# 2014 Illinois
## Forest Health Highlights

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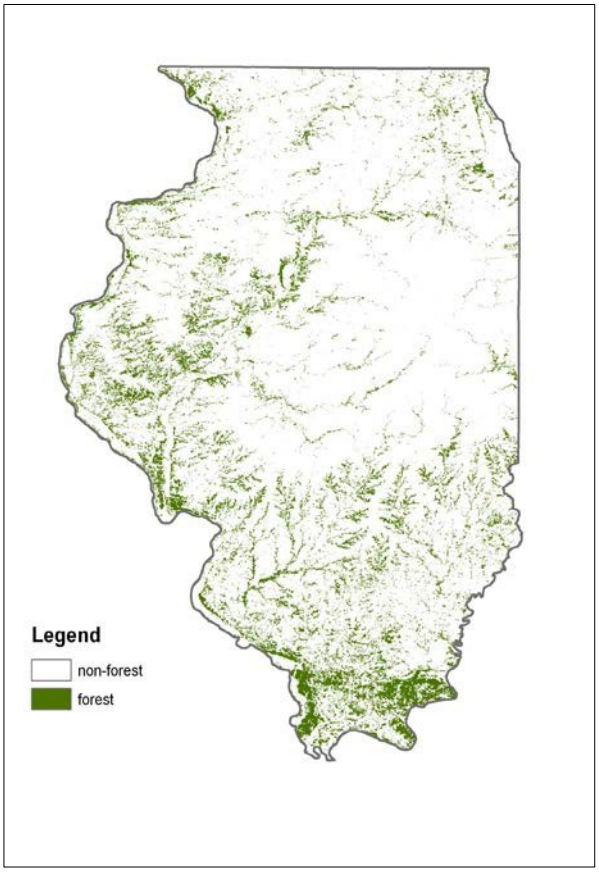
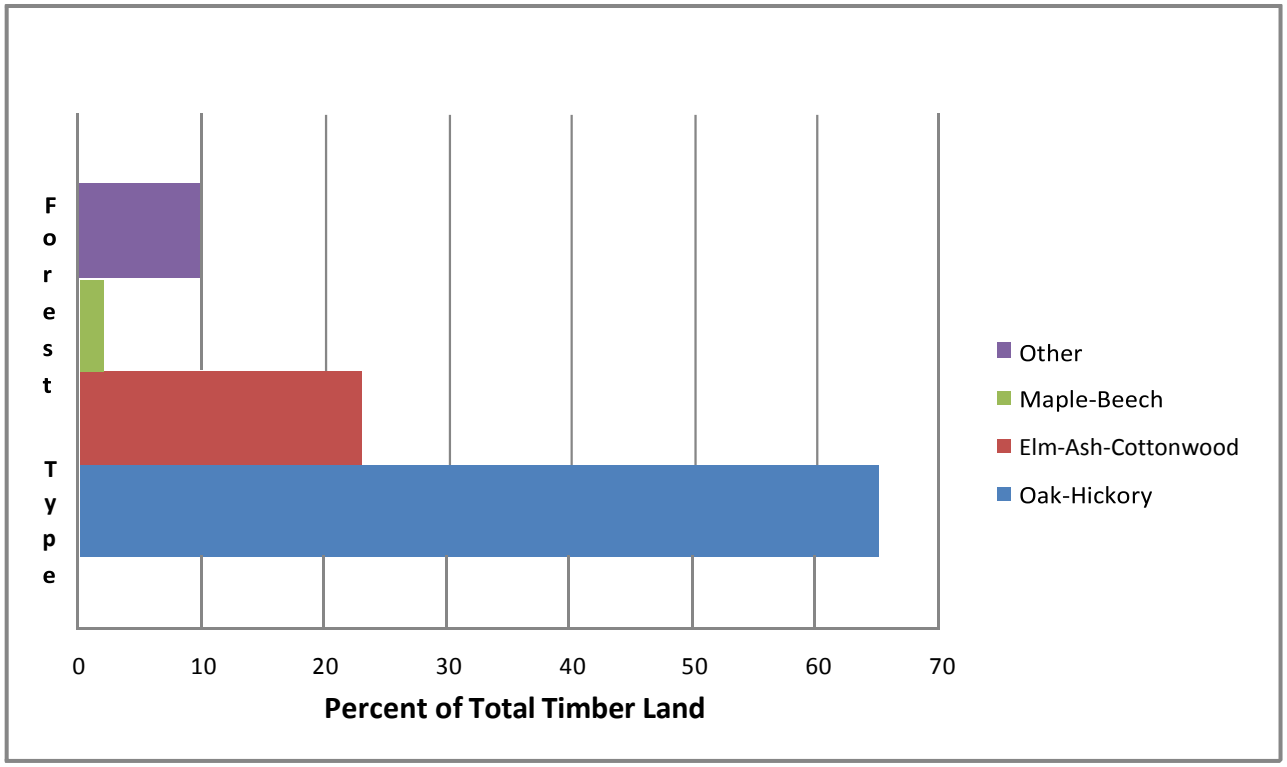



# I. Illinois' Forest Resources

Illinois forests have many recreation and wildlife benefits. In addition, over 32,000 people are employed in primary and secondary wood processing and manufacturing. The net volume of growing stock has increased by 40 percent since 1962, a reversal of the trend from 1948 to 1962. The volume of elms has continued to decrease due to Dutch elm disease, but red and white oaks, along with black walnut, have increased by 38 to 54 percent since 1962.

The area of forest land in Illinois is approximately 5.3 million acres and represents 15% of the total land area of the state (Figure 1). Illinois' forests are predominately hardwoods, with 90% of the total timberland area classified as hardwood forest types (Figure 2). The primary hardwood forest types in the state are oak-hickory, at 65% of all timberland, elm-ash-cottonwood at 23%, and maple-beech which covers 2% of Illinois' timberland.




# II. Forest Health Issues: An Overview

## Arthropod Pests

Overall, the 2014 growing season was relatively quiet with no serious arthropod pest outbreaks, The one exception was the on-going infestations of Gouty Oak Gall (GOG) on pin and shingle oaks (*Quercus palustris* and *Q. imbricaria*) in central, western, and southern Illinois.

**Gouty Oak Gall (GOG)**

Gouty oak gall (GOG) is a woody gall that forms on small twigs and branches of scarlet, red, pin, and black oaks (*Quercus* spp). The tiny native wasps, *Callirhytis cornigera* and *C. quercuspunctata* are responsible for forming the galls (Figures 3 and 4) (10).

Like most gall-forming wasps, their lifecycles can be rather complex and complicated and GOG is no excep tion. Adults emerge in May and June, and lay eggs in major veins of oak leaves. GOG larvae form blister-like galls with adults emerging in July. After mating, the adult female lays eggs in young oak twigs. Young GOG's appear as small, brown marbles which grow to two inch diameter brown galls. Later, adults emerge from the gall completing the two-year lifecycle. (Figures 3 and 4).

Galls can be physically removed on small trees in the northern part of the insect's range (northern Illinois), but in southern Illinois, galling can be quite heavy and pruning may not be practical especially on large trees.
Heavy galling can cause death of twigs and branches, but generally does not kill a mature, healthy tree (10).

As in 2013, heavy galling was observed again in 2014 along the I-57 corridor south of I-70 (Effingham, Illinois) as far south as the Dixon Springs area; between the I-57 and I-55 corridors from the Shawnee National Forest (SNF) north to I-70; and west from Springfield along I-74 to the Mississippi River. Heavy GOG populations and tree death were observed in south-central Illinois (Eldon-Hazlett and S.A. Forbes State Parks) as well as in the Springfield, Illinois area. GOG-affected trees were in all stages of decline from newly infested trees to dead trees. Stress agents, such as drought, soil compaction, and poor drainage are probably the predisposing agents for extensive dieback and death of pin oaks in south central Illinois, but death of individual branches by GOG was evident.

**Figure 3a. Heavy infestation of GOG.**

**Figure 3b. Close up view of GOG.**

# Plant Diseases

## Foliar, root rot, vascular, decline, and canker diseases

Overall, disease incidence was more typical for 2014. Near normal spring temperatures and abundant summer precipitation was favorable for most common foliar diseases. Stress related diseases like *Cytospora*, *Botryosphaera*, *Thyronectria*, and *Fusarium* cankers, oak wilt, and white pine decline were at normal levels. *Phytophthora* root rots were present probably due to overwatering, poor drainage, and wrong plant siting. *Phomopsis* and *Pestilotia* tip blight of juniper and arborvitae was observed statewide (1, 11)

## Ash Decline and Dieback

Considerable ash (*Fraxinus* spp.) decline (both green and white ash) continued to be observed along the I-57 corridor south of I-70 to extreme southern Illinois (Dixon Springs area). Declining ash were also observed later in the season (July-August) along the I-64 corridor from south central Illinois (Mt. Vernon area) west to the East St. Louis, IL. Most trees showed thinning canopies and dieback. Death was also a common symptom. Trees were examined periodically throughout the summer, but there was no evidence of EAB. This trend has been going on since 2008 and may be caused by ash decline and/or ash yellows. Luley, et al. (1994) documented an outbreak of ash yellows in this geographic area.

More specifically, ash decline continued to appear in east central Illinois (Kickapoo S.P.) in July and August. Ash decline was also observed in other areas of east central and southern Illinois (Fox Ridge, S.A. Forbes, and Wayne-Fitzgerrell S.P.'s).

## Pine Decline

IDNR district foresters reported cases of white pine (*Pinus strobus*) decline statewide particularly in western Illinois. In addition, dying and dead Scots (*P. sylvestris*) and Austrian (*P. nigra*) pines were common, in both urban and forested areas. Individual trees were not specifically examined, but most contain evidence of bark beetles and Carolina pine sawyer beetles, and probably died of pine wilt disease. The droughts and hot weather of 2010 and 2011 followed by the severe and extreme 2012 drought continue to pre- disposed these trees to the above pests and diseases.

## Oak Decline

In addition to oak trees infested with GOG, drought effects were spotty. Chronoic oak declind and some mortality was reported in central and western Illinois. Western Illinois has been under an extended drought for the last number of years. Missouri also reported similar observations in eastern Missouri adjoining portions of Illinois. Drought stressed oaks will be susceptible to Armillaria root rots, oak borers and bark beetles.

# III. Exotic Pests/Complexes

## Pests

### Emerald Ash Borer

The **emerald ash borer (EAB)** continues to spread throughout Illinois particularly to the west and south. Seven (7) new positive finds for 2014 include Logan, Menard, Peoria, Perry, Sangamon, Tazewell, and Williamson counties. Five (5) additional counties are considered "at risk", Christian, Franklin, Fulton, Jefferson, and Mason counties. In addition, EAB has been confirmed in three state parks (Rock Cut, White Pines, and Shabbona). Presently the IDA-EAB quarantine covers 61 of 103 Illinois counties (refer to Figure 5). In 2014, purple and green Lindgren funnel traps (LFT's) were deployed at 60 sites in Illinois state parks forests, natural areas, forest pre- serves, and on private property of forest landowners. The emerald ash borer (EAB) is a phloem feeding wood boring insect that kills its host by destroying the vascular system of the tree. Unlike many other borers, EAB has the capability to attack both healthy and stressed ash trees.

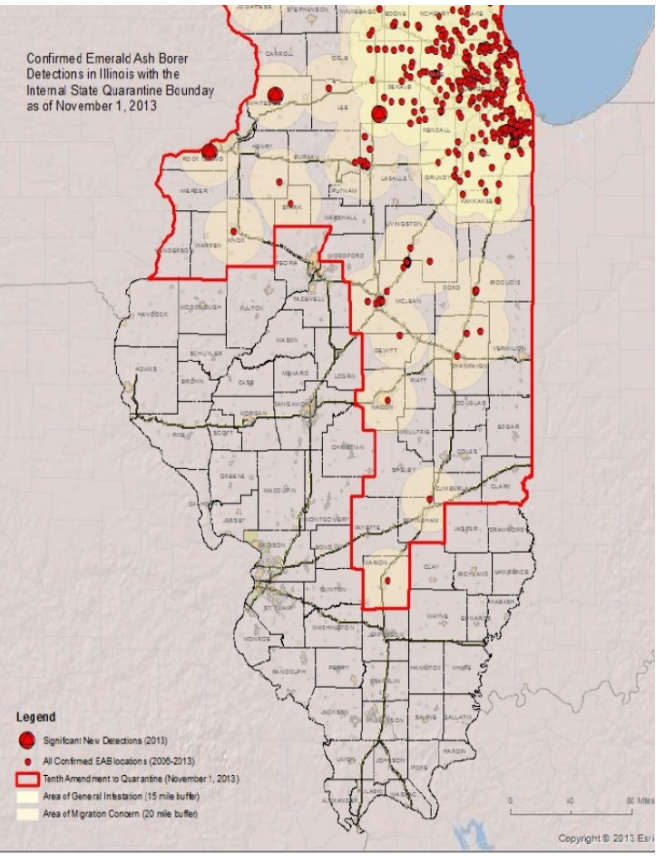



**Figure 4. 2013 EAB Quarantine Map - New Finds**

## Asian Long-horned Beetle (ALB)

**To date, no new sightings of ALB have been discovered**. The original ALB infested areas are no longer under quarantine and the Illinois quarantine is now lifted since ALB has not been found since 2007. Visual surveys were conducted throughout Illinois.

## Brown Marmorated Stink Bug (BMSB)

This newest exotic insect pest was found in Illinois in Cook and Kane counties as early as 2010. This insect has a broad range host including tree fruits, vegetable, and woody landscape plants (3). To date, the BMSB has been found in 14 counties in Illinois primarily in NE, central, and SW Illinois. Five new counties were added to the list in 2013 (15).

## Viburnum Leaf Beetle (VLB)

As reported in the 2009 Forest Health Highlights (FHH), the viburnum leaf beetle (VLB) was found in 2009 in an urban Cook county landscape. The viburnum leaf beetle feeds on a variety of commonly planted viburnums and has the potential to become a major pest of these ubiquitous woody landscape plants.The VLB has added to the forest health watch list.

## Chinese Long-horned Beetle (CLHB)

Another invasive long-horned beetle, *Hesperophanes campestris*; synonym *Trichoferus campestris* and similar to ALB appeared for the first time in 2009 near O'Hare airport and in Crawford county in east central Illinois (Figure 6). Its arrival at O'Hare is not surprising since it is a major point of entry, but the east central Illinois find is unsettling. The CLHB was captured near a pallet- making plant which is consistent with the movement of infested green wood and wood products. CLHB has also been found near Minneapolis, MN and in Quebec, Canada. The insect is originally from Asia and parts of Eastern Europe and spreads through movement of infested wood. It has a similar life cycle as the Asian long-horned beetle (ALB) and causes similar damage to trees. Preferred hosts of the CLHB are presented in Table 1 (9). In cooperation with APHIS, an intensive trapping, effort using 12 Unit LFT's, was conducted in 2014 in 60 sites including state parks, forests, natural areas, and county forest preserves.

**Table 1. Preferred hosts of the Chinese Long-horned Beetle**

| | | | |
|---|---|---|---|
| Apple | Mulberry | Maple | Birch |
| Beech | Ash | Locust | Walnut |
| Larch, | Fir | Cedar | Oak |
| Willow | Elm | Cut wood of spruce and pine. | |


**Figure 5. Adult Chinese Long-horned Beetle**

## Insect/Disease Complexes

### Thousand Cankers Disease of Walnut (TCD)

**To date, neither the WTB nor TCD has been found in Illinois.** Beginning in early summer, 2014, four unit LFT's were deployed along with a newly developed pheromone for detection of the walnut twig beetle (WTB). Traps were placed at sites including 60 state parks, forests, natural areas, county forest preserves, private woodlots, and wooded areas near mills (Figure 7). In addition to trapping, visual assessments of declining walnut trees, and documentation of walnut plantings and walnut natural stands were conducted and developed.

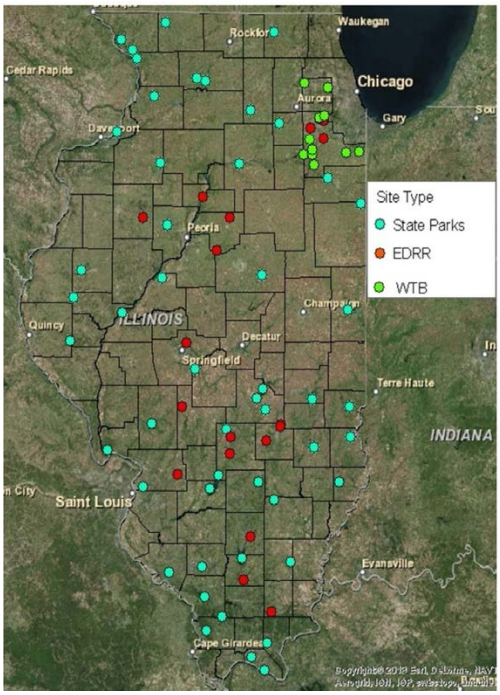



**Figure 6. Locations of Lindgren Funnel Traps**

**Sudden Oak Death (SOD)**

SOD is a deadly disease that attacks primarily oaks, but also rhododendron, and other woody ornamental trees and shrubs. The fungus causes cankers on stems contributing to plant decline and eventual death. Beginning in spring, 2012, a stream baiting sampling program was conducted as per the USDA-SOD protocol. Another sampling period (October – November, 2012) was conducted and no SOD inocolum was found.
Stream baiting sampling was not conducted in 2014.

**Dutch Elm Disease (DED)**

This vascular wilt disease has been with us for decades and continues to kill American and red elms throughout Illinois. Based on reports provided by the University of Illinois Plant Clinic (UIPC) and Morton Arboretum Plant Clinic (MAPC), DED cases continue to be a problem and levels were comparable to 2013 levels (1, 11).

**Oak Wilt (OW)**

The dreaded oak wilt is found in every Illinois county and has become a major urban and forest tree disease. Reports for 2012 by the UIPC indicate that 2012 OW disease incidence was higher compared to previous years (11). It is very likely, that the 2012 drought contributed or even accelerated the development of OW in pre-disposed trees.

**Verticillium Wilt (VW)**

This very ubiquitous and opportunistic vascular wilt fungus was common in 2014 and at levels seen in previous years. Flooding and drought over the last seven years including the severe 2012 drought has and will continue to predispose woody plants to VW. Sugar maple, red maple, ash, smoketree, Japanese maple, saucer magnolia, and three-flowered maple are just a few examples of VW susceptible hosts (3).

**Bacterial Leaf Scorch (BLS)**

Bacterial leaf scorch resembles abiotic scorch, but is caused by a bacterium, *Xylella fastidiosa* (Figure 8). It is thought to be spread by leafhoppers and spittlebugs (Figure 9). Tree hosts include elm, hackberry, maple, mulberry, oak, sweetgum, sycamore, and planetree (Table 2) (5). Since 1999, the UIPC records show that BLS has tested positive in 10 Illinois counties stretching from Jefferson, Madison, and St. Clair counties in southern Illinois through parts of central Illinois (i.e. Sangamon, Champaign, Douglas, Moultrie, Iroquois), north to Cook and DuPage counties, and to Jo Daviess county in extreme northwest Illinois (11). With the exception of Champaign county with 40 positive samples, the remaining 9 counties have had 1-3 positive cases confirmed. In terms of hosts, BLS has been found in bur, northern red, pin, white, swamp white, and shingle oaks from 1999-2008. In 2008, BLS was found in seven oak positives including northern red, swamp white, pin and several unidentified oak species. Eleven BLS samples were submitted in 2010 to the MAPC. Of the 11 samples, two were positive, one inconclusive and eight were negative (1). The positives were found on oaks growing in DuPage and Cook counties.

Historically, in 2011, a total of 22 trees were tested for *Xylella fastidiosa.* One sample, taken from an American elm (*U. americana*), tested positive (Cook county), and six were elevated and inconclusive. Eleven (11) samples were taken from trees growing at The Morton Arboretum. Additional samples were received from western and northwestern suburbs of Chicago, and western Illinois, but were negative (1). Reports received from the UIPC indicate BLS symptoms were more pronounced in 2012 probably due to drought stress. No new BLS positives were recorded for 2014

**Figure 7. Bacterial leaf scorch symptoms.**

## Table 2. Tree species known to be susceptible and not susceptible to BLS

**Susceptible Species**
American elm
Red maple
Silver
Sugar Maple
Black oak
Bur oak
English oak
Northern red oak
Pin oak oak
Swamp white
White
American sweetgum
American sycamore

**Non-Susceptible Species ( Based on Observations)**
Euopean black alder
Northern catalpa
Kentucky coffeetree
Amur cork tree
Chinese elm
Hackberry
Shagbark Hickory
Shellbark hickory
Pignut hickory
Katsura tree
Littleleaf linden
Cucumber tree
Balck maple
Chinkapin oak
Sawtooth oak
Common sassafras
Tulip tree
Japanese zelkova

# IV. PLANT DISEASES

**Bur Oak Blight (BOB)**

Bur oak leaf blight is a fungal disease that attacks bur oak (*Quercus macro-carpa*) with severe symptoms occurring on *Q. macrocarpa* var. *oliviformis* (Figure 10). It has been found in Kansas, Nebraska, eastern South Dakota, Minnesota, Iowa, Wisconsin, Illinois and Missouri. In 2011, BOB was found isolated from a tree in Winnetka, Illinois (north shore area of Chicago) and in 2012 from a single tree in Lake County, Illinois. No BOB samples were received in 2014, and no new finds were recorded.

BOB is caused by the *Tubakia* sp fungus resulting in blighting of the tree over a period of years. It starts in the lower portions of the tree and moves upward. Leaf symptoms usually do not show up until late summer (Figure 11). Severely affected trees may die after protracted years of defoliation. Bur oaks growing in established savannahs and upland areas appear to be more vulnerable. Oaks growing in bottomlands and/or dense forests appear to be less affected (4,12).

**Figure 8. Crown symptoms of BOB.**

**Figure 9. Foliar synptoms of BOB.**

## Needle Cast Disease

Two very common diseases affecting conifers, *Rhizosphaera* needle cast and *Diplodia* (i.e. *Sphaeropsis*) were present in 2014. Both of these fungal leaf diseases attack the needles of cone bearing tree species causing premature needle cast or a browning and/or death of the growing tip, respectively. While not outright fatal, they stress the trees and reduce overall ornamental qualities and growth rates.
Coupled with chronic drought, a deadly combination may result (1,11).

## Stress-related Canker Diseases

*Cytospora* canker of spruce is definitely a stress related disease particularly of Colorado blue spruce. Spruces are a common urban forest and landscape species. The cankers are initially found on the undersides of the branches and result from some type of stress. Spruce trees growing in urban environments are very prone to this canker. While not fatal, the cankers cause branches to die distal to the canker resulting in a loss of ornamental quality and landscape function (1). In addition, there has been an increase of *Thyronectria* canker on honeylocust and the honey locust borer in areas of northeast Illinois. It is anticipated that other cankers will make their appearance for some time into the future. (1).

## Hickory Decline

In recent years, reports of dieback and mortality of hickory have been reported in areas of the upper Midwest (Figure 12). Bitternut hickory (*Carya cordiformis*) and shagbark hickory (*C. ovata*) appear to be most affected. Symptoms include thinning canopies, dead branches, and eventually tree death (13).

Historically, death of hickory trees was attributed to the hickory bark beetle (*Scolytus quadrispinosus*) following droughts. Recent research seems to indicate that hickory decline may include a complex of biotic and abiotic factors such as bark beetles (*Xylobiopsis basilaris and* borers (*Agrilus otiosus*), and the fungus *Ceratocysis smalleyi*. In some cases, Armillaria root rot fungus has been found and is associated with recently dead trees (13).

Hickory decline and dieback is most common in overstocked stands. Current management practices include sanitation by removing dead and dying trees to reduce bark beetle breeding habitat and insecticide applications to the trunk of individual trees. Widespread use of insecticides for forest stands would not be economical nor practical (13).

**Figure 10. HIckory Decline**

**Heterobasidion Root Rot of Red Pine**

The fungus is a root and basal stem rotting fungus that colonizes cut stumps and then moves through root systems to adjoining trees. The fungus eventually colonizes the lower stem leading to wind throw and death of affected trees. In the Midwest, white, red, and jack pines are most susceptible (Figure 13). Thinned and/or harvested pine stands are prone to this disease. Prevention is the best approach. Treating freshly cut stumps with a fungicide along with and good sanitation and stump removal are important management tactics.

Aerial and ground surveys from 1962 to 1971 by Hanson and Lautz confimed *Heterobasidion annosum* being present in southern Illinois. Since 1971, there is no record of further *H. annosum* surveys. 2014 statewide surveys did not indicate any new finds of *Heterobasidion* spp. in red pine.

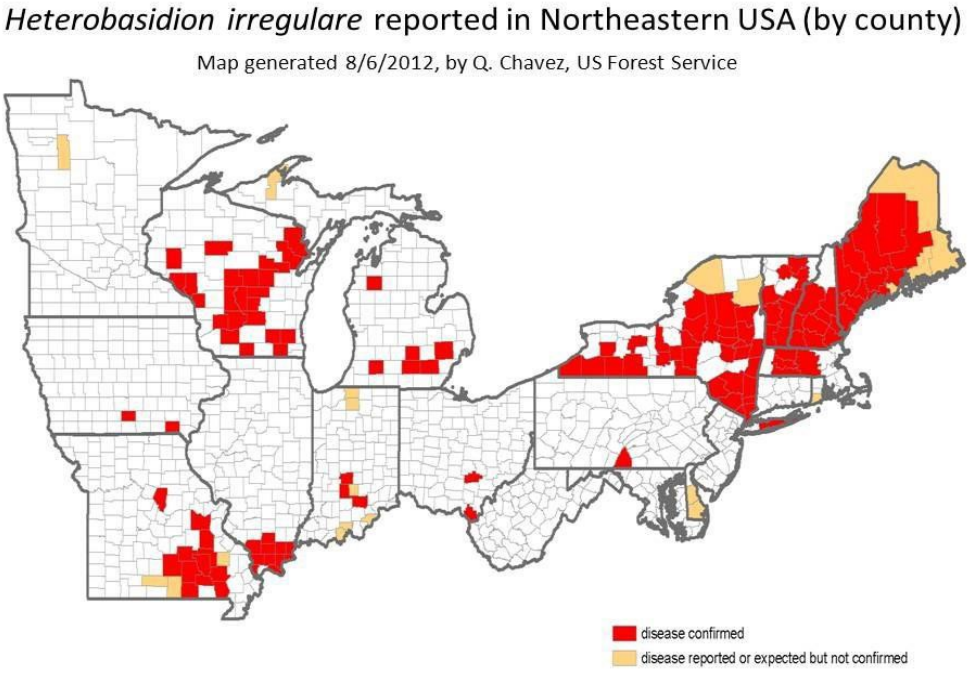



**Figure 11. Heterobasodion root disease(HRD) reported in Northeastern US, by county**.

# V. Insect Pests

## Bark Beetles (BB) and Wood-borers (WB)

Bark beetles attack primarily stressed trees including both hardwoods and conifers. Prolonged drought or a variety of abiotic and biotic stresses may pre-dispose trees to bark beetle attacks.

Based on field observations and in conversations with green industry members and foresters, 2014 appeared to a "normal year" for bark beetle activity. No major bark beetle outbreaks were observed or reported. Due to extremely dry conditions in some regions of the state, trees are still stressed and may be attacked by bark beetles and/or borers. Weaken trees may lack the ability to fight off these attacks and succumb.

In addition, engraver beetles and the Zimmerman pine moth continue to be chronic problems for many of our urban forest conifer species particularly Scots, Austrian, and muhgo pines. As above, both of these insect pests tend to attack stressed conifers growing on poor sites (poor drainage) along with drought stress, soil compaction, construction damage, etc.

Expanding on 2011 trapping efforts, 12 unit LFT's were placed in 60 state parks, forests, and natural areas, on private land, and near wood mills during the 2014. Identification of trap specimens are still being processed and identified at this time.

## Fall Webworm (FWW) and Eastern Tent Caterpillar (ETC)

Small scattered pockets of fall webworm (FWW) and eastern tent caterpillar (ETC) nests were seen at state parks and forests in southeastern (Lincoln Trail S.P.) and southern Illinois (Lake Murphysboro and Pyramid S.P's). Populations were comparable to previous years.

## Japanese Beetle (JB)

Japanese beetle was evident throughout the state, but defoliation was sporadic and not nearly as extensive as in previous years. Minor Japanese beetle feeding damage (<20% defoliation) was observed in most locations.

## Elm Flea Weevil (EFW)

The European flea weevil (EFW) (*Orchestes alni*) has been a pest in the upper Midwest since 2003, but has been in the U.S. since 1982. The EFW is a very tiny insect ($1/16^{th}$ inches long) with the characteristic long snout. (Figure 14). Adults are reddish-brown with black heads. Adult EFW's emerge in May and early June and begin feeding on young leaves chewing small holes in the leaf (Figure 15). Adult females lay eggs and the young larvae begin mining the leaf-tip eventually becoming a blotch-like mine. Larvae pupate within the leaf and emerge as a adults in mid to late summer. Adults over winter in under loose bark and in litter under infested trees (2). EFW feeding damage should not be confused with the elm leaf miner (*Kaliofenusa ulmi*) which is a blotch-mining sawfly. While the adult elm leafminer (ELM) emerges about the same time as the EFW there are subtle differences in larval feeding and biology. ELM larvae typically form blotch-like mines

**Figure 12. Adult flea beetle.**

**Figure 13. Adult flea beetle feeding damage on leaves.**

throughout the leaf in contrast to the leaf tip mines associated with EFW larvae. Also, by mid-June, mature ELM larvae drop from the leaf and enter the soil to pupate. Adult emergence does not occur until the following spring with one generation per year. Larval and adult feeding is usually considered an aesthetic issue, but coupled with heavy Japanese beetle feeding damage, preferred hosts can be completely defoliated by mid to late summer.

Research conducted at The Morton Arboretum (7, 8) and by Condra et al. (2010) indicate that *U. pumila* (Siberian elm) and 'Homestead' elm are the most susceptible to EFW feeding damage. In addition, long term field feeding preference studies conducted at The Morton Arboretum have indicated that elm hybrids with Siberian elm and *U. carpinifolia* parentage are strongly preferred by EFW (8). Refer to Table 3 for a listing of highly preferred hosts and host preference by geographic origin.

Table 3. Summary of feeding damage on elms by the elm flea weevil

| **Elm Biotype (Medium to heavy feeding damage)** | **Elm Biotype (Very low to low feeding damage)** |
|---|---|
| *U. laevis* | *U. propinqua var. suberosa* |
| *U. Morton Glossy* 'Triumph' | *U. glabra* |
| *U. davidiana* var. *manshurica* | *U. alata* |
| *U. americana f. pendula* | *U. macrocarpa* |
| *U. lamellose* | *U. thomasii* |
| *U. castaneifolia* | *U. crassifolia* |
| *U. foliaceae* | *U. parvifolia var. coreana* |
| *U. procera* | *U. Americana 'Moline'* |
| *U. berganniana* | *U. 'Morton Plainsman'* x *U. parifolia* |
| *U. pumila* | *U. japonica* x *U. wilsoniana* |
| *U. davidiana x U. pumila* | *U.pumila x U. Americana* |
| *U. carpinifolia x U. pumila* | *'Sapporo Autumn Gold' x U. pumila* |
| | *U. carpinifolia* hybrids |

**Source: Morton Arboretum (2004-2009).**

# VI. WEATHER/ABIOTIC RELATED DAMAGE

The 2014 winter was characterized by much below normal temperatures with temperatures 6-10°F across most of Illinois. The winter started with near to above normal precipitation, but December was rather dry for much of Illinois (<75% of normal). Above normal precipitation prevailed from January to March with above normal snowfall. Most areas of the state experienced the most severe winter in 30 years and the 8th coldest for the region. Snowfall ranked in the top five for Illinois and other Midwestern states. For example, Chicago received 67.4 inches, making it the third highest on record. (14)

As spring 2014 approached, there was considerable concern about flooding due to heavy snow pack and deep frost (2-3 feet) in the soil. As it turned out, ideal snow melt conditions occurred and only minor flooding occurred due to cooler than normal spring temperatures (2-4°F below average in northern Illinois) and near normal temperatures in April and May. Below normal precipitation occurred in western Illinois and was classified as abnormally dry to moderate drought based on the U.S. Drought Monitor. Summer, 2014 was quite pleasant with record cool for July (2nd coolest in Illinois) over much of the Midwest. June and August were slightly warmer than normal with a wet June (9th wettest for Illinois) and August. The cooler temperatures and adequate rainfall helped plants recover from the previous severe drought of 2012 and dry weather of July and Au- gust 2013 (14).

Aerial flyovers of the northern third of Illinois and extreme southern Illinois (Cache River Area) indicated Illinois forests were healthy, overall, with no obvious pest, disease, or abiotic problems.

## DIAGNOSTIC TRAINING CLINICS

A series of diagnostic training and EAB management workshops were conducted throughout Illinois in 2014. Attendees included commercial and municipal arborists, IDNR district foresters, consultants, master gardeners, allied members of the green industry, and natural resource managers. Workshop participants received instruction on proper pest and disease identification, diagnosis, and sampling techniques. Additional topics included updates on EAB management, TCD, BLS, BOB, common arthropod pests, and abiotic diseases.

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*The data presented in this summary are not to be considered to be comprehensive nor all inclusive studies. The narrative reported here is based on visual and observational surveys by Dr. Fredric Miller, IDNR Forest Health Specialist, IDNR Forest Health field technicians, IDNR district foresters, Stephanie Adams of The Morton Arboretum Plant Diagnostic Clinic, informal conversations with consultants and members of the green, natural resources, and forest industries.*

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