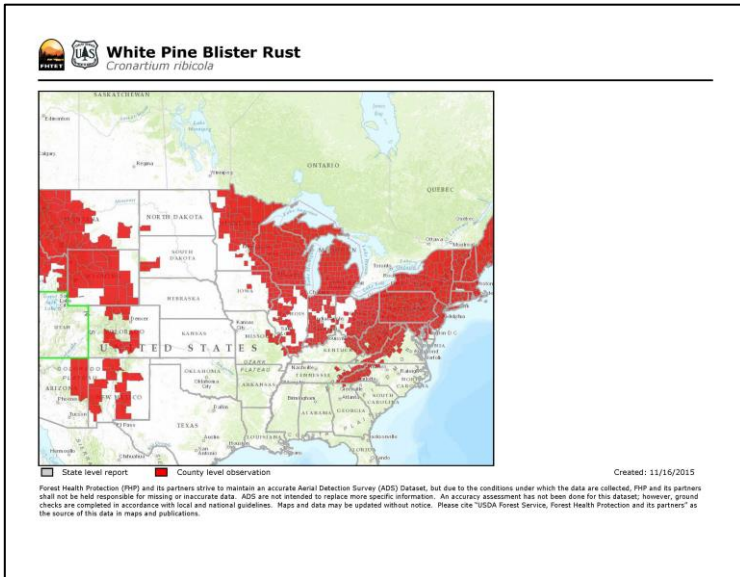


Figure 18. The range map for known areas of white pine blister rust (Map: USFS FHTET)



Figure 19. Rust spores on an infected tree. (Image: Brian Geils, USDA Forest Service, Bugwood.org)

Additional Pest Surveyed: Pine Shoot Beetle

Year: 2019

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.

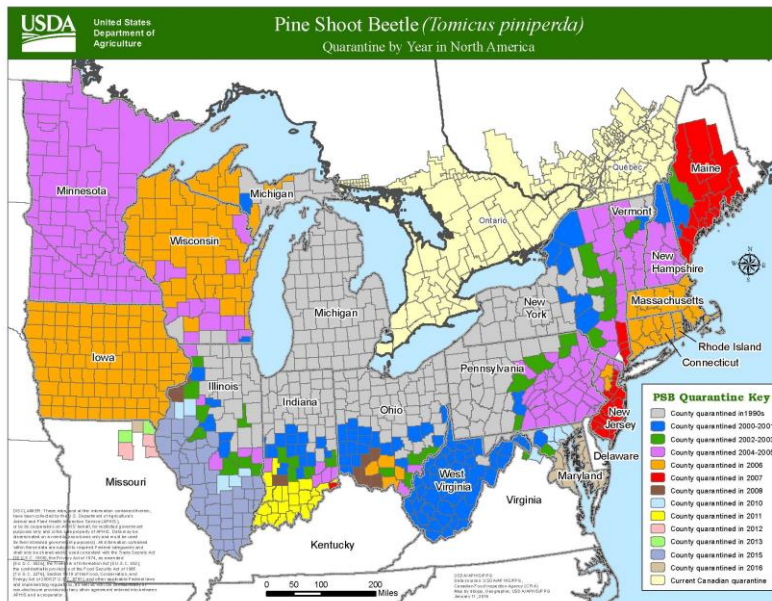


Figure 20. The map above shows the quarantined areas for pine shoot beetle. (Image: by USDA-APHIS-PPQ)

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

Additional Pest Surveyed: Dutch Elm Disease

Year 2019

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 2019. The 2019 season appeared to have a high occurrence of [Dutch elm disease](#).



Figure 22. Areas where Dutch elm disease is generally known to occur within the continental United States.
(Image: Tivon Feeley, DNR)

Additional Pest Surveyed: Hickory Dieback

Year: 2019

State: Iowa

Forest Pest

Common Name: Hickory Dieback

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 2,100 acres

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



Figure 23. Hickory bark beetle attack. (Image: Dr. Jennifer Juzwik, USFS)



Figure 24. Associated cankers. (Image: Dr. Jennifer Juzwik, USFS)

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. The most common non-native species found in the FIA report as problematic in Iowa forests are multiflora rose, reed canarygrass, bush honeysuckle, garlic mustard, Japanese knotweed, autumn olive, common buckthorn, Japanese barberry, and oriental bittersweet (Miles, P.D. Wed Mar 25 20:46:53 MDT 2016. [Forest Inventory DataMart](#) web-application version 1.6.0.01. St. Paul, MN: U.S. Department of Agriculture, Forest Service, Northern Research Station.).

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 threatening 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 2019

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

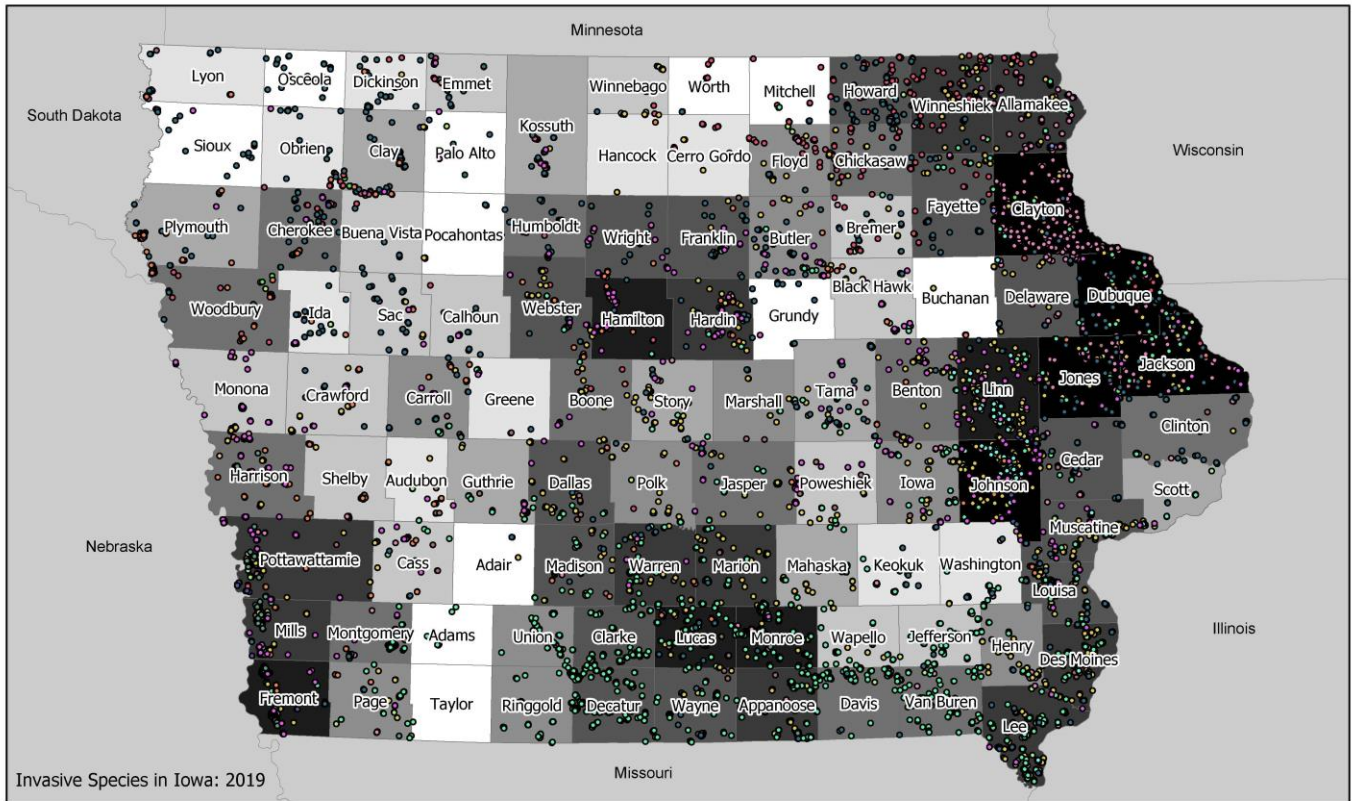
I= Isolated- the species is infrequent, not commonly seen

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
<i>Abutilon theophrasti</i>	Velvetleaf	W
<i>Ailanthus altissima</i>	tree-of-heaven	W
<i>Alliaria petiolate</i>	garlic mustard	W
<i>Berberis thunbergii</i>	Japanese barberry	W
<i>Bromus tectorum</i>	cheatgrass	W
<i>Butomus umbellatus</i>	flowering rush	I
<i>Carduus acanthoides</i>	plumeless thistle	I
<i>Carduus nutans</i>	Musk thistle	W
<i>Celastrus orbiculata</i>	Oriental bittersweet	LA
<i>Centaurea maculosa/beibersteinii</i>	spotted knapweed	LA
<i>Centaurea repens</i>	Russian knapweed	I
<i>Centaurea solstitialis</i>	yellow starthistle	I
<i>Cirsium arvense</i>	Canada thistle	W
<i>Cirsium</i> spp.	thistle	W
<i>Cirsium vulgare</i>	bull thistle	W
<i>Conium maculatum</i>	poison hemlock	I
<i>Coronilla varia</i>	crown vetch	W
<i>Daucus carota</i>	Queen Anne's lace	W
<i>Dipsacus fullonum/sylvestris</i>	common teasel	I
<i>Dipsacus laciniatus</i>	cutleaf teasel	I
<i>Dipsacus sativus</i>	Indian teasel	NP
<i>Elaeagnus angustifolia</i>	Russian olive	I
<i>Elaeagnus umbellate</i>	autumn olive	LA
<i>Euonymus alatus</i>	burning bush	LA
<i>Euphorbia esula</i>	leafy spurge	W

Species	Common Name	Abundance
<i>Fallopia japonica</i>	Japanese knotweed	LA
<i>Frangula alnus/Rhamnus frangula</i>	glossy buckthorn	I
<i>Heracleum mantegazzianum</i>	giant hogweed	NP
<i>Hesperis matronalis</i>	dame's rocket	W
<i>Humulus japonicus</i>	Japanese hop	LA
<i>Lespedeza cuneata</i>	Sericea lespedeza	I
<i>Ligustrum japonicum</i>	Japanese privet	NP
<i>Ligustrum obtusifolium</i>	blunt-leaved or border privet	I
<i>Ligustrum sinense</i>	Chinese privet	NP
<i>Ligustrum vulgare</i>	common or European privet	I
<i>Lonicera fragrantissima</i>	fragrant honeysuckle	NP
<i>Lonicera japonica</i>	Japanese honeysuckle	LA
<i>Lonicera maackii</i>	Amur honeysuckle	W
<i>Lonicera standishii</i>	Standish's honeysuckle	NP
<i>Lonicera tatarica</i>	Tatarian honeysuckle	W
<i>Lonicera x bella</i>	Bell's honeysuckle	I
<i>Lonicera xylosteum</i>	European fly honeysuckle	NP
<i>Lythrum salicaria</i>	purple loosestrife	W
<i>Morus alba</i>	white mulberry	W
<i>Pastinaca sativa</i>	wild parsnip	W
<i>Potamogeton crispus</i>	curlyleaf pondweed	I
<i>Pueraria montana</i>	kudzu	I
<i>Rhamnus cathartica</i>	common buckthorn	W
<i>Rosa multiflora</i>	multiflora rose	W
<i>Tamarix</i> spp.	salt cedar	I



Ranges are numbers of stands with invasive species by county. Darker counties have more stands with invasive species present.		Invasive species shown with the total number of stands in which the species was reported.		
◻ ≤28	◻ ≤197	• Autumn Olive, 1238	• Garlic Mustard, 3249	• Oriental Bittersweet, 251
◻ ≤57	◻ ≤321	• Barberry, 307	• Hawthorn, 1	• Privets, 15
◻ ≤84	◻ ≤482	• Black Locust, 388	• Honeysuckle, 4183	• Purple Loosestrife, 1
◻ ≤116	◻ ≤743	• Brome Sod, 3	• Japanese Hops, 20	• Reed Canary Grass, 1858
◻ ≤143	◻ ≤1454	• Buckthorn, 1303	• Japanese Knotweed, 8	• Siberian Elm, 931
		• Burning Bush, 49	• Multiflora Rose, 5624	• Tree of Heaven, 277
		• Catalpa, 14	• Norway Maple, 7	• White Mulberry, 1454

Figure 25. The map above details the locations of invasive species as identified by DNR District Foresters and the Forest Health Program Leader in 2019. (Image: Tivon Feeley, DNR)


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 urban areas; and
- WHEREAS,** invasive species, such as emerald ash borer, Asian longhorned beetle, 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,** 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:

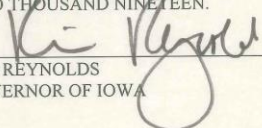
NOW, THEREFORE, I, Kim Reynolds, Governor of the State of Iowa, do hereby proclaim the month of May 2019
as

INVASIVE SPECIES AWARENESS MONTH


in Iowa.



IN TESTIMONY WHEREOF, I HAVE HERE-
UNTO SUBSCRIBED MY NAME AND CAUSED
THE GREAT SEAL OF THE STATE OF IOWA TO
BE AFFIXED. DONE AT DES MOINES THIS 29th
DAY OF MARCH IN THE YEAR OF OUR LORD
TWO THOUSAND NINETEEN.


KIM REYNOLDS
GOVERNOR OF IOWA

ATTEST:


PAUL PATE
SECRETARY OF STATE

Additional Pest Surveyed: White Oak Mortality

Year 2019

State: Iowa

Forest Pest

Common Name: White Oak Mortality

Scientific Name: Unknown

Hosts: Quercus alba

Setting: Rural Forests and Urban

Counties: SE Iowa

Survey Methods: General Observation

Acres Affected: Approximately 8,100 acres

Narrative: There have been several counties in SE Iowa where DNR has visited woodlands that had severe white oak mortality from unknown causes. The white oaks start to decline in the lower slopes and the decline/mortality quickly moves upland. The leaves turn chlorotic and within a year, the tree is complete dead. The current management plan is to aggressively harvest affected trees.

This pattern of decline is similar to what Missouri has reported over the past several years. Samples collected in 2017 indicated activity of Armillaria root disease, two-lined chestnut borer, and a variety of decline-inciting disease agents, so it is unclear of the foundational cause of mortality. Nested PCR tests for oak wilt disease have all been negative. In 2019, mortality continued, but the causes continue under investigation.

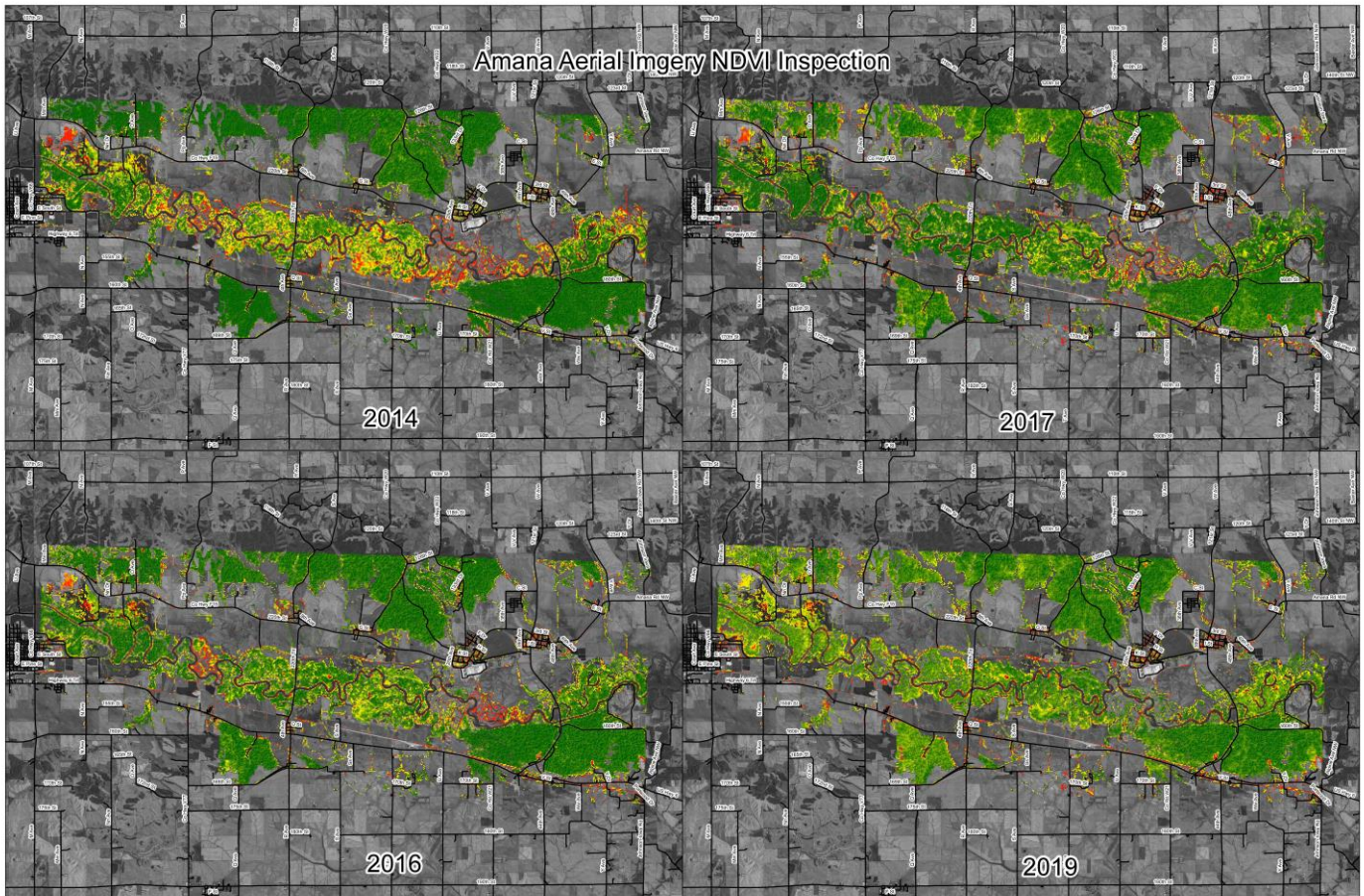


Figure 26. The map above details the photosynthetic activity as a measure of the tree health. Green indicates a healthy level of photosynthetic activity, yellow a reduced level and red nearly dead. The imagery is set to show forest canopy only. The white oak decline is starting in the lower valleys and along the edges of the forest. More research is being done at this site. (Image: Tivon Feeley, DNR)

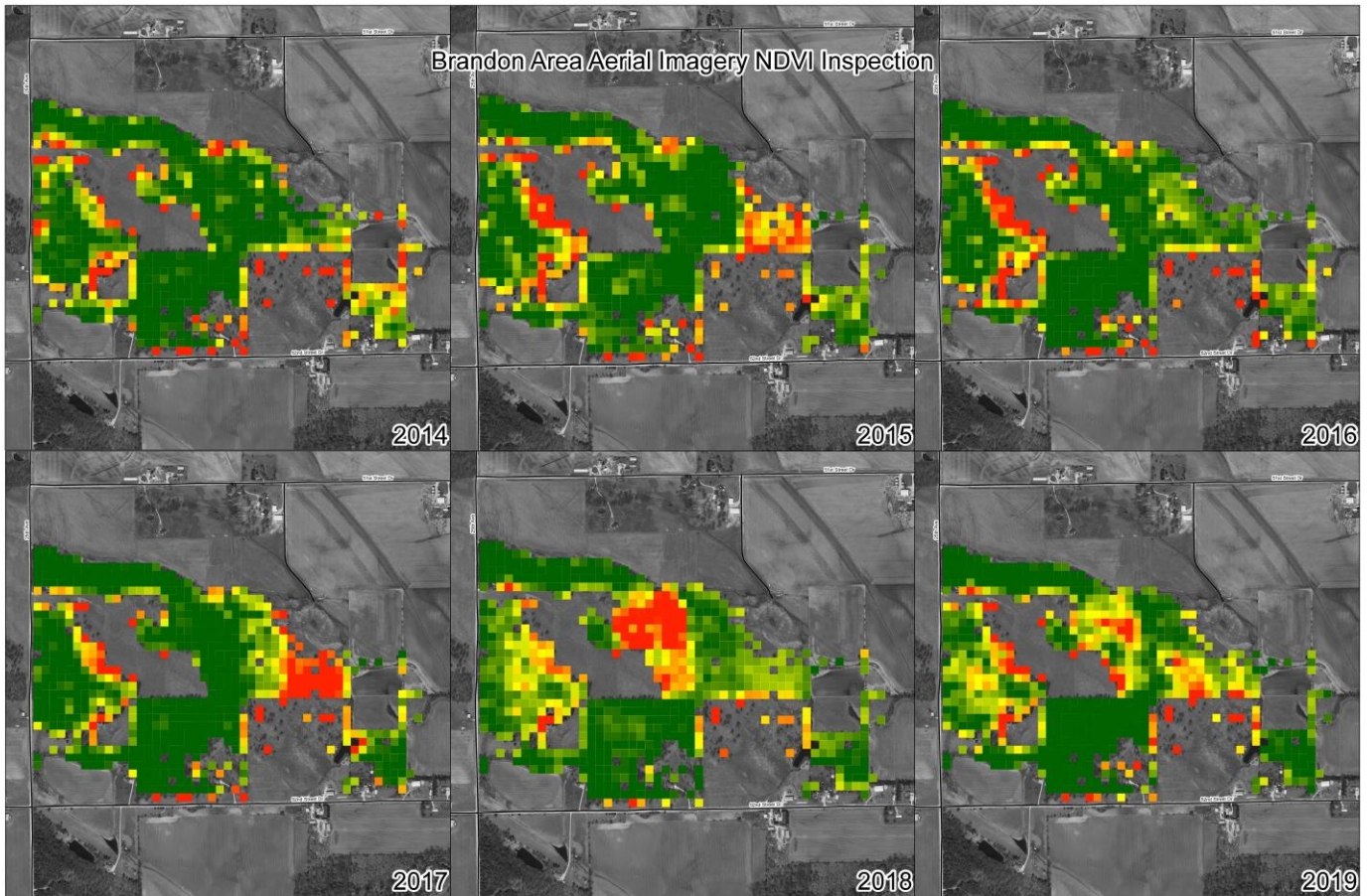


Figure 27. The map above details the photosynthetic activity as a measure of the tree health from 2014-2019 and you can see the “hot” spots of white oak decline. This decline fits the pesticide drift pattern. (Image: Tivon Feeley, DNR)

Additional Pest Surveyed: Oak Tatters

Year 2019

State: Iowa

Forest Pest

Common Name: Oak Tatters

Scientific Name: Unknown

Hosts: Oaks and Hackberry

Setting: Rural Forests and Urban

Counties: Statewide

Survey Methods: General Observation

Acres Affected: Approximately 4,000 acres

Narrative: DNR received several phone calls of tatters on oak and hackberry in 2019. The cause of oak tatters is not known. However, a study conducted by the University of Illinois suggested that Class 5 herbicides might be causing oak tatters. This has yet to be proven in the field.

Overall, the number of reports received during 2019 was lower than average past growing seasons. DNR will continue to work with its cooperators to determine the cause of oak tatters.

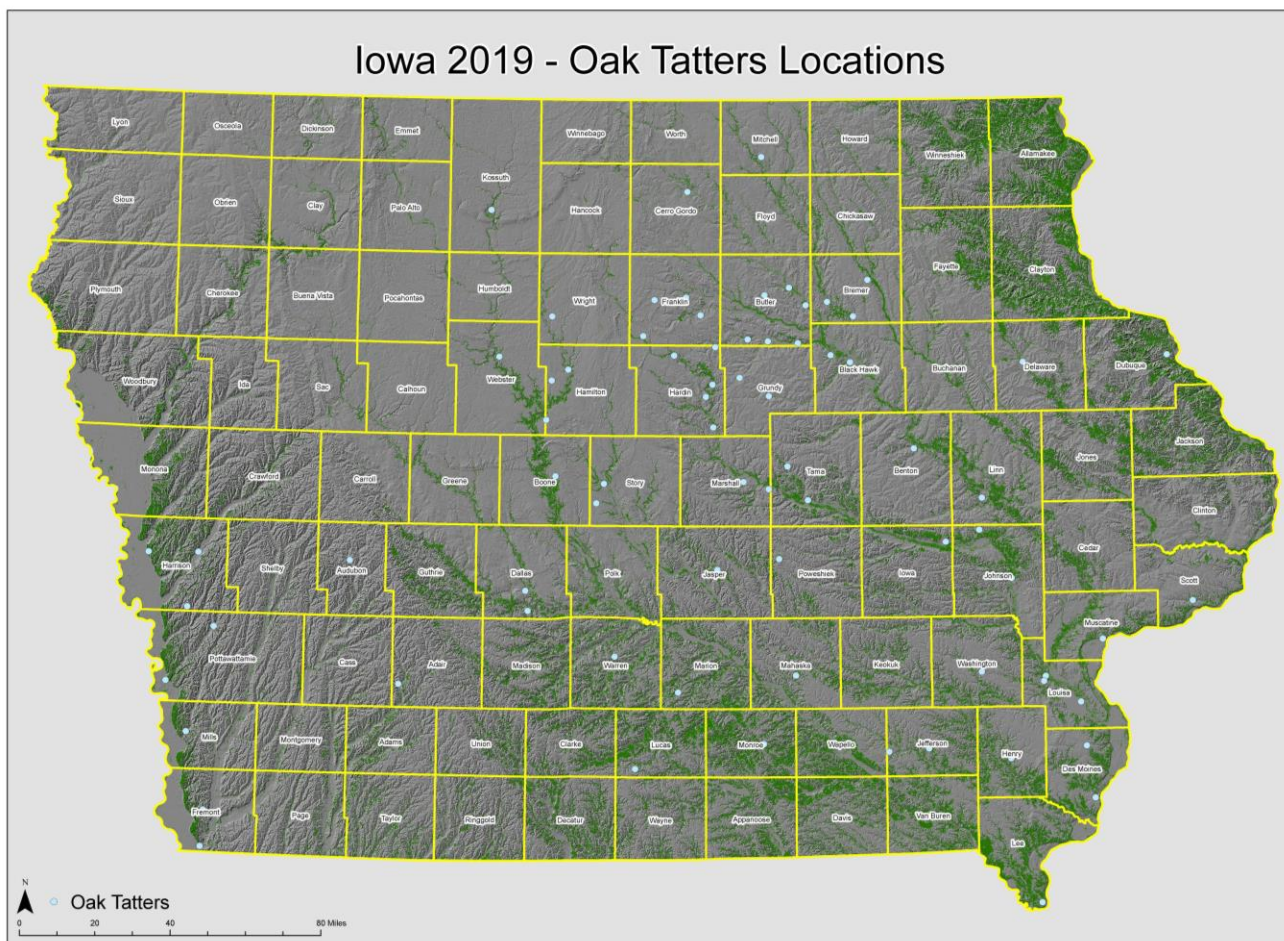


Figure 28. The map above details the locations that reported oak tatters in 2019. (Image: Tivon Feeley, DNR)

Aerial Survey

Each year the DNR utilizes an airplane and a tablet with mapping software on it to track forest health issues from above the tree canopy. A total of 1,915,426 acres of land were surveyed this year. The 2019 survey found significant pockets of white oaks declining in Southern Iowa. The cause of this decline is not yet known and DNR will continue to follow these sites in 2020.

Most counties along the flight route showed signs of Dutch elm disease and high level of bur oak blight. Scattered trees with lace bug damage were observed 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 2018 aerial survey. The aerial flight continued to find small pockets of aspen declining in NE Iowa, as has been the trend for the past seven years. The cause of the aspen decline is thought to be from the age of the stands. This is the sixth year that ash mortality associated with EAB has been observed in the aerial surveys. This occurred only in areas where EAB was known to be established and the damage was very noticeable from the air. Numerous conifers suffered severe winter desiccation, as detailed in the introduction. Overall, there were significantly higher forest health issues than were observed in past aerial survey. Bur oak blight and emerald ash borer were commonly seen impacting Iowa's landscape during this survey. A total of 1,012,598 acres of EAB damage was mapped in 2019.

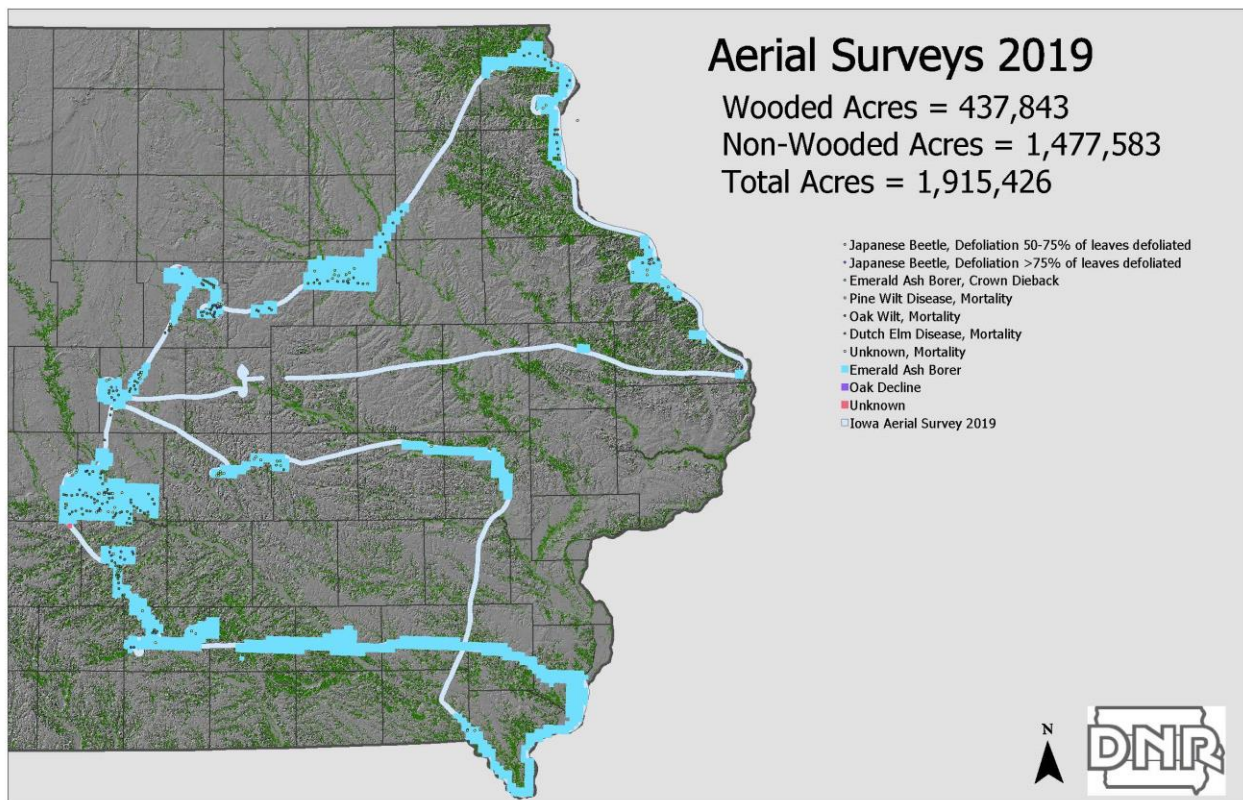


Figure 29. The map above shows the flight lines where the aerial mapping took place. (Image: Tivon Feeley, DNR)

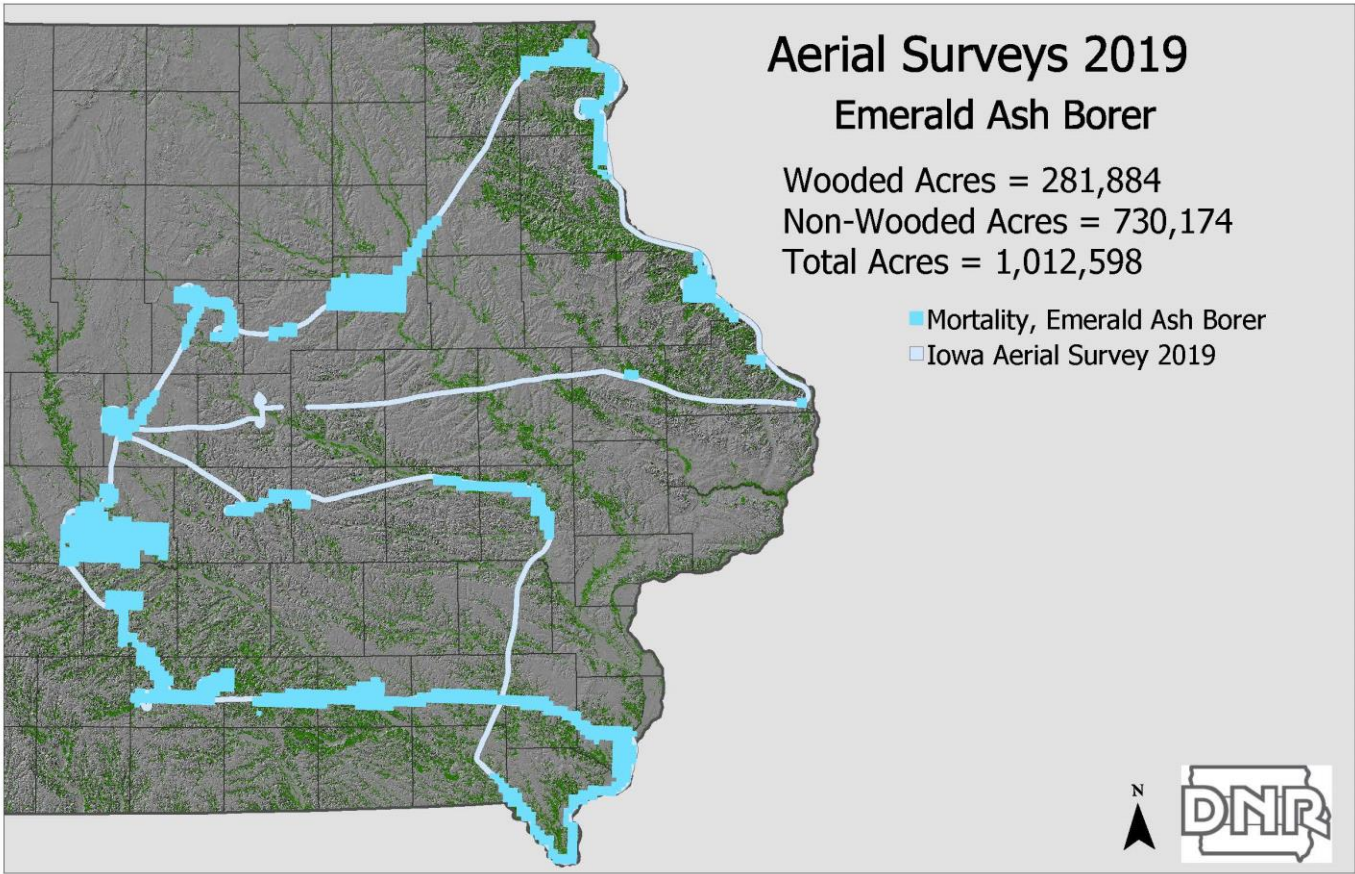


Figure 30. The map shows the polygon acres of emerald ash borer damage that was mapped out in 2019. This does not reflect the total number of trees. (Image: Tivon Feeley, DNR)

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.

The Forestry Section, 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 2019, and plans are in place for a similar continued vigorous forest health program operation in 2020. 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: white oak decline, 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 2020.

DNR 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.

"There are those who say that trees shade the garden too much, and interfere with the growth of the vegetables. There may be something in this: but when I go down the potato rows, the rays of the sun glancing upon my shining blade, the sweat pouring down my face, I should be grateful for shade."

-Charles Dudley Warner

Useful Phone Numbers and Websites

DNR Forestry Bureau has an updated [forest health page](#).

DNR maintains an [emerald ash borer resource page](#).

Iowa Department of Agriculture and Land Stewardship [Tree Health Page](#).

[Iowa State University's Pest Management](#) and the Environment page host information on emerald ash borer, gypsy moth, and much more.

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 their [Plant Disease Clinic website](#).

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.

Check out the [DNR landowner assistance](#) web page.

Be sure to look at the updated [Iowa DNR website](#).

DNR Forest Health Program Leader Contact Information

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