EMERGING THREATS
TO IOWA'S FORESTS, COMMUNITIES, WOOD INDUSTRY & ECONOMY

IOWA DEPARTMENT OF NATURAL RESOURCES

FORESTRY BUREAU

Executive Summary

Proper woodland and community tree care plays a critical role in creating healthy rural and urban community forests. Forest management of rural woodlands, including ensuring an appropriate number of trees per acre and maintaining species diversity, are the best insurance against native and exotic invasive woodland and tree threats. The best plan of action for communities is to inventory tree resources and work to create a diverse community forest that does not have more than 10 percent of any one species.

Iowa's three million acres of forest land provide environmental benefits to all Iowans in terms of soil erosion control, air quality, and water quality. In 2013, more than 6.5 million trees died. Within those trees there were more than 125 million board feet of wood, compared to 98 million board feet of wood harvested. This level of mortality is the highest level reported from US Forest Service inventories in twenty years. This is disturbing when considering more than 18,000 Iowans are employed in the wood products and manufacturing industry, generating nearly $4 billion in annual sales, more than $900 million in annual payroll and more than $25 million to private woodland owners annually from the sale of timber.

Each year, the Iowa DNR's Forestry Bureau cooperates with numerous agencies to protect Iowa's woodlands from insects, diseases, and other damaging agents. Iowa's forests are facing an unprecedented level of native and invasive pests that threaten to create a new wave of mortality unseen since the arrival of Dutch elm disease. In the *2013 Iowa Forest Health Highlights* the DNR identified in detail five key pests that have emerged as a severe threat to Iowa's native woodland and community. The full report is available at http://www.iowadnr.gov/eab and select the *Forest Health Highlights* tab.

The key pests identified include gypsy moth, emerald ash borer, bur oak blight, thousand cankers disease of black walnut, and Asian longhorned beetle. **Gypsy moth** catches were at an all time high in 2010, shattering the previous record by a factor of more than 3 times. As a result, over 170,000 acres of forest land were treated in 2011 to reduce the exploding population. The populations were reduced and there were only 269 **Gypsy moths** captured in 2013.

In 2010, **emerald ash borer** was first detected in Iowa resulting in a quarantine that places restrictions on how far ash wood material, including firewood can be moved. In 2013, **emerald ash borer** was found in four new counties spread throughout Iowa. An additinal find in 2014 was discovered in Febuaruy 2014. Due to the geographical spread of **emerald ash borer** in 2014, the entire State of Iowa was quarantined for the pest.

Bur oak blight, identified in Iowa in 2007, has continued to spread and cause advanced decline and premature mortality for bur oaks in rural woodlands and community forests.

T**housand cankers disease of black walnut** is not yet in Iowa. However, the Iowa DNR is actively monitoring for the walnut twig beetle that carries thousand cankers disease to protect black walnut, Iowa's most economically valuable tree species.

Asian longhorned beetle has not been identified in Iowa, the locations that have this pest have been devastated. Quarantines are in place to help prevent the spread and eradicate the beetle.

These five emerging pests will place an additional financial burden on Iowa's communities by threatening nearly all 26 million community trees. They threaten 55 million board feet (56 percent) of the wood products volume that is currently desired for harvesting and over 6 billion board feet (53 percent) of the existing timber volume standing in Iowa's forests today.

The economic loss caused by these five key pests is an estimated $1.4 billion over twenty years for forest landowners and wood products businesses and over $20 billion in urban tree removal.

These figures have been calculated based on mortality to all host trees from the five mentioned emerging threats over the next twenty years. This is a surety for our ash resource and a distinct possibility for our oak, black walnut and maple resources without adequate management and care of our woodland and tree resources.

Gypsy Moth

BACKGROUND

Gypsy Moth is a European insect species introduced in Boston, MA in 1869 as an experiment to help provide silk for the textile industry. This exotic insect continues to spread west from that introduction site and defoliate native forests.

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

ECONOMIC IMPACTS

- The total estimated impact of Gypsy Moth to Iowa's forest landowners and wood products businesses is over **$551 million** or an annualized loss of over **$22 million** in perpetuity for Iowa's economy.
- Other economic losses include non-timber products like seed production, reduced wildlife habitat and a **$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.

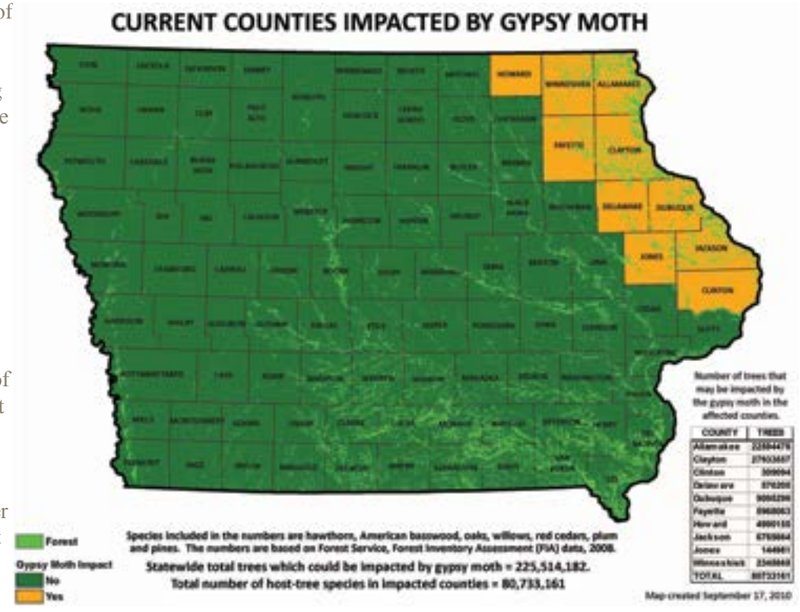
Above: The predicted look oak trees in Iowa will have during the early summer after gypsy moth caterpillars consume all of the leaves.

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.

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.



Emerald Ash Borer

BACKGROUND

Emerald ash borer (EAB; *Agrilus planipennis*) is a small green invasive wood boring beetle that attacks and kills ash trees. The adults live on the outside of ash trees feeding on the leaves during the summer months. The larvae 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

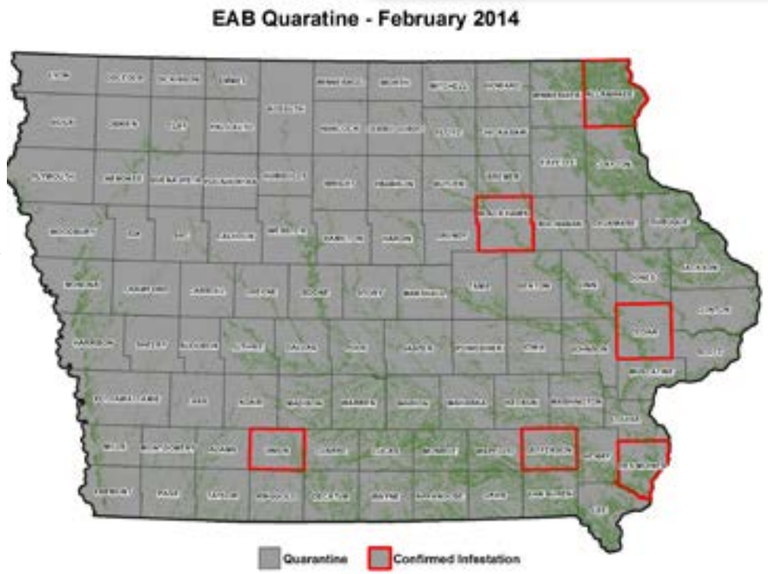
- The total impact of emerald ash borer to Iowa's forest landowners and wood products businesses is over **$27 million** or an annualized loss of **$1 million** in perpetuity for Iowa's economy.
- Other economic losses include non-timber products such as reduced wildlife habitat and an over **$4.1 billion** 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.



Bur Oak Blight

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.

The above oak tree has died from bur oak blight.

ECONOMIC IMPACTS

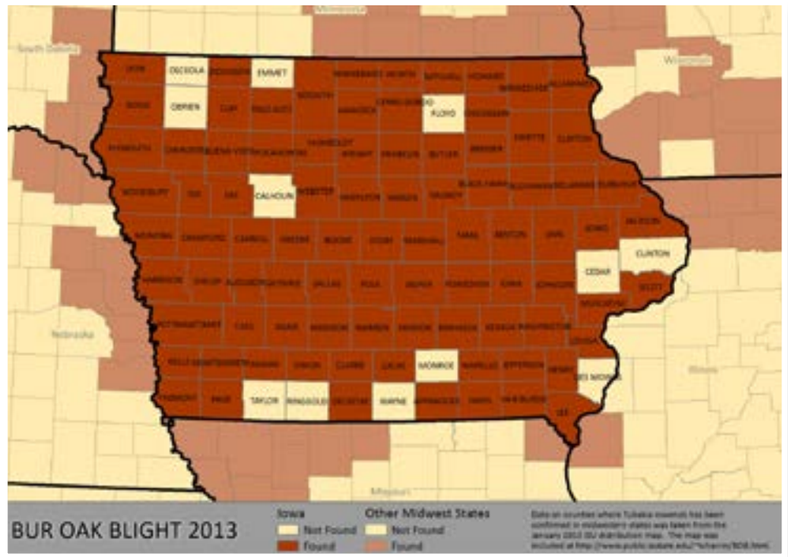
- The total impact of BOB to Iowa's forest landowners and wood products businesses is more than **$19 million** or an annualized loss of close to **$770,000** in perpetuity for Iowa's economy.
- Other economic losses include non-timber products like nut production, reduced wildlife habitat and a **$964 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.



Thousand Cankers Disease of Black Walnut

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 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 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.

Above: The black walnut is Iowa's most economically important tree species

Below: The walnut twig beetle and the galleries they leave behind under the bark of large branches

ASIAN LONGHORNED BEETLE

BACKGROUND

Asian Longhorned Beetle (ALB) is an exotic pest native to China. The larva of this beetle kills trees by tunneling through the tree, which girdles stems and branches.

ALB most likely traveled to the United States inside wood packaging materials from China, and has been intercepted at various ports of entry and warehouses throughout the country. In the United States the beetle prefers to attack maple species (*Acer spp.*), such as: boxelder, sugar, Norway, silver and red maple. In high concentrations or if there is not enough maple present they will also attack birch, elm, horsechestnut, and Ohio buckeye. It occasionally attacks: ash, London planetree, mimosa, poplar, and European mountain ash.

Maple, the beetle's host of choice, is a tree extremely common in urban settings. An infestation of ALB would be devastating for many communities throughout Iowa. However, with monitoring ALB can be detected early and eradicated.

ECONOMIC IMPACTS

- The total economic impacts of ALB to Iowa's forest landowners and wood products industry is over **$222 million**.
- Other economic losses would include non-timber products such as reduced wildlife habitat as well at a cost of nearly **$13 billion** to communities in lost benefits like energy savings, property value, storm water retention, and carbon sequestration. Communities and homeowners will bear the brunt of the cost burden for removing dead trees cause by ALB.

WILDLIFE IMPACTS

Maple trees have moderate importance to wildlife as cover and food. Seeds are eaten by birds and small mammals and the buds are eaten by birds, squirrels and deer. The trees are used for nesting sites by many birds.

MANAGEMENT SOLUTIONS

Proper woodland and community tree management have a critical role in creating healthy trees. The best insurance a landowner can have when managing their woodlands is to maintain a diversity of tree species; while ensuring an appropriate number of trees are growing on each acre. The best management plan for communities is to create diversity by not having more than 10 percent of any one species represented. These simple management plans provide the best defense against emerging forest health threats.

Images:

Dean Morewood, Health Canada, Bugwood.org
Michael T. Smith, Bugwood.org
ALB infestation map [map]. "United States Department of Agriculture Animal and Plant Health Inspection Service". <http://beetlebusters.info/ > (Accessed September 05, 2012).

Above: This map shows states with quarantines (red) and states at risk (tan).

Below: An urban street devastated by ALB.

Useful Links

IDNR Forestry Bureau forest health page. http://www.iowadnr.gov/Environment/Forestry/ForestHealth.aspx

IDNR Emerald Ash Borer Resource page. http://www.iowadnr.gov/EAB

IDNR Urban Forestry page. http://www.iowadnr.gov/Environment/Forestry/UrbanForestry.aspx

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

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

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

The Iowa State University Plant Disease Clinic. Contact phone number 515-294-0581 or on the web at http://www.extension.iastate.edu/Pages/plantpath/pdcintro.html

Iowa State University Extension Entomology. Contact phone number 515-294-1101 or on the web at http://www.ent.iastate.edu/clinic/

Iowa State University Bur Oak Blight page. http://www.public.iastate.edu/~tcharrin/BOB.html

Iowa DNR website at http://www.iowadnr.gov/

National Invasive Species Information Center- www.invasivespeciesinfo.gov

Emerald Ash Borer General Information - www.emeraldashborer.info

General Pest Information - www.aphis.usda.gov