DECEMBER 2013

MISSOURI Forest Health UPDATE

FROM THE MISSOURI DEPARTMENT OF CONSERVATION FOREST HEALTH LAB

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Serving nature and you.

Emerald Ash Borer

The emerald ash borer (EAB), *Agrilus planipennis*, is a non-native forest pest that is causing widespread mortality of ash trees in eastern and central North America. By the end of 2013, it had been detected in 22 US states stretching from Colorado to the East Coast and in Ontario and Quebec, Canada.

The first EAB population detected in Missouri was discovered in 2008 in Wayne County in the southeastern part of the state. Detection surveys have been conducted annually in Missouri since 2004, by visually examining trees at high-risk sites such as campgrounds (2004-2007), and later with EAB sticky traps after they became available in 2008.

In 2012, additional infested areas were detected in southeast Missouri (Madison and Reynolds Counties) and on the other side of the state near Kansas City (Platte County). In 2013, a total of 922 traps were monitored throughout the state by the Missouri Dept. of Agriculture (MDA) and the U.S. Dept. of Agriculture (USDA APHIS PPQ). EAB was detected in five more counties: Butler, Bollinger and Perry in the southeast, Pulaski in south central Missouri, and Jackson in the Kansas City area (see map on page 2).

In response to the detected EAB distribution scattered from western to southeastern Missouri, the Missouri Dept. of Agriculture expanded the state EAB quarantine in September 2013 to include all Missouri counties.

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Emerald ash borer adult.

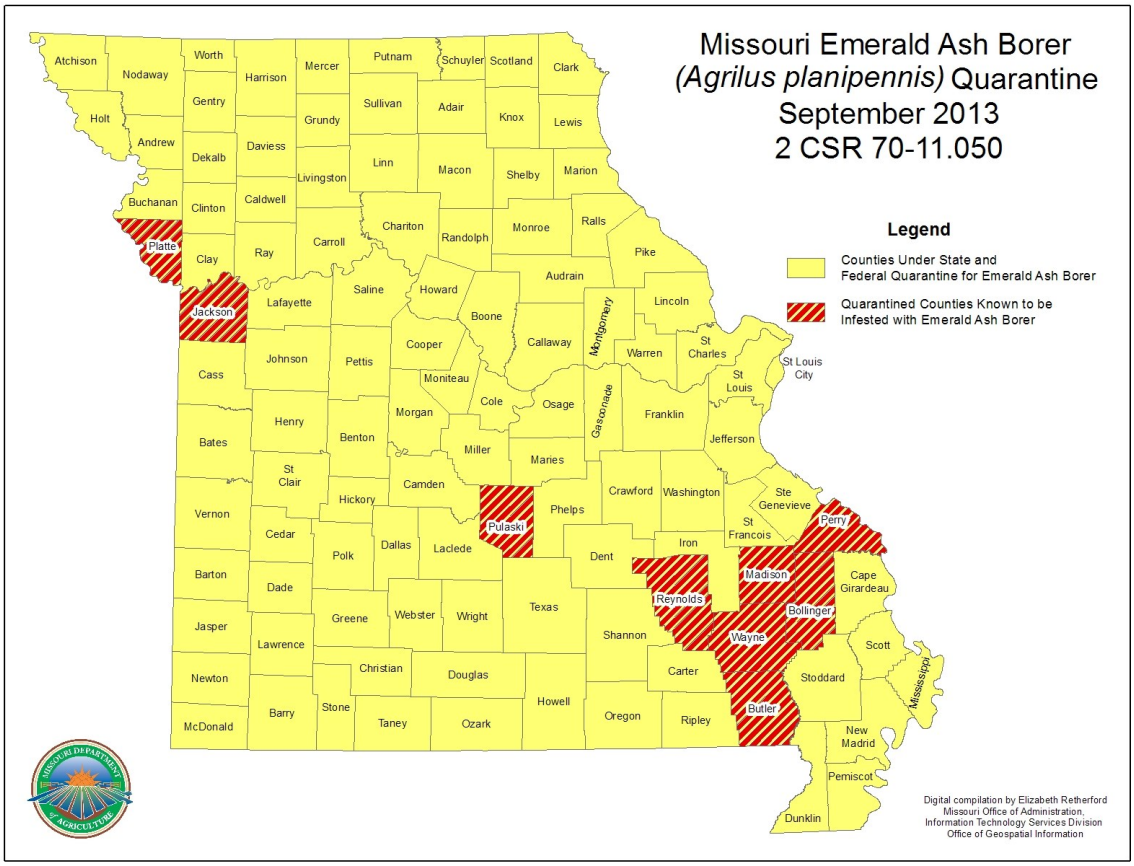
Emerald Ash Borer *continued*

USDA APHIS PPQ followed suit with a similar statewide federal EAB quarantine in November 2013. Both agencies have been working with forest product industries and other stakeholders since that time to educate about the impacts of the quarantine and the potential use of compliance agreements to move regulated items with specified protocols.

Outreach efforts by the Missouri Dept. of Conservation (MDC) and partners in the Missouri EAB Program continue around the state. Displays, presentations, news releases and other outreach activities occur at many workshops, fairs and other venues throughout the year.

MDC's Forestry Division staff works with communities and green industry groups to educate about EAB management strategies and the need for each community to start planning and implementing their response to the EAB threat. Missourians are encouraged to be alert for evidence of infestations and visit this web site to learn more and report suspect infestations: http://eab.missouri.edu

Biological control is one tool that may eventually be useful in managing EAB populations. Three species of non-stinging parasitic wasps (*Oobius agrili*, *Testrastichus planipennisi*, and *Spathius agrili*) that are natural enemies of EAB in Asia were approved in 2007 for release in North America. Prior to release they were tested for host (EAB) specificity and potential non-target impacts. As of 2013, these parasitoids have been released in 16 of the 22 infested states. The EAB biological control program in Missouri is managed by the Missouri Dept. of Agriculture. All three species of parasitoids were released in 2012 and 2013 at the site of the first detected EAB population in Wayne County. Establishment of parasitoids at that site will be evaluated starting in 2014. Known EAB populations in other Missouri locations will be monitored with sticky traps to determine additional locations where parasitoid releases could be considered. Further details about EAB biological control are available at: http://www.emeraldashborer.info/biocontrol.cfm



Missouri statewide EAB quarantine (yellow) and known infested counties (red stripe).

In 2013, EAB was detected in five new counties: Butler, Bollinger and Perry in the southeast, Pulaski in south central Missouri, and Jackson in the Kansas City area.

Thousand Cankers Disease of Walnut

Black walnut is ecologically and economically important to Missouri, and thousand cankers disease (TCD) represents a serious threat to this resource. TCD occurs when the walnut twig beetle (WTB), *Pityophthorus juglandis*, attacks walnut trees, spreading the *Geosmithia morbida* fungus that causes small cankers in the phloem tissue under the tree bark, eventually causing tree decline and mortality.

TCD has not been detected in Missouri; however there is concern that undetected TCD infestations could be present, or that spread may occur from western states or North Carolina, Ohio, Pennsylvania, Tennessee and Virginia where it has been detected. Potential long-distance spread of TCD through movement of infected walnut materials enhances this threat. Existing survey technology is not very sensitive, and TCD is unlikely to be detected until several years after introduction. Detection of well-established infestations makes eradication efforts difficult. It is important to conduct detection surveys for TCD, as well as inform citizens about the disease and the risk of wood movement from areas with known infestations.

In 2013, both the Missouri Department of Conservation (MDC) and the Missouri Department of Agriculture (MDA) conducted surveys for TCD using USDA Forest Service and federal Farm Bill funding respectively (see map). MDC placed 50 WTB pheromone-baited Lindgren funnel traps at high-risk locations with declining walnut

Black walnut tree with TCD symptoms in Tennessee.

trees (urban areas, campgrounds, sawmills) in central and southeast Missouri. MDA placed 143 WTB traps in the St Louis, Kansas City and southwest Missouri metro areas. Visual surveys were conducted by both agencies in high-risk areas to identify potentially infested trees. Branches were examined from suspect trees. When suspicious symptoms were observed under the bark, sample branch sections were triple-bagged, placed in a cooler with ice and transported to diagnostic facilities for evaluation and culturing as needed. Since 2010, 850 locations have been surveyed visually and 255 WTB traps deployed (see map on page 4). No evidence of WTB or TCD has been detected in Missouri. Common walnut problems detected during surveys included drought stress, site-related issues, and infestation by several other wood-boring insects (primarily round-headed and flatheaded borer larvae).

Outreach efforts were continued to raise public awareness about TCD. Messages included the potential

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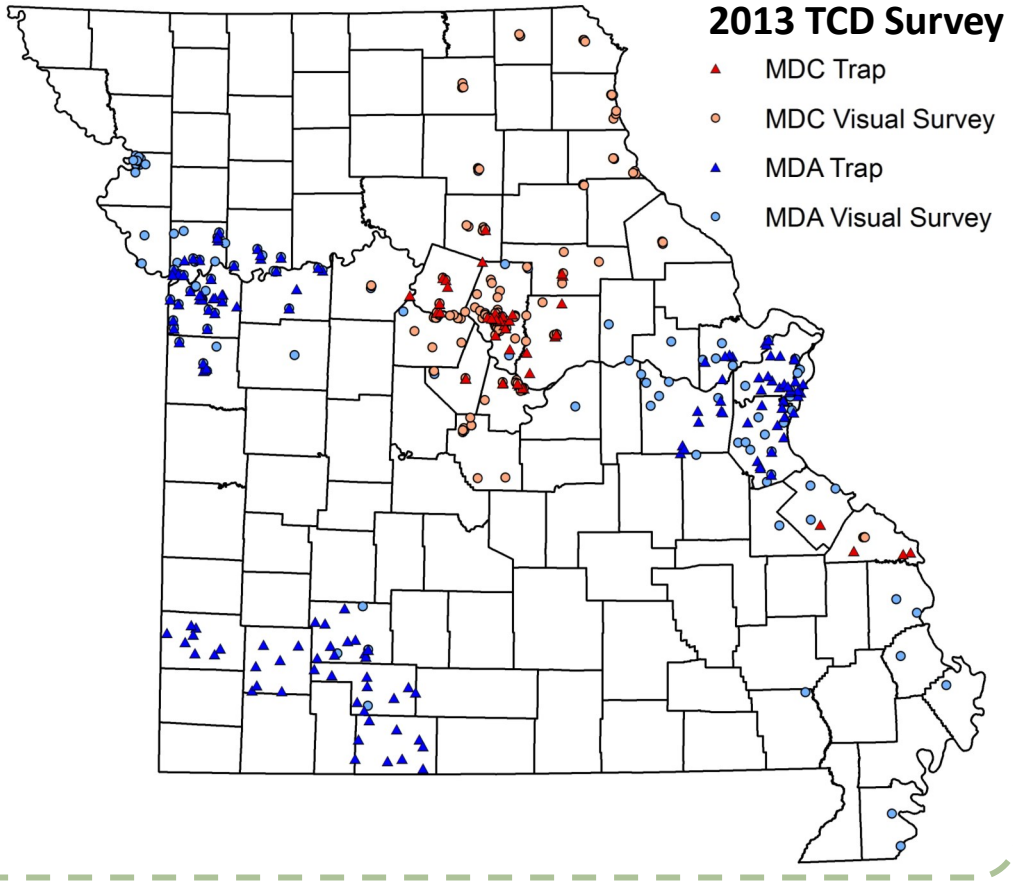
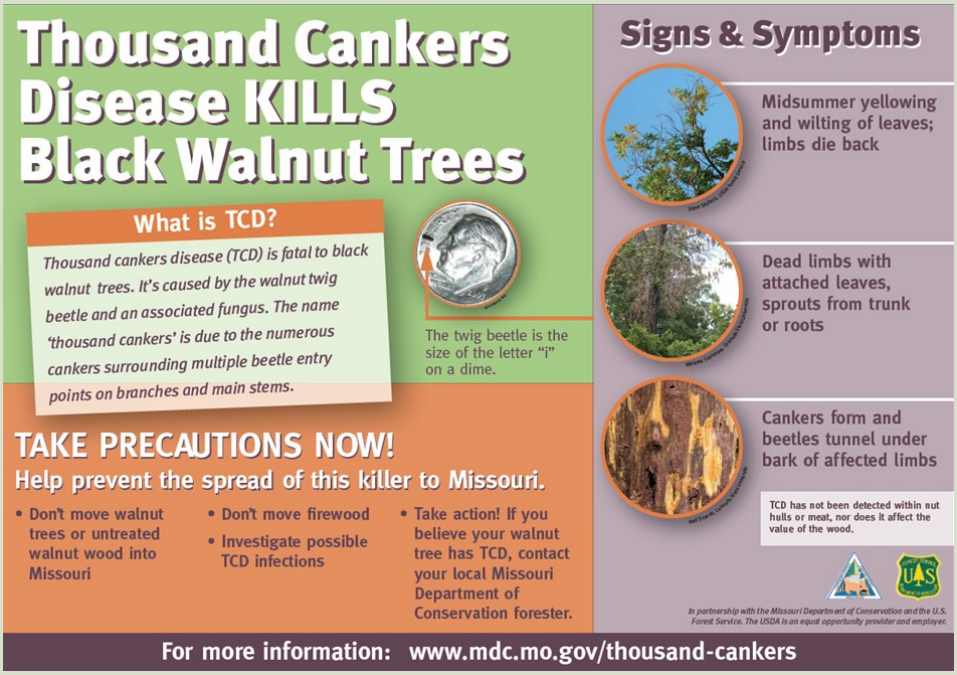


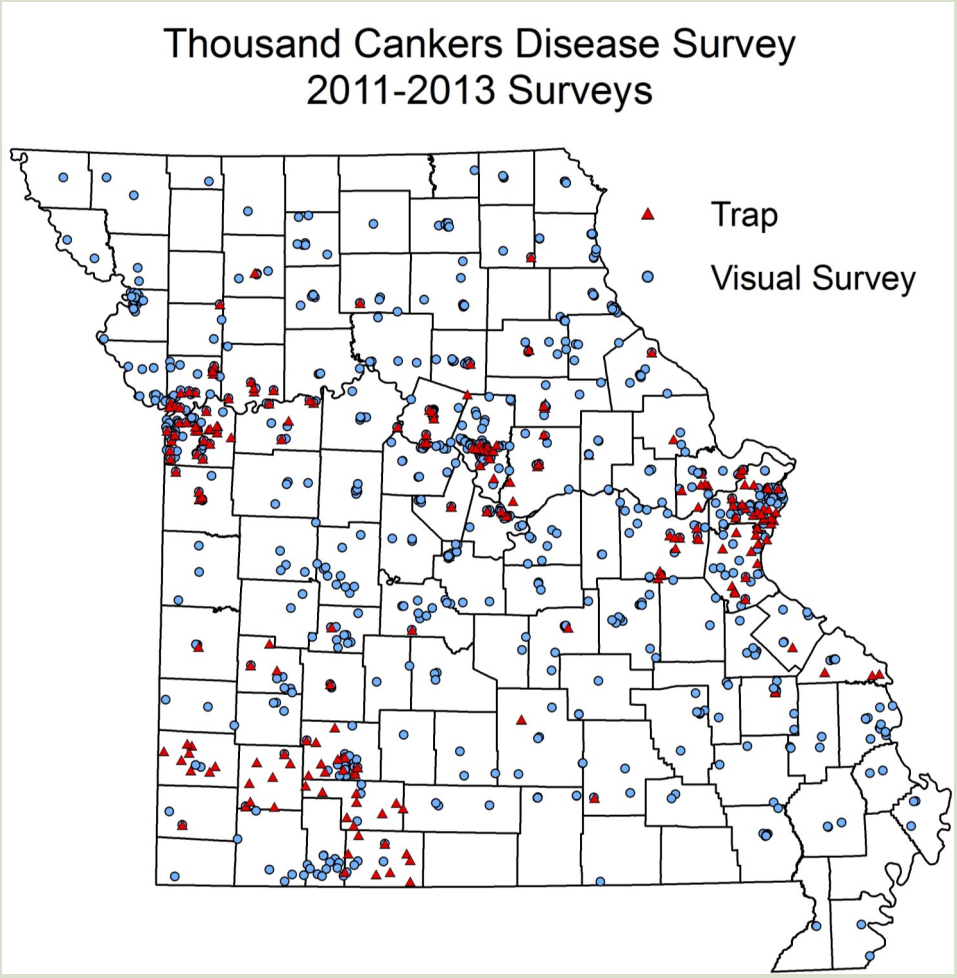
Thousand Cankers Disease of Walnut *continued*

impact of TCD, the threat posed by movement of infected walnut materials, and identification of suspect trees. Several state agencies and institutions including MDC and MDA as well as stakeholder groups were involved in outreach. Efforts in 2013 included TV and radio interviews, presentations, trainings, and displays at a variety of public and green industry meetings. An updated TCD FAQ for Missouri, TCD identification card, and brochure for homeowners are available from MDC to raise awareness. MDC also maintains a website for more information on TCD, www.mdc.mo.gov/thousand-cankers. Missourians are encouraged to report suspect trees via the online reporting form which can be found linked to the TCD website or here on the University of Missouri Extension website. Photos of suspect trees can also be emailed to **forest.health@mdc.mo.gov** as a first step in determining what trees should be visited by trained personnel.

An action plan has been drafted to organize the Missouri response to the threat of TCD. The plan describes several efforts to slow the spread of TCD and prepare for a potential detection including continued outreach activities and monitoring of trees at high risk sites. It also describes a response to detection of an infestation and includes a list of key stakeholders to keep informed. This action plan will supplement the Missouri Invasive Forest Pest Plan currently under development.



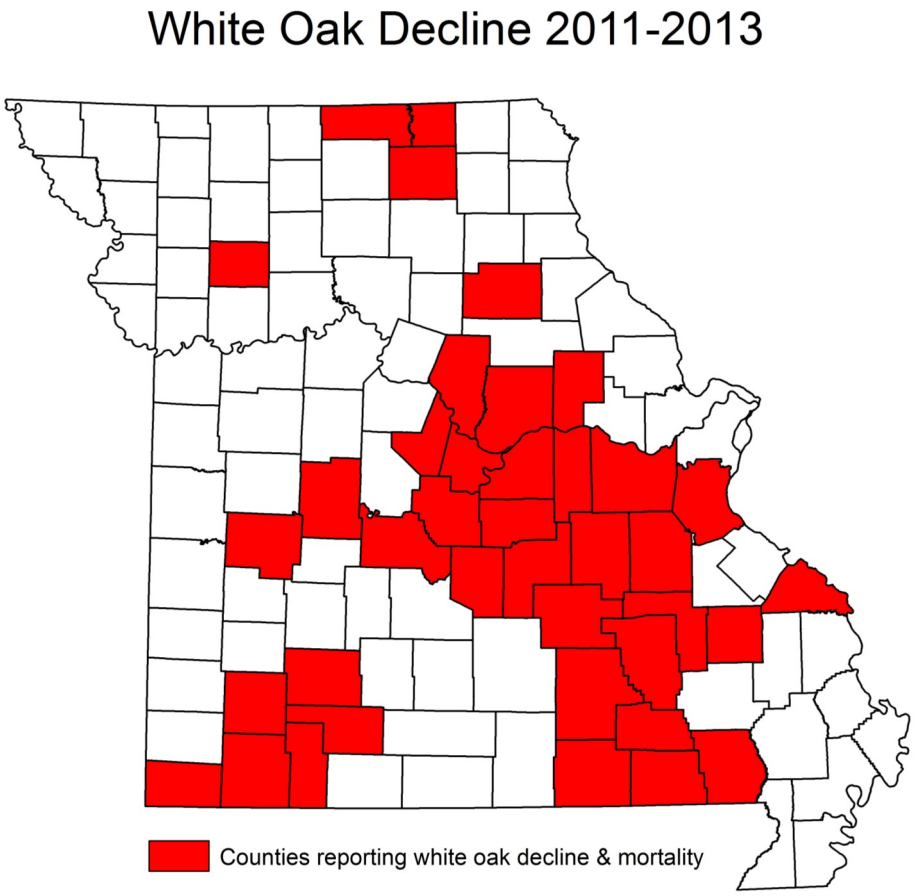
A TCD awareness advertisement with key messages.



White Oak Decline

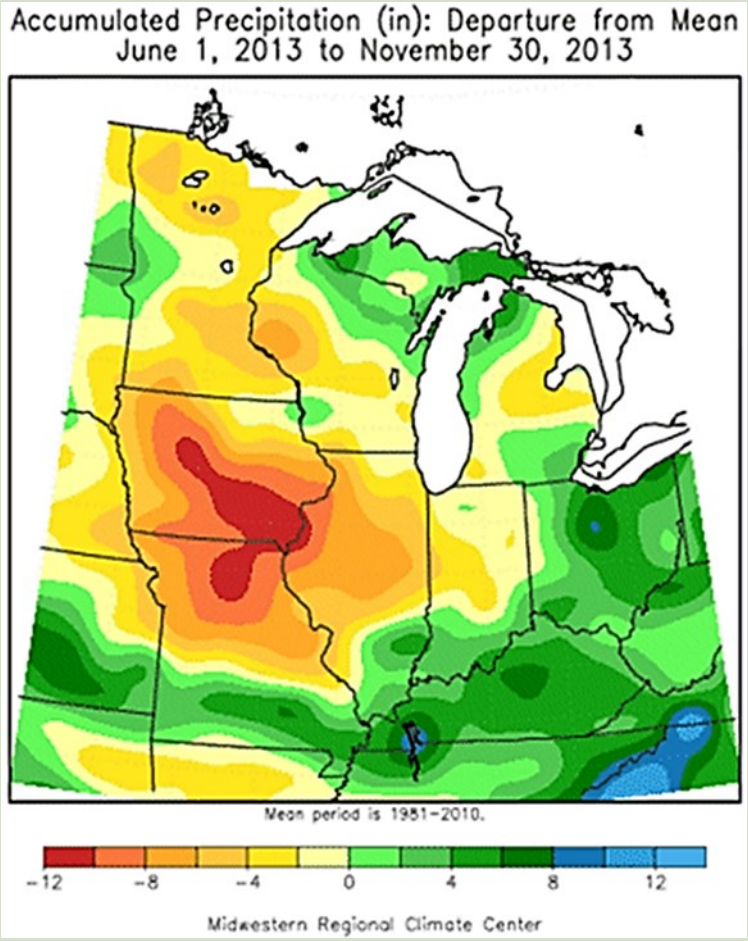
White oak is important in Missouri due to its longevity, mast production for wildlife and saw timber value (2 billion dollars). Increased decline and mortality is a concern for this resource. Beginning in August 2011 and continuing through fall 2013, the MDC Forest Health staff received many reports of rapid white oak decline and mortality, often occurring within one growing season. In 2013 a majority of reports came from east central and southeast Missouri.

This syndrome is different from other oak decline patterns reported in Missouri, which typically include red oak species on ridge tops and upper slopes of SW facing aspects and is often attributed to the combined effects of advanced tree age, high stem density, and drought. In many recent white oak reports, pockets of white oak decline in mixed oak stands have been located on lower slopes. Other oak species are rarely affected. Biscogniauxia (Hypoxylon) canker, twolined chestnut borer and other native borers are frequently observed. Some trees have evidence of Armillaria root rot. Depending on the location, white oak has been subjected to many stressors in recent years including multiple extreme weather events and severe jumping oak gall infestation in 2010. Funding has been secured through a USDA Forest Service Evaluation Monitoring grant for a white oak decline research project at the University of Missouri with cooperation and additional funding from MDC. Further investigations will look in greater detail at associated insect and fungal pathogens as well as site characteristics.



White oak decline pocket at Pea Ridge Conservation Area in east central Missouri.

Weather-Related Issues



June-November 2013 departure from 30-year mean accumulated precipitation (inches) in the Midwest (Midwest Regional Climate Center).

Across Missouri, trees were seriously stressed at the start of 2013 due to past extremes of excessively wet weather in 2008-2009 and exceptionally severe drought in 2012. In 2013, extreme weather continued with distinctly different patterns across the state, ranging from historic flooding in southern Missouri to severe drought in northern Missouri. After a cool, wet start in spring, huge precipitation disparities developed in late July and August. Some parts of southern Missouri received more than 15 inches of rain and had their wettest August on record, while parts of northern Missouri had their driest August on record and experienced moderate to severe drought that continued through fall (Pat Guinan, State Climatologist). By the end of December, most of the northern half of the state still had abnormally dry to moderate drought conditions (Drought Monitor).

Scattered decline and mortality of hardwoods and conifers occurred across the state in 2013. Multiple weather stressors of the past few years are believed to be the primary causes, including frost damage, storm damage, and others in addition to excessive moisture and drought. But drought is likely playing the most significant role. Impacts of these weather-related stresses are expected to be observed over the next several years with increasing incidence of boring insects, root diseases, canker diseases and general tree decline.

New Forest Health Alerts

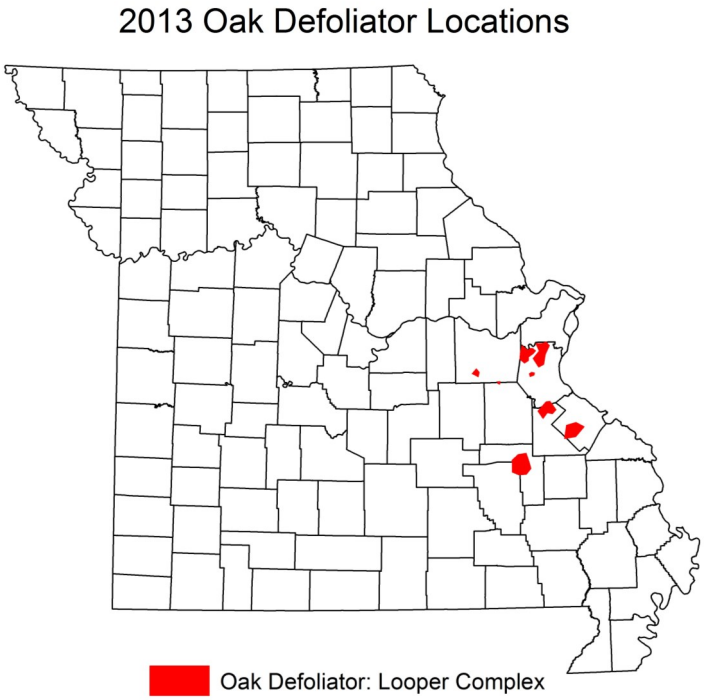
The Forest Health Lab produced three new forest health alerts in 2013: Hypoxylon Canker, Oak Wilt, and Urban Tree Decline. Each alert contains several useful pictures. Written information includes descriptions of signs and symptoms, recommendations on treatments, and ways to prevent each issue. These alerts and more can be found at http://mdc.mo.gov/node/12746.

To receive emails with new forest health alerts and periodic updates on Missouri's forests, please subscribe to the MO Forest Health electronic mailing list at http://mdc.mo.gov/user_mailman_register.

Defoliators & Forest Disturbance Mapper

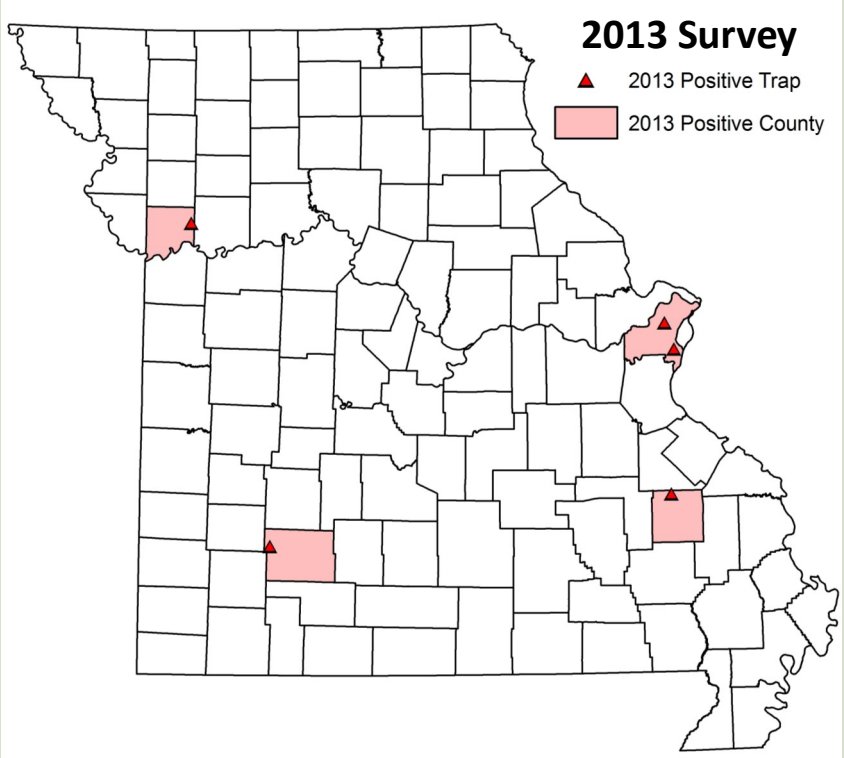
Many defoliators were active on deciduous trees during the spring and summer, particularly across eastern and southern Missouri. Significant defoliation, wandering caterpillars and the sound of falling frass were reported by the public and MDC foresters in both rural and urban locations. A looper complex caused the heaviest defoliation and was observed mostly on white and post oaks. The two most frequently reported species in the complex were the common oak moth (*Phoberia atomaris*) and the black-dotted brown moth (*Cissusa spadix*), although several other Lepidopteran defoliators were present. The black-dotted brown moth was reported to feed most heavily on post oaks with damage reaching over 50% in some locations. A previous outbreak of *P. atomaris* and *C. spadix* occurred in 2001 in southern Missouri.

To identify areas potentially damaged by defoliators, we used Forest Disturbance Mapper (FDM), a new tool provided by the USDA Forest Service. FDM is a web-based program that uses satellite imagery to detect both recent and persistent forest disturbances. This tool highlights forested locations that differ from the average for healthy green foliage. Several MDC foresters



conducted ground surveys this summer to verify the extent and cause of damage in locations highlighted by FDM. We plan to use this technology again during the 2014 growing season to watch for disturbances ranging from defoliators to storm damage.

Gypsy Moth Survey



The multi-agency Missouri Cooperative Gypsy Moth Program conducted its annual survey to detect the presence of gypsy moths (*Lymantria dispar*) by placing and monitoring over 6,700 traps in 56 counties during 2013.

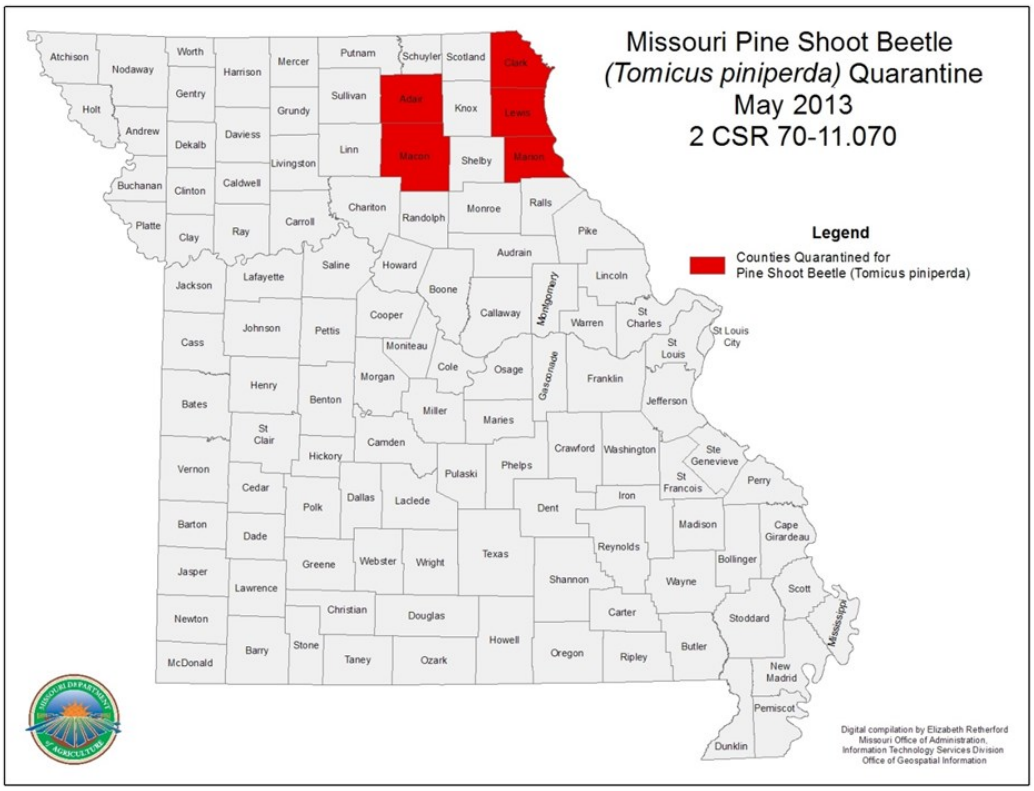
A delimit area of intensive trapping was established around the site of the only moth captured during the 2012 trapping season (Cape Girardeau County). A delimit area in Callaway County trapped during 2012 was repeated during 2013 to confirm no moths were present in the area.

Five male moths were captured statewide this year: one each in Clay, Greene, and Madison Counties, and two in St. Louis County. All were confirmed to be European gypsy moths. No moths were captured in delimit areas. No reproducing populations of gypsy moths have yet been detected in Missouri, but the gypsy moth invasion front continues to advance from northeastern Iowa and Illinois.

Pine Shoot Beetle Quarantine Expanded

The pine shoot beetle (*Tomicus piniperda*), a bark beetle pest of pines in Europe and Asia, was first detected in the U.S. in 1992. It is now known to be established in 19 other Midwestern and northeastern states and two Canadian provinces. The Missouri Dept. of Agriculture (MDA) detected the state's first occurrence of pine shoot beetles (PSB) in traps during the 2012 survey season. Positive locations included Macon, Marion, and Lewis Counties. Survey efforts during the spring of 2013 detected this pest in two additional northeastern counties, Adair and Clark. In 2014, PSB surveys are planned for all 11 Missouri counties bordering the five positive counties.

Although not a severe forest threat like emerald ash borer or thousand cankers disease, PSB has the potential to be a significant pest in stressed pine stands. PSB has been considered primarily a Christmas tree pest in North America because of its shoot feeding behavior. It most commonly attacks Scots pine (*Pinus sylvestris*) and other non-native pine species. But studies have shown PSB can successfully breed and shoot-feed in several North American pine species, including Missouri's native shortleaf pine (*P. echinata*). How this insect will behave in shortleaf pine stands with our Missouri climate is unknown.



MDA has implemented a state interior quarantine that affects only the five counties where PSB has been detected. Pine nursery stock, Christmas trees, lumber with bark attached, and other raw pine materials are regulated.

Pine shoot beetle adult.

Questions? Contact your local Resource Forester or Urban Forester with the Missouri Department of Conservation.

Find contact information for your county at:

www.mdc.mo.gov

Address Label

An electronic copy of this document can be found at:

http://mdc.mo.gov/node/12746