



Central States Forest Health Watch



Current forest health information for land managers in Illinois, Indiana, Iowa and Missouri

August 12, 2011

This collaborative effort of the USDA Forest Service Northeastern Area, Missouri Department of Conservation, and Indiana, Iowa and Illinois Departments of Natural Resources provides technical updates twice a year on forest health issues of regional interest. Useful information can also be found in previous editions, which are available [here](#).

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Important Regional Forest Health Issues

Nonnative insects and pathogens continue to be highly significant forest health issues in our region, even when they have not yet been found here. In this edition you will find updates on Emerald Ash Borer, Gypsy Moth, Asian Longhorned Beetle, and Thousand Cankers Disease.

Emerald Ash Borer (EAB) *(Thank you to Steve Katovich for summarizing this info, and the States for their individual updates.)*

By mid-August we have gone past the flight period for emerald ash borer (EAB) in the Central States region. The purple panel traps will begin to be collected and checked for EAB adults. As that data becomes available, we are likely to have some new EAB populations located. The map on the following page highlights the counties where EAB has been found to date. Counties highlighted in red are the newest reports from 2011. Many of the newest finds have been reported by homeowners and tree care professionals. Outreach and education efforts targeting those groups have made many folks very aware of the signs and symptoms of EAB.

This current spring and summer has seen an emphasis on biological control releases in a number of states. We will need some patience as we wait to see if the released parasites will have a major impact on EAB populations. More on that effort can be found at: <http://www.emeraldashborer.info/biocontrol.cfm>

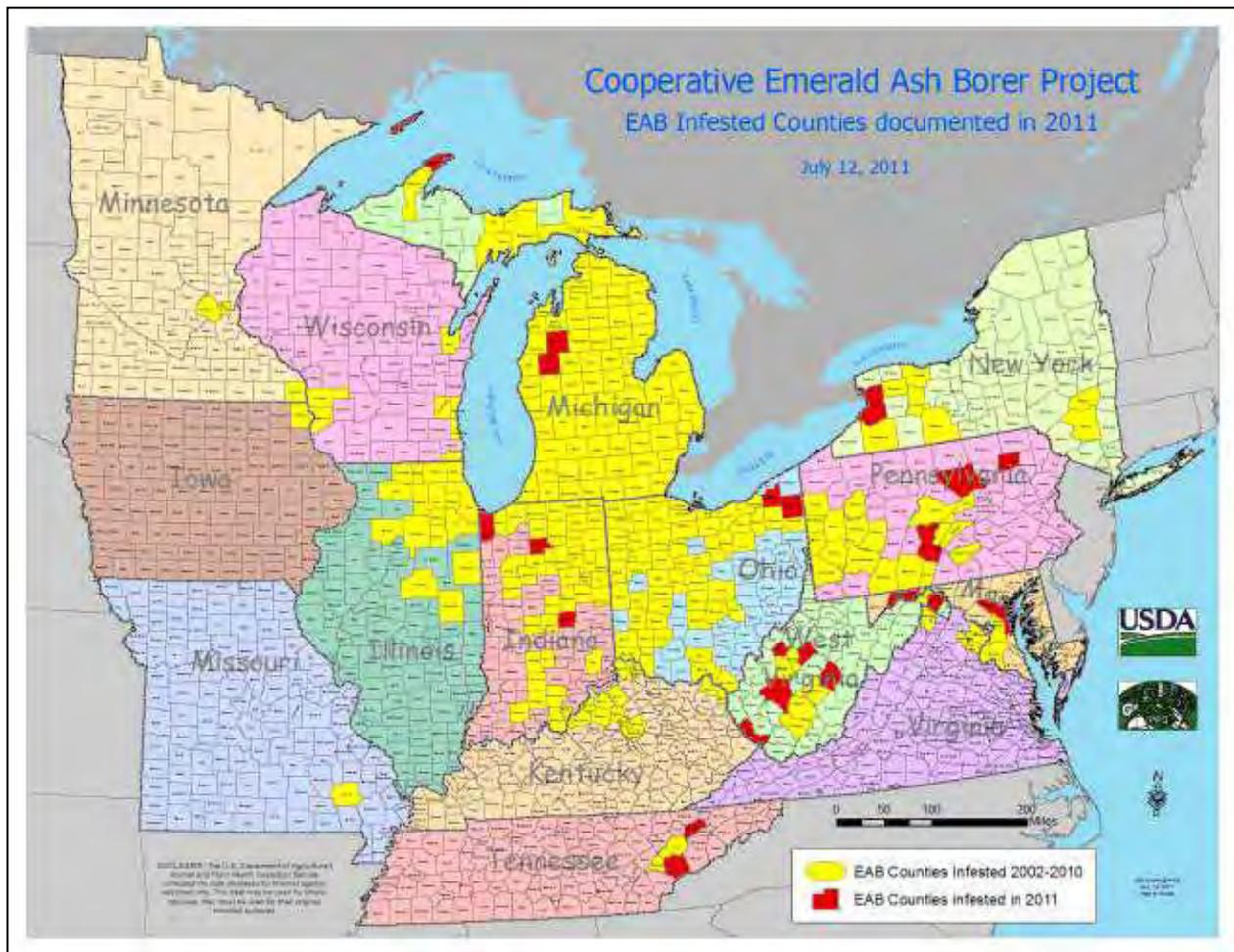
In addition, as we had mentioned in the last issue of this newsletter, the insecticide options for EAB management have expanded and improved greatly over the last few years. The efficacy of treatments has improved and the cost of treatments has generally dropped. Treatment options are outlined in the following extension publication: http://www.emeraldashborer.info/files/Multistate_EAB_Insecticide_Fact_Sheet.pdf

Another very recent extension publication discusses some of the non-target issues and other concerns related to EAB insecticide treatment. That can be found at:

http://www.emeraldashborer.info/files/Potential_Side_Effects_of_EAB_Insecticides_FAQ.pdf

A state-by-state discussion below summarizes where EAB is in each state, and highlights some of the responses.

Iowa: The island on the Mississippi River in the far northeast corner of Allamakee County continues to be the only confirmed location with EAB in Iowa. Monitoring is ongoing, and communities continue their preparedness activities, as they are able.



Missouri: The only known infestation continues to be the Greenville site in Wayne County in Southeast Missouri. APHIS is conducting delimit surveys. Missouri Department of Agriculture also continues to do EAB survey of sites with high risk of introduction. For updated information, check out the Missouri Emerald Ash Borer webpage at www.eab.missouri.edu. Don't miss their "BorerBites" EAB update newsletters that are posted under the publications section. The latest copy can be found here: http://extension.missouri.edu/emeraldashborer/pdf/EABNews_June2011.pdf.

Indiana: Currently, 45 counties have an EAB infestation and 51 counties are under quarantine. The 2011 cooperative (with USDA APHIS) EAB survey has focused on using purple panel traps on high risk sites (including sawmills, campgrounds, and rest areas) in uninfested counties, primarily in the southeastern and southwestern areas of the state. To date, two traps have captured EAB, both in new counties – Rush and Dearborn – in southeast Indiana. In addition to the trapping survey, visual survey by DNR staff, arborists, and foresters through the late winter and spring has detected new infestations in existing counties. Landowners/ homeowners have also reported EAB due to the information and education efforts that informed them of the quarantine and the need to report EAB infested trees.

The other EAB survey work is the aerial survey to map ash mortality. It is estimated that more than 50,000 forested acres have noticeable or extensive ash mortality in the woodlots. The mortality ranges from 1-2 dead ash trees per acre to all ash dead in the woodlot. The northeastern quarter of Indiana has the largest amount of ash mortality with the greatest concentration in Huntington County where all woodlots have all ash dead and dying. The other area of concentrated heavy ash mortality is in southern Indiana in the Orange, Lawrence and Washington tri-county infestation. In addition to the above areas, the aerial survey found that ash mortality is increasing in several areas. These areas are Allen County which includes the city of Fort Wayne; the Pigeon River in LaGrange County; the four northeastern counties – DeKalb, Steuben, Noble and LaGrange; Wabash and Miami Counties west of Huntington County as EAB moves down the Wabash River;

the metropolitan Indianapolis area that includes Carmel, and Fishers; and the Winchester area in Randolph County in east central Indiana.

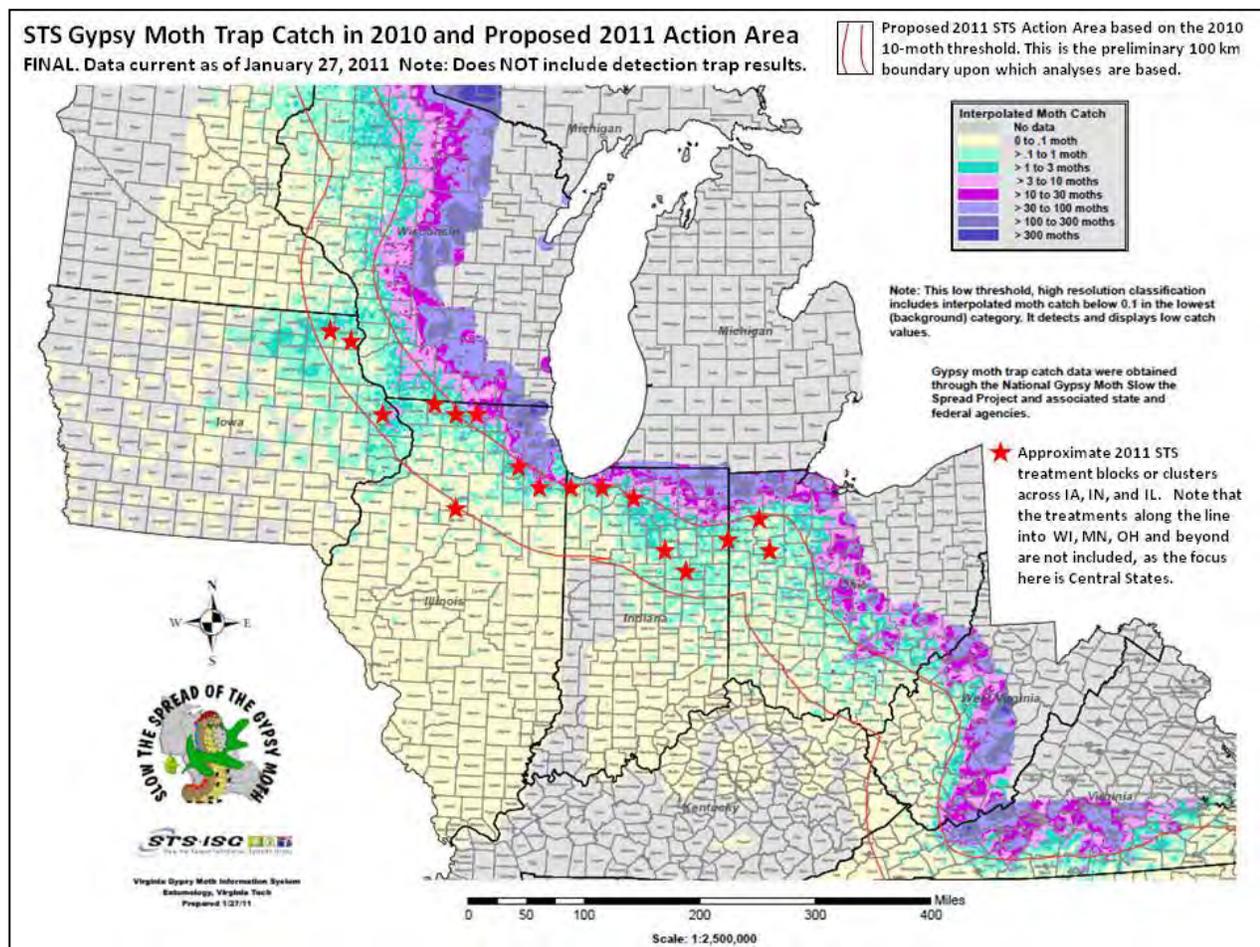
The Hoosier National Forest continues to test Slow Ash Mortality (SLAM) protocols in the Hardin Ridge Campground area. In spring they injected over 100 trees with TreeAge, and survey efforts continue to map the ash resource and monitor EAB.

Illinois: Illinois first found EAB 5 years ago. They have just released an updated list of communities and parks that have found EAB. That list, now more than five pages long, is available at: [http://www.agr.state.il.us/eab/PDFs_for_web/Home/Confirmed EAB Locations.pdf](http://www.agr.state.il.us/eab/PDFs_for_web/Home/Confirmed_EAB_Locations.pdf)

EAB and the St. Louis Gateway Arch: Your chance for input.

The National Park Service is considering a strategy for addressing the impact of EAB on the more than 900 ash trees at the St. Louis Gateway Arch (Jefferson National Expansion Memorial). Part of the strategy includes replacing the ash trees with another single species along the major walkways. This differs from other EAB management strategies in which the goal is to increase tree species diversity when replacing trees. The proposed strategy would retain a single species along walkways, because as stated by the Park Service, “The primary goal of the tree replacement is to maintain the significant character-defining qualities of the planting as they contribute to the Memorial's status as a National Historic Landmark.” The Park Service is seeking public input on the EAB Strategy Environmental Assessment until August 24, 2011. For more details, see: <http://parkplanning.nps.gov/projectHome.cfm?projectID=29875>

Gypsy Moth (GM) Activities – Spring 2011



In areas near the leading edge of GM, treatment activities were undertaken to reduce populations to “slow the spread” of the advancing front. GM continues to slowly expand westward, with populations now established in eastern and central Wisconsin, northern Indiana and northeastern Illinois. Iowa has had high moth trap catches in the northeastern part of the state, but multiple life stages have not been observed to confirm that there is an established population. Iowa joined the Slow the Spread (STS) program in 2010, and sites were treated in three areas in 2011. Missouri has had some catches of GM in pheromone traps, but is still considered to be without established populations, so they do not yet participate in the STS program. The map on the previous page shows the results of GM STS trapping in 2010, reflecting where male moth catches are high. Male moth catches are used to define the boundaries of STS action areas. The map does not include detection traps. The map also includes approximate locations of some of the treatment sites, as an example of where actual treatments were distributed within the proposed treatment area.

In Illinois and Indiana, the first moths of the year were later than normal, as expected from the late and wet spring. In Indiana, Btk treatments were approximately two weeks later than usual because of the slow development of caterpillars. In areas with established populations in Indiana, no defoliation was noted this year, perhaps because the weather conditions allowed greater mortality of the larvae by NPV and entomophaga. In Indiana, moth flight was also a little later than normal, with the first flight reported on July 5 in Fort Wayne.

States without established populations:		
	Treatment Activities	Trapping Activities
Iowa	First ever STS treatments were implemented on 81,154 acres on 4 sites over 3 counties (Jackson, Allamakee and Winneshiek) in northeast Iowa. All treatments were aerial application of mating disruption.	Iowa began to participate in the STS program in 2009. In 2011, 4,289 traps were placed in northeastern Iowa as part of the STS grid. An additional 2,986 gypsy moth detection traps were placed across the remainder of the state in a joint effort of IA DNR Bureau of Forestry, USDA APHIS, IDALS, and City Foresters.
Missouri	None	MO Dept. of Conservation, USDA APHIS, U.S. Dept. of Defense and MO National Guard cooperated to set out an estimated 6,000 detection traps in Missouri. Delimit trapping is being conducted in 2 counties where gypsy moths were captured last year (Jasper and Jefferson).
States with established populations:		
	Treatment Activities	Trapping Activities
Illinois	Aerial application of Btk on 15 sites (approx. 2270 acres) and mating disruption on 8 sites (approx. 9700 acres) was planned in 5 counties in northern Illinois, west of the Chicago metro area. The intent of these treatments is to slow the spread of gypsy moth by eliminating reproducing populations in the treatment sites. Some private GM suppression occurs in the greater Chicago area, but this is not reported to or monitored by the Forest Service or State.	Approximately the same number of traps was placed in 2011 as 2010. In 2010 they planned to place 7,000 STS monitoring traps in the northern 1/3 of the state. In 2010, USDA APHIS and Illinois Dept of Agriculture planned to place approximately 4,900 detection traps in the portion of the state not covered by the STS program.
Indiana	Gypsy moth Btk treatments were applied to treatment sites totaling 2,852 acres in Allen, Lake and Porter Counties. Two applications were made to each site with the exception of one site in Porter County. Gypsy moth mating disruption treatments with pheromone flakes were applied June 24-25 to 23,869 acres in 27 treatment blocks in 9 sites in 8 counties (Adams, Grant, Laporte, Marshall, Miami, Porter, Starke and Wabash) in northern Indiana.	The gypsy moth survey set more than 13,000 traps with more than 8,000 set in the STS area of northern Indiana. The southeastern area of the state was rotated out of the survey and the southwestern area rotated back into the survey

Asian Longhorned Beetle *(Thank you to Dennis Haugen for summarizing this info.)*

Asian Longhorned Beetle (ALB) was found in Bethel, Ohio, about 30 miles southeast of Cincinnati during June 2011. The infestation was identified after a property owner noticed unusual damage to several maples. A survey is underway to delimit the population, and more than 600 infested trees have already been found. Tate Township in Clermont County (56 square miles) has been quarantined.

This detection emphasizes the importance of public awareness of ALB. The general public has been key in detecting many of the ALB infestations. Further information about ALB identification, host species, and life cycle can be found at:

http://www.na.fs.fed.us/pubs/palerts/alb/alb_pa.pdf

<http://www.uvm.edu/albeetle/identification/index.html>

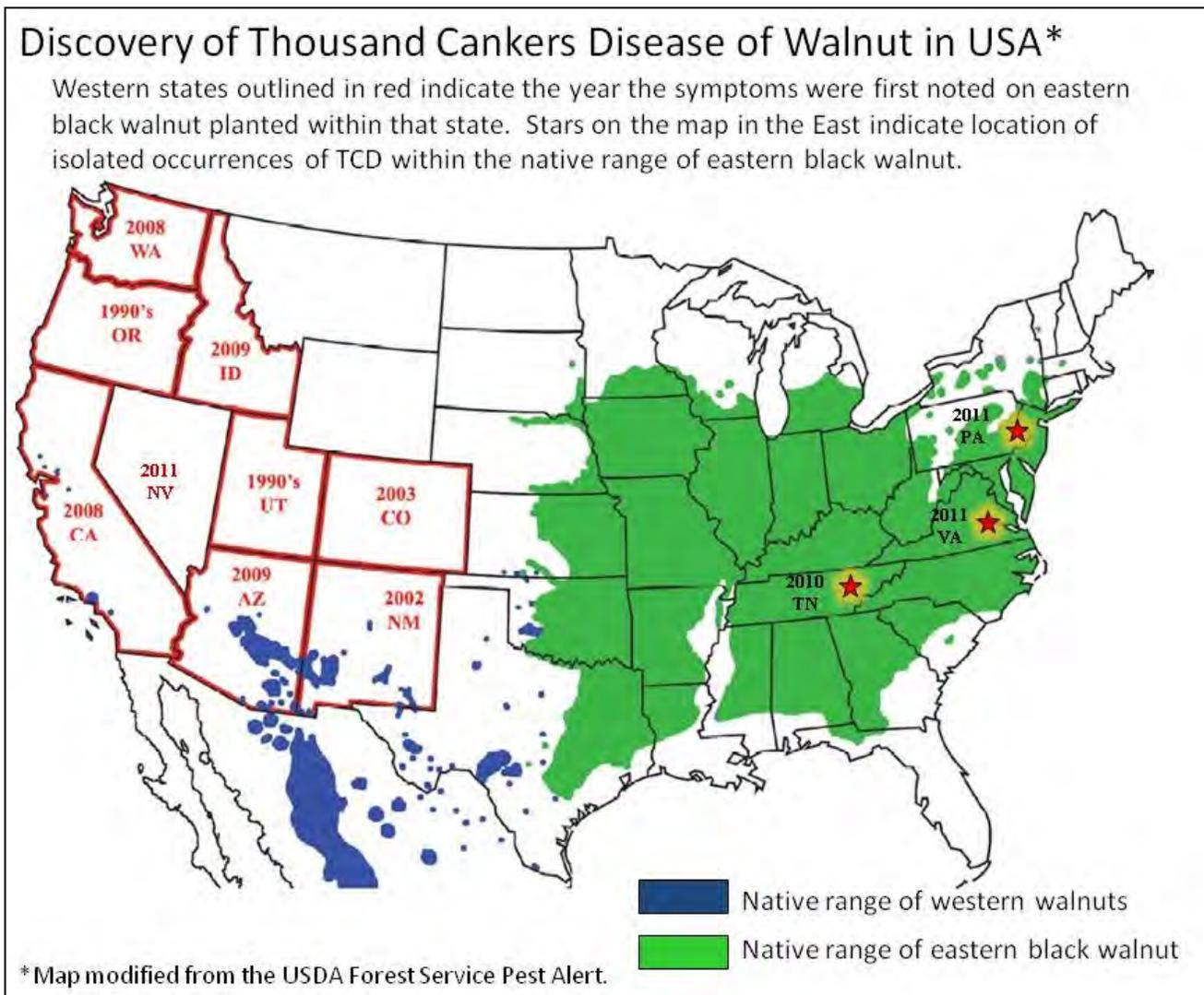
<http://www.beetlebusters.info/>

The status of the other ALB infestations are as follows:

- Worcester, MA – detected in 2008, more than 19,000 infested trees found (621 trees so far in 2011). Treated 90,000 trees with imidacloprid in 2011. Quarantine expanded to 98 square miles.
- Middlesex/Union Counties, NJ – detected in 2004; 729 infested trees destroyed. Last detection was in 2006.
- Chicago, IL – detected in 1998; 1551 infested trees destroyed. Declared eradicated in April 2008.
- New York City & Long Island- detected in 1996; 6,275 infested trees destroyed and still finding infested trees. Since 2001 more than 550,000 trees have been insecticide-treated. NY quarantine is 142 square miles

Thousand Cankers Disease of Black Walnut

The map below, modified from the TCD pest alert, demonstrates the current status of TCD.



On July 21, the Virginia Department of Agriculture announced the detection of Thousand Cankers Disease (TCD) near Richmond, Virginia. Quarantine has been placed on Chesterfield and Henrico Counties and the city of Richmond. This is the second known location of TCD within the native range of black walnut in the eastern United States, the other being discovered in Tennessee in 2010. Delimit survey is currently being conducted.

At the beginning of August the Walnut Council was apprised of the current situation, and shortly thereafter the National TCD steering committee also held a teleconference. Some of the observations from these recent communications include:

- The area currently known to be affected in Virginia is mostly suburban/residential, with a few affected trees along agricultural fields. To date, no affected trees have been found in a forested setting in the area.
- The affected trees are in communities/urban areas distributed in a corridor approximately 30 to 40 miles long and 10 miles wide. Affected trees have been found in both Chesterfield and Henrico County.
- The symptoms being observed in Virginia include bronzing foliage and some water-soaked appearance of foliage. The point here is that the symptoms are more variable than we first recognized, and may differ depending on host physiology and environmental conditions. This is not terribly surprising, but is worth noting.
- It is unknown how TCD arrived in Virginia. It is unknown how long it has been present, but it has been there “a while.”

On July 29, Pennsylvania State Cooperative Extension collected a suspect sample from Bucks County, PA. By August 9, Pennsylvania Department of Agriculture and USDA had confirmation of the presence of both the walnut twig beetle and fungus from Bucks County. A quarantine order was signed on August 10, stopping the movement of all walnut material and all firewood from Bucks County outward. This latest report is so new that we don't have any further information at this time.

Bottom line: We don't know where TCD will show up next. If you observe black walnut with deteriorating health, report it to a forest health specialist in your State.

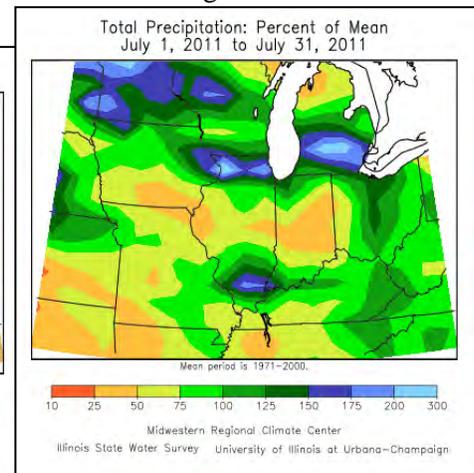
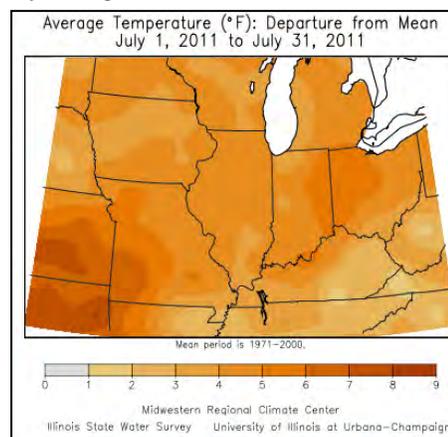
The TCD pest alert is available online at <http://www.na.fs.fed.us/pubs/detail.cfm?id=5225>

Because of the importance of black walnut in all of the Central States, each State is conducting visual surveys for TCD at various levels. By the next edition of the CSFW, we hope to have a better confirmation of where TCD isn't within our region.

Weather Overview

The summer of 2011 is going into the record books as “a hot one.” In Missouri, July was the hottest month on record since the 1980 heat wave, and the 6th hottest July since recordkeeping began in 1895. The map below shows that Missouri did not suffer alone, although the Southwest corner of Missouri did get an extra dose of heat. The heat was accompanied by a large swath of below normal

rainfall right through the center of our region. This has resulted in drought across a large portion of the Central States, as shown in the map on the following page. This is somewhat surprising after the wet spring we experienced across much of the region. As a result, people who were reporting anthracnose and leaf blights in the early summer are now reporting drought and scorch symptoms.

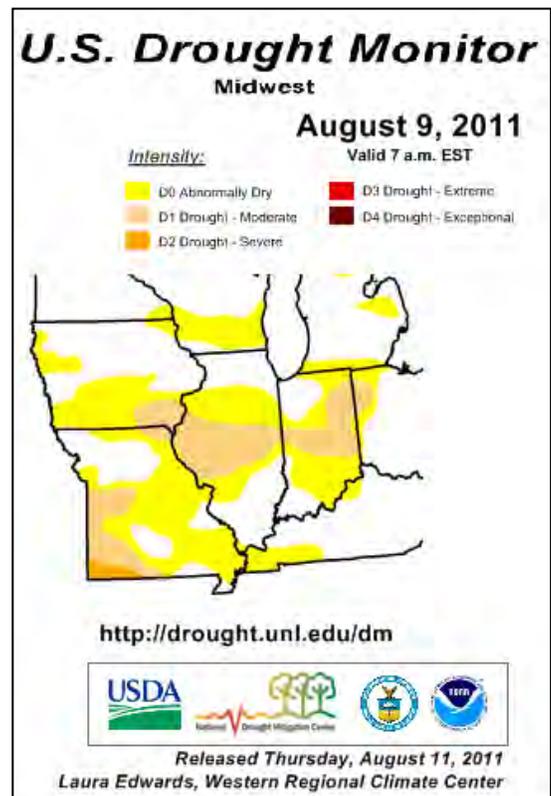


When the rain has come in the region, it has often been as a component of violent storms. In southeastern Illinois, extensive storm damage observed in early June and again in July. All of southern Illinois had some level of storm damage, consisting of uprooted trees, broken limbs, and twisted central leaders. Near the end of July, record daily precipitation records were set in several locations, and flash flooding was reported in eastern Iowa and northwestern Illinois. Dubuque, IA, received 10.62 inches of rain on the night of July 27, resulting in extensive damage from flash floods.

The Missouri River in Iowa and Missouri has experienced minor to major flooding along its entire length throughout the summer, with a gradual decrease during July. Major flooding was still in progress at St. Joseph, MO, at the end of July, but was expected to fall below major flood stage in early August.

And of course there have been more repercussions than heavy rains and flash flooding from the intense storms of this summer. Joplin, MO, was extensively damaged by a massive tornado on May 22, and recovery efforts will be ongoing for some time. How massive was it? Recent reports from the Missouri Department of Conservation note that they are “not sure how many trees are being removed... but they have been grinding and hauling off wood debris as fast as they can and they still have stockpiled almost 50,000 cubic yards of material. A real-world comparison would be saying it’s about 400 semi truck loads.” Interestingly, they are trying to keep groups wanting to replant in Joplin away from the area until at least this fall so that they can ensure that recovery construction is well underway or done before trees are planted. They are continuing to try to show people where, how, and what to plant for all the right reasons.

With the recurring damage we’ve seen from storms, it seems relevant to provide you with some links to resources that provide guidance on responding to storm damage, and also proactively managing your forest so that it is less subject to damage when the storm does strike. Here are a few useful resources:



Managing Storm Damaged Trees—ISU Extension Publication

<http://www.extension.iastate.edu/Publications/SUL6.pdf>

Repairing storm damaged trees:

<http://www.kbs.msu.edu/community-outreach/extension-land-and-water/information-resources/repairing-storm-damaged-trees>

How to predict if your tree is subject to storm damage:

<http://www.extension.umn.edu/distribution/naturalresources/components/DD7415a.html>

Storm Damage to Landscape Trees: Prediction, Prevention, Treatment:

<http://www.extension.umn.edu/distribution/naturalresources/DD7415.html#damage>

What else is being reported across the Region

Imprelis herbicide damage

Imprelis is an herbicide that was released by DuPont in 2010 for commercial applicator (not homeowner) use in treatment of broadleaf weeds in turf. Because of its putative safety and high effectiveness against particularly difficult weeds, it was rapidly adopted by landscapers and lawn-care specialists. This spring and summer there have been an exceptionally high number of cases of damage from this herbicide to trees, both conifer and hardwood, across the central US. The active ingredient in Imprelis is aminocyclopyrachlor. Some laboratories are equipped to sample for this chemical, though it is costly (\$200 or more per sample). In Indiana, the State Chemist issued a Stop Sale order for Imprelis. Class action lawsuits have been initiated. DuPont has suspended sales of the product and has a product return and refund program. DuPont has a website for Imprelis information and to report problems: <http://www.imprelis-facts.com/>

Because this is a new problem with new information emerging, it is difficult to provide conclusive recommendations of how to treat affected plants. The most common recommendations are:

- Avoid additional stress to affected trees by watering when needed, but avoid overwatering or water-logging of soil.
- Avoid fertilizing trees this year, as the stimulation of new growth may result in additional stress.
- Be patient to see if the damage is permanent, or whether the tree will recover. An exception to this would be totally dead trees that have become a safety hazard.

Extension specialists have quickly compiled fact sheets and resources with images of the damage and advice on how to respond. Some of these are available on the internet:

<http://www.ppd.l.purdue.edu/PPDL/hot11/6-10.html> (Purdue site, with links to several resources)

http://hort.uwex.edu/sites/default/files/Imprelis%20factsheet%20Jull_0.pdf (Wisconsin factsheet)

http://expeng.anr.msu.edu/uploads/files/122/Imprelis%20homeowner%20factsheet_Bert%20Cregg.pdf (Michigan State factsheet)

Bur Oak Blight

A new Pest Alert on Bur Oak Blight, by Jill Pokorny and Tom Harrington, provides photographs of symptoms, information for identification of symptoms and submission of samples, and current status of management recommendations. The electronic version of the publication is available on the NA publications webpage at <http://www.na.fs.fed.us/pubs/detail.cfm?id=5248> and hard copies can be requested from the US Forest Service or Iowa State University. The publication number is NA-PR-02-11.

In Iowa, BOB symptoms are progressing more slowly in 2011 than in 2010. To date, a significant number of bur oak trees with severe BOB symptoms have been confirmed only in southern Minnesota, Iowa, and eastern Nebraska. The fungus has been confirmed in southwestern Wisconsin and northeastern Kansas, but the disease levels in those trees is unknown. Although a few trees with BOB have been examined from Missouri and Illinois, BOB does not appear to be common in those states, and there are no reports of it from Indiana. Leaf symptoms of BOB typically begin to appear in late July or August.

Spruce issues

Sudden needle drop of spruce, also known as SNEED, has been diagnosed for the first time in Illinois (<http://hyg.ipm.illinois.edu/article.php?id=282>). This disorder, caused by *Setomelanomma holmii*, has been a bit of a mystery since it was described in 2002 as a colonizer of living spruce. CSFHW even provided an extensive article on it in 2003 (<http://www.na.fs.fed.us/fhp/fhw/csfhw/nov03/sneeddetail.pdf>) when it emerged in Missouri. Unfortunately, subsequent attempts to fulfill Koch's Postulates (the pathologist's checklist to prove that an organism is in fact the conclusive cause of disease) have not been successful, and we still don't really know whether this pathogen truly has a significant role in causing disease on spruce.

A myriad of other spruce disorders, including rhizosphaera and stigmata needle blights, cytospora canker, and diplodia shoot blight, were observed by the Illinois plant disease clinic this spring and early summer. Missouri Department of Conservation's forest health lab has also seen many spruce disorders this spring and summer, including weather stress, rhizosphaera, stigmata, and SNEED, but no diplodia shoot blight on spruce. A common underlying problem that leads to abundance of these diseases is stress. The wet weather this spring may have exacerbated the foliar problems. Judicious pruning to improve air circulation is often helpful to reduce foliar disease.

In Indiana, blue and Norway spruce of all sizes experienced dieback and mortality. In some cases, Imprelis may be involved, but the cause in other situations is believed to be stress from last year's drought, needlecast diseases from the wet spring, spider mites, and bark beetles.

Japanese Beetles

In some areas, Japanese beetles have been around a long time and seem a non-issue, but in other areas the populations have been very high this summer. Many places in Illinois, the central and north central portion of in particular, have noted high levels of Japanese beetles. Damage was common on lindens, crabapples, and Siberian elms. The July 1 edition of the Morton Arboretum Plant Health Care Report (<http://www.mortonarb.org/tree-plant-advice/article/22437/plant-health-care-report-july-1-2011-issue-201111.html>) and June 13 and July 11 editions of the University of Illinois Extension Home Yard and Garden Pest Newsletter (<http://hyg.ipm.illinois.edu/index.php>) contain good information about this pest.

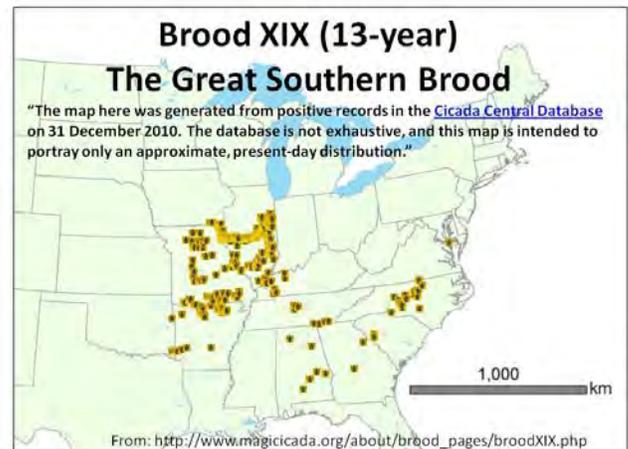
Japanese beetle damage is particularly annoying, because the adults feed for such a long period of time (~ 2 months). The adults feed on many species of trees, including birch, linden and apple, and also on many popular garden plants, like roses, raspberries, and grapes. Fortunately this pest is more of an urban problem than a forest health issue, although I personally get quite disgusted at pairs of beetles performing unthinkable acts in broad daylight on my raspberries. There is an effective pheromone for adult beetles, but it is generally not effective in a control program because the adults fly long distances. You are unlikely to be successful in capturing enough adults to impact the seemingly endless population, and you may actually increase local population by attracting them to your yard. Even when adults are finished feeding, they have left their eggs in the soil so that the larvae can feed on the roots of turf. There are biological control and pesticide options; generally your university extension service will have the latest information on most effective treatments for your area.

Periodical Cicada

Brood XIX of the 13-year cicada emerged in May and early June 2011 in Missouri and Illinois. The adults cause oviposition wounds on trees, leading to branch death (flagging) on the twigs where they have laid their eggs. Nearly anything you ever wanted to know about the periodical cicada can be found on the webpage of the *magicicada* project at

http://www.magicicada.org/about/brood_pages/broodXIX.php.

The next brood due to emerge in our area is brood III in 2014. Indiana University has an interactive brood map posted on the internet, where you can see where peak emergence of various broods is due to occur each year <http://www.indiana.edu/~preserve/cicada/CicadasPres/slide14.html#>.



Other news from around Illinois

In the southern tip of Illinois, considerable decline of both green and white ash, unrelated to EAB, has been observed. Affected trees showed thinning canopies and dieback, and sometimes death. This trend has been progressing since 2008. The cause may be ash dieback or ash yellows, as these disorders have been previously documented. Ash decline has been noted in several State Parks, including Kickapoo, Fox Ridge, S.A. Forbes, and Wayne-Fitzgerrell.

Also in southern Illinois, heavy occurrence of gouty oak gall was observed, causing decline and even death on heavily affected trees. Gouty oak gall is caused by a tiny wasp with a two year lifecycle. In the first year, the less conspicuous galls are formed on leaves and twigs. By the second year, the woody, gnarled galls up to 2 inches across encircle small branches and can girdle them.

Pine decline, probably caused disposition by drought and hot weather in 2010 and 2011, has killed scattered Sots and Austrian pines statewide. Pine wilt disease, bark beetles, and pine sawyer beetles are probably involved.

Other news from around Indiana

With the wet spring, sycamore, oak, maple, ash and other species experienced damage from anthracnose. No oak tatters was observed this year, possibly because wet crop fields delayed corn planting so that herbicides were not applied during the time when oaks were breaking bud. The other good news from the wet spring is that there are not high current drought impacts. However, lingering effects from previous droughts continue to show up as ongoing decline of yellow poplar in southern Indiana and ongoing oak decline around the state. White oak mortality in southern Indiana continues from a combination of factors, including overstocking, poor soil drainage, and previous droughts. Hypoxylon canker is often observed on oak that is dying or dead from oak decline.

Many of the major defoliators in Indiana (Forest Tent Caterpillar, Looper complex, Jumping oak gall, locust leaf miner, and oak tatters) did not cause damage this year, but walnut caterpillar is high in areas, and

fall webworm is expected to be high, especially in the southern part of the state. Bagworms are also late this year, and problems are just beginning to be reported.

Pine Shoot Beetle (PSB) was detected in Indiana in the early 1990's, and individual counties have been placed under State and Federal quarantine as the insect was detected in those counties. Currently PSB has not been detected in 35 southern Indiana counties. A recent review of the remaining area of Indiana at risk resulted in the decision to remove the state quarantine and have the entire state under federal quarantine. The process to remove the state quarantine has started, as well as APHIS starting their process to quarantine all of Indiana. While the process occurs, the state will operate under a total state quarantine. It may be worth noting that Iowa took a similar approach several years ago.

Other Resources and Sources of Information

Extension Plant Clinics are also a diagnostic resource in your state. Websites for the respective clinics are:

Iowa State University Plant and Insect Diagnostic Clinic: <http://www.plantpath.iastate.edu/pdc/>

University of Missouri Plant Diagnostic Clinic: <http://plantclinic.missouri.edu/>

University of Illinois Plant Clinic: <http://plantclinic.cropsci.uiuc.edu/index.html>

Within Illinois, the Morton Arboretum also provides Diagnostic Lab Services on the same fee schedule as the

University of Illinois: <http://www.mortonarb.org/plant-clinic.html>

Purdue University Plant and Pest Diagnostic Lab: <http://www.btny.purdue.edu/Extension/PPDL.html>

From October 3-6 Michigan will host the **North Central Forest Pest Workshop** (NCFPW) in Walden Woods, Michigan. The NCFPW is an annual gathering of persons interested in forest health in the North Central portion of North America. It is usually attended by entomologists, plant pathologists, foresters, and other scientists and students. Each year it is held in a different location. Additional information will be posted on the NCFPW website (www.forestpathology.org/hosted/ncfpw/) as it becomes available.

Feature Topic: The Immediate and Long Term Effect of Flooding for Urban Forests and Natural Forest Stands.

By Fredric Miller, Ph.D.; Forest Health Specialist – Illinois Department of Natural Resource; fmiller@jcc.edu

This past spring and early summer most of the Midwest experienced heavy rainfall amounts and flooding. This led to extensive flooding for a number of days and months and seems to be becoming an annual event for many areas. The loss of life, property and well-being of thousands of people was catastrophic. A sometimes forgotten casualty associated with flooding and storm damage is the demise and loss of our urban and natural forest trees.

Some of us, myself included, vividly remember the massive Mississippi River flood of 1993. Major urban areas such as Des Moines and the Quad Cities area of Iowa and Illinois, St. Louis, Missouri and a myriad of towns, smaller communities, and massive areas of farmland were inundated for weeks and months. Extensive tree death occurred in many flooded urban areas. Beginning in the fall of 1993, after most flood waters had receded, a group of us from the University of Illinois began systematically monitoring two flooded locations in the Davenport, IA, area to better understand the immediate and long term effects of the flood. In addition, a comprehensive tree mortality survey of Hull, IL, (just south of Quincy, IL) was conducted in October 1993 to determine the immediate and short term effects of flooding. The two sites at Davenport (downtown Davenport and Credit Island) have been flooded a number of times since 1993 and as recently as spring 2011.

Trees on the two flooded sites in Davenport were examined one to two times per year from 1993 to 2003 and every other year since for overall tree condition, decline, and evidence of disease and/or insect infestation. A group of non-flooded (control) trees located on the Rock Island Army Arsenal were selected and were examined for the same criteria as the flooded trees.

After nearly 20 years of observations and subsequent periodic flooding, what have we learned? There are some species that will simply not tolerate flooding of any kind or for any length of time. This was borne out very clearly based on our Hull woody plant mortality survey conducted in October, 1993 just a few weeks after the flood waters had receded. Not surprisingly, virtually all evergreens including eastern red cedar, pines,

spruces, and hemlock showed death of lower branches or total tree death if they had been totally inundated. It was very easy to measure how high the flood waters had reached just by looking at the brown-green line on these plants. On the deciduous side, sugar maple, crabapple, flowering cherry, plum, pear, and peach, and lindens all succumbed. We saw this same effect at both of the sites in Davenport as well. A group of large (4-8 inch diameter) linden trees all died where flood levels reached 4-5 feet.

On the positive side, silver maples, elms including Siberian elm, green ash, Bald cypress, river birch, honeylocust, and sycamore all withstood the 1993 flood. I just visited the Davenport sites this past week (August, 2011) and a good number of the above species, including some large green ash, are still with us. One exception has been the hackberries. Right after the flood we noticed a fairly extensive area of hackberries that had died just downstream from Davenport. Hackberries in downtown Davenport are all gone now, but took longer to die. Most declined over about a 10 year period with basal rot eventually finishing them off. Another interesting phenomenon has been the long-term survival of a group of old-growth bur oaks on Credit Island. These oaks have withstood countless flood events, but now after nearly 20 years, most of them have succumbed to the abuse. Only a few of them still remain from 1993.

Not only are tree species an important part of the equation, but flooding characteristics also have an effect on tree survival. The floods of 1993 occurred early in the growing season and persisted well into the active growing season. Oxygen demands by trees' roots were at their peak. Based on my own observations and discussions with others, tree mortality may be higher with spring and early summer floods. As the water warms, it carries less oxygen which can deprive roots. Floods that occur later in the season and of course, during fall and winter when trees are approaching dormancy or dormant do not seem to be as lethal to trees. Another factor is the duration of the flood and the speed of the current. Depending on tree susceptibility, short flood events of a few days or weeks will probably be less prone to mortality compared to water standing around trees for weeks and even months. In some areas (i.e. Davenport), trees were flooded virtually the entire spring and summer (April to September). The oak trees mentioned previously also showed scouring around the trunk. Fast flowing flood waters will wash away the soil around the base of the tree and buttress roots and expose fine root systems to desiccation once things dry out. Along with scouring, floating debris can also wound trees allowing for decay fungi and insects to invade.

The big surprise for all of us was that no catastrophic and/or wide spread disease or insect outbreaks occurred as a result of the 1993 flooding and subsequent flooding. Either trees died very quickly before they could be attacked by insects and disease or we saw a very gradual decline over a many years, a decade in this case, but with no outbreaks of diseases or wood-boring infestations that you would expect with chronic stress. For the trees in the chronically flooded areas, they apparently have learned to adapt even if they are not considered to be floodplain species. We did not see large-scale die off on bottomland species in spite of the extended and extensive flooding. The one exception to this would be the slow decline and death of the bur oaks growing on Credit Island.

In conclusion, what can we say after nearly 20 years of observations?

- Lindens, sugar maple, evergreens and conifers, and most flowering ornamentals and fruit bearing trees will not tolerate a short duration flood event. If you have these trees species growing in areas prone to flooding, you will eventually lose them depending on the flood event.
- The tough ones of silver maple, Siberian elm and other elms, honey locust, and green ash (assuming EAB does not get it first) usually will survive fairly extensive flooding and be around for a number of years.
- Some species like the hackberries and oak may also surprise you with their susceptibility and/or resilience against flooding.
- All this leads to the importance of species diversity when planning for and managing trees in an urban forest setting.
- A comprehensive tree inventory is critical in order to properly plan for and assess the potential economic, environmental, and ecological effect of a major flood event.

This newsletter is also available on the WWW at:

<http://na.fs.fed.us/fhp/fhw/>



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