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Cost-Share Funding for EAB Treatment in Virginia's Urban Forests

An EAB-infested tree, with tell-tale epicormic growth in the lower crown. Photo by Eric R. Day, Virginia Polytechnic Institute and State University, Bugwood.org.

By Pete Stewart and Eric Wiseman, Ph.D.

Urban forests often act as incubators for new populations of invasive pests and pathogens. Because major cities are global-trade and transportation hubs, non-native forest pests frequently arrive and escape to nearby trees after stowing away inside plant material or cargo crates. Additionally, the abundance of defenseless, native tree species, street-tree monocultures and stressed trees common in urban forests provides susceptible hosts for these newly arriving pests.

Many of North America's most damaging infestations of invasive forest pests and pathogens were first observed in cities. This list includes the gypsy moth (Medford, Massachusetts, 1869), chestnut blight (The Bronx, New York, 1904), Dutch elm disease (Cleveland, Ohio, 1930), hemlock woolly adelgid (Richmond, Virginia, 1951), sudden oak death (Marin County, California, 1995), Asian long-horned beetle (Brooklyn, New York, 1996) and the emerald ash borer (Wayne County, Michigan, 2002).

As the area occupied by an invasive species expands, strategies for control typically shift from eradication to containment and, ultimately, to protection of assets (threatened species, infrastructure) if local containment is not feasible. When early efforts successfully contain or even eradicate an invasive species, however, there are large economic and ecological benefits.

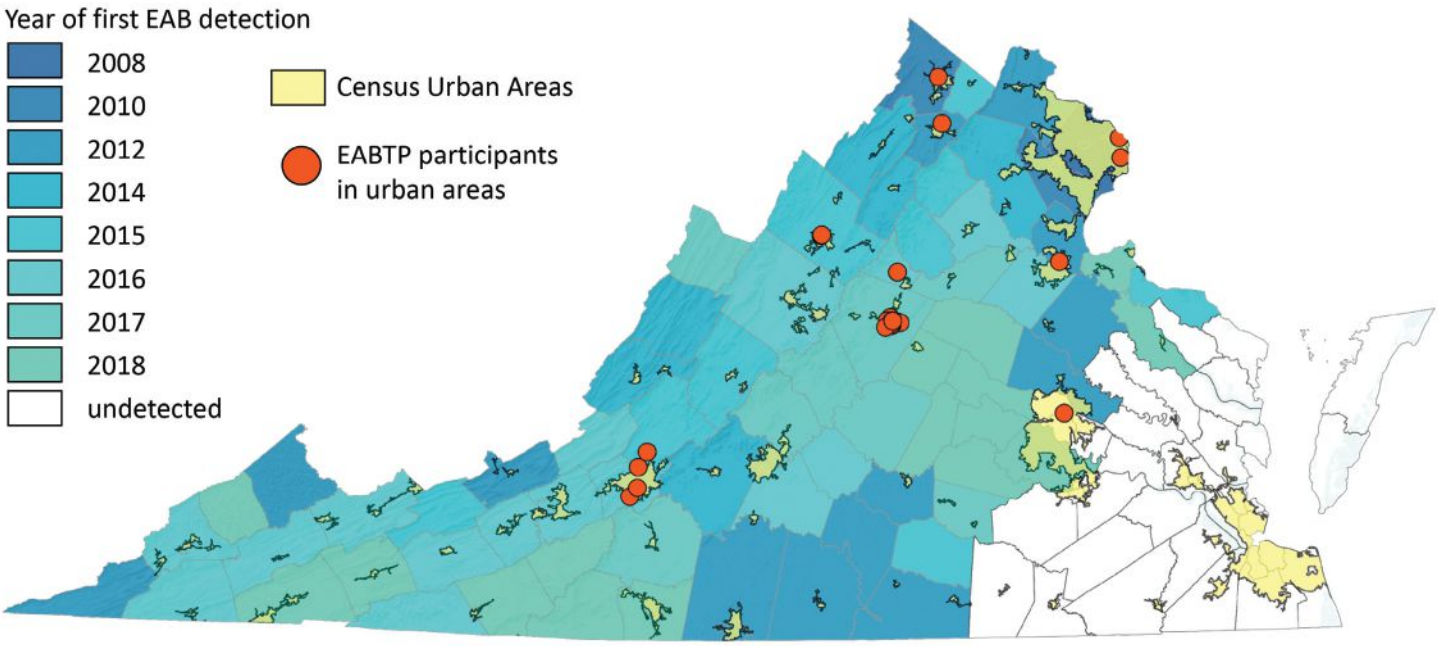
For these reasons, coordinated management of invasive pests within cities is important not just for urban forests but also for surrounding forested areas. Ideally, this coordination can extend beyond local and state forestry agencies to include arborists, stewardship groups and property owners.

Cost-sharing programs are one tool available to public forestry agencies that may prove useful for coordinating agency pest-management efforts with those of arborists and properties owners. Typically, these programs offer reimbursement payments to property owners for certain land-management actions, ultimately benefiting people and the environment beyond private-property borders. For decades, these programs have been used to promote land-conservation or agricultural-production practices among rural landowners, but their use in urban areas is relatively new.

The Emerald Ash Borer Treatment Program

The emerald ash borer (EAB) has spread rapidly across eastern North America in the roughly 20 years since it arrived in Michigan. In Virginia, EAB has been present continually since 2008, when it was first detected in Fairfax County, not far from the Maryland border. Since then, EAB has spread to most of Virginia's counties, except for the southeastern corner of the state. Because the entire state now falls within the federal EAB quarantine zone, the current focus of EAB management has shifted from containment of the pest to conservation of native ash species and their ecological communities.

As part of these efforts, the Virginia



Spread of EAB across Virginia by county. Census Urban Areas are shown, and the rough locations of EABTP participants in urban areas are marked. Image courtesy of the authors.

Department of Forestry (VDOF) began its Emerald Ash Borer Treatment Program (EABTP) in 2018. This cost-sharing program offers 50% reimbursement payments for insecticidal treatment of ash trees. Its objective is to conserve populations of ash trees in minimally impacted parts of the state by encouraging treatment of trees that might otherwise go untreated.

Applications for EABTP assistance were required to include a signed bid for treatment from a licensed pesticide applicator (who in almost all cases was also a Certified Arborist) and were approved only after on-site verification of tree species and health by a VDOF county forester. Of 111 participants in the program's first year, 19 were local governments or organizations; the remaining 92 were individual property owners. Of these, 28 were located in urban areas.

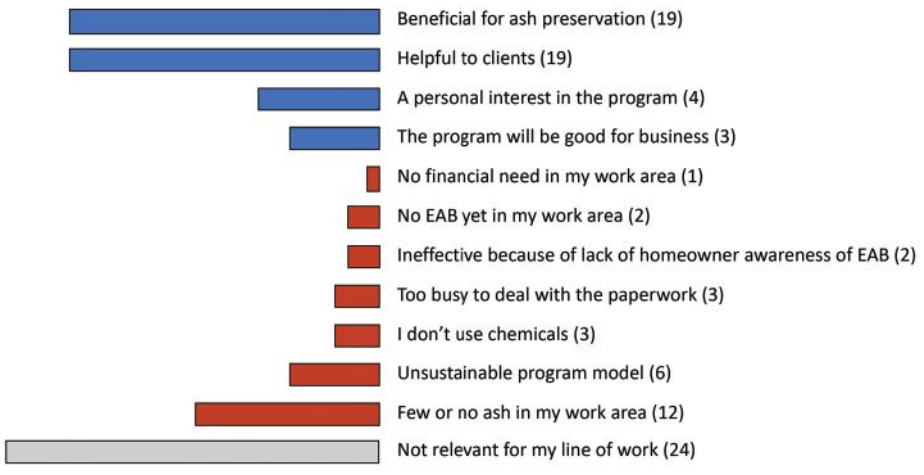
In partnership with VDOF, we conducted a study at Virginia Tech to assess first-year implementation of the EABTP. Although the program was not intended to contain EAB spread, we hoped some of our findings might be informative for future pest-outbreak scenarios. There were two topics we investigated – first, characterizing urban properties that participated in the EABTP, and second, gauging impressions among arborists and foresters of the EABTP.

Participant properties

We used public geographic databases to collect information on all participant properties within urban areas (28), and then conducted tree inventories on a sample of these properties. The average parcel size was 0.6 acres, with 48% tree cover. On average, homes on these properties were built in the mid-1950s and were located in counties where EAB had been present for four years. From a U.S. Forest Service database, we found that the pre-EAB abundance of ash species in forests surrounding these urban parcels was on average 3.5%, compared to a statewide pre-EAB average of 1.5%.

On the sites visited, we inventoried all trees more than 4 inches in diameter at breast height (DBH). We collected data including species, dimensional measurements, a condition rating, locational data and a site description. Across 16 properties, we inventoried 365 trees comprising 57 species.

Of these 365 trees, there were 59 white ash (*Fraxinus america*na) but only a single green ash (*Fraxinus pennsylvanica*). This meant that white ash accounted for 16.2% of all inventoried trees. The next most common species were red maple (*Acer rubrum*) at 8.5%, hackberry (*Celtis occidentalis*) at 4.9%, flowering dogwood (*Cornus florida*) at 4.4% and silver maple (*Acer saccharinum*) at 4.2%. Native ash



Reasons given by arborists and foresters for interest (blue) or lack of interest (red) in future EABTP participation (98 total responses). Graphic courtesy of the authors.

Map showing tree cover and parcel boundaries of an urban property. Tree cover was accessed from Virginia's Statewide Landcover Dataset (1m resolution). Image courtesy of the authors,

were clearly the predominant landscape trees on these properties, two to four times more common than other species.

As measured by relative structural value, white ash was the dominant species by an even greater margin. This index was calculated for each tree using i-Tree Eco (a software suite from the USDA Forest Service that provides urban and rural forestry analysis and benefits assessment tools) and an estimated replacement cost based on the Council of Tree and Landscape Appraiser's Trunk Formula. Using this formula, white ash accounted for 31.3% of the dollar value of landscape trees across all properties. The next most valuable species was tulip-poplar (*Liriodendron tulipifera*) at 9.0%, followed by red maple at 7.7%, silver maple at 5.8% and northern red oak (*Quercus rubra*) at 4.4%.

These results point to two related findings: first, that most of the EABTP funding within urban areas went to relatively large and wooded properties, and second, that ash species made up a large proportion of the number and value of landscape trees on participant properties. From the point of view of a municipal forester, these results might be helpful for identifying property owners interested in a forest-health project or, alternatively, for highlighting areas where outreach might not be as fruitful. The concentration of large white ash trees on many properties also suggests there may be a threshold of tree size or number above which a homeowner is more likely to invest in tree preservation.

One potential application of this research would be to help target an outreach campaign, such as one conducted by the Milwaukee Forestry Division[1] in 2009. After identifying properties with ash trees using hyperspectral and LIDAR (light-detection and ranging) data, city foresters contacted individual households by mail with information about EAB management. Based on our study, identifying properties with high densities of high-value trees that are vulnerable to an emerging-pest threat might lead to higher participation in a forest-health program, because the landowners perceive greater losses of benefits.

Forest practitioners

We also conducted a survey of VDOF foresters and arborists within Virginia to add the perspectives of people responsible for carrying out tree inspection and treatment. The survey asked questions about professional experience, personal characteristics and attitudes toward cost-share participation. Through VDOF, we contacted roughly 105 county foresters with potential responsibility in the EABTP and received 19 completed responses (18% response rate). With the assistance of the Mid-Atlantic Chapter of ISA (MAC-ISA), we contacted almost 1,600 members and Certified Arborists and received 144 responses (9% response rate). On average, respondents in both groups were in their mid-forties and had completed a college degree. Interestingly, while almost every arborist respondent was a Certified Arborist, nearly three-quarters of forester respondents also held the Certified Arborist credential.

When asked about the percentage of work hours spent on forest-health projects, foresters (20%) appeared less regularly involved than arborists (33%). All forester respondents were aware of the EABTP through VDOF training sessions and had made an average of five visits to applicant sites. More than half (52%) of the arborists were also aware of the program, but relatively fewer were involved – their average number of site visits to bid on tree treatments through the program was less than one.

Photos of white ash trees treated through Virginia's EABTP. Photos courtesy of the authors.

When asked for written responses about their interest, or lack of interest, in the EABTP, opinions varied sharply, but the greatest number of responses expressed support. Combining responses from foresters and arborists, we organized 98 completed responses into 12 categories and graded these as positive, neutral or negative.

Close to half of the responses were positive (45). The most common reasons given for interest in the program were that it benefited ash species (19) and that it benefited clients (19). Four respondents described a personal interest in the program, and three anticipated that participation would be good for their businesses. There were 24 neutral responses, stating that the program was not relevant to their work duties. Of the 29 negative responses, the most common had to do with a low abundance of ash in their work area (12), a critique of EABTP as an unsustainable program (6), dislike of insecticide treatments (3) and disinterest in paperwork required by the program (3). Other negative responses cited homeowners' lack of awareness of EAB (2), no local EAB presence (2) and lack of financial need among clients (1).

These responses suggest strong support among foresters and arborists for whom the EABTP was relevant. Setting aside negative responses dependent on external factors (abundance of ash or EAB) and neutral ones, the ratio of positive to negative responses was 3:1. While a small number expressed interest based on potential growth in sales, many more were interested for conservation or customer-service reasons.

The spread of EAB through Virginia and other states has vexed conventional control measures used on other nonnative tree pests. Many lessons have been learned about monitoring, detection and control that hopefully will aid ongoing conservation of native ash trees in both urban and rural forests. Thus far, insecticidal treatments have been the only short-term solution to preserving individual high-value trees. The expense of treatment has been a turnoff for many property owners, leading to high mortality rates and large losses of ecosystem services. Cost-sharing programs may hold promise for inducing treatment of trees and conservation of ash tree populations until more cost-effective control measures are discovered.

1. Sivyer, David. "Mapping the Future for EAB Readiness and Response Planning in Milwaukee: An Update." City Trees, January (2010): 16.

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