

Results of the 2011 and 2012 Municipal Ash Surveys

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In 2006, the emerald ash borer (EAB) (*Agrilus planipennis* Fairmaire) was confirmed in Lily Lake, Illinois, which is in the northern Chicago suburbs. As the infestation grew, there became more concern for which management tactics are most efficient, effective, fiscally sound, and tolerated by residents. Six years of infestation have resulted in many management tactics, which vary among municipalities. The Municipal Ash Management Survey (MAMS) was developed to track what management tactics have been used by municipalities, to assess their impact, and communicate these results to other communities. The goal is to help municipalities develop EAB management plans that work best for their community.

The MAMS was modeled after Dr. Dan Neely's Dutch elm disease (DED) surveys, which were conducted from the 1950s-1990s, though the Illinois Natural History Survey. The results of Dr. Neely's surveys were distributed to municipalities to aid in tracking the elm populations, annual losses, and evaluate management strategies. Similar questions were asked in the MAMS, they included: the nature and scope of management activities (chemical treatments and removals), financial information about managing the infestation (removals, labor, chemicals, damage to property), the nature of the labor force managing the trees (municipal employees or contractors), and information about tree death and reforestation programs (rate of replanting and funding sources).

The participants in the 2011 and 2012 surveys were predominantly from the Chicago region. Most of the participants were municipalities, though a few park districts, forest preserves, and townships also responded (Table 1). Most of the data presented will be from the municipal responses, unless otherwise noted, because of the quantity and completeness of their responses and, as they are also the most likely users of these data.

	MAMS Year	
	2011	2012
Organization type		
Municipality	77	82
Park District	6	11
Forest Preserve	3	1
Township	1	0

Table 1. Number of 2011 and 2012 MAMS participants by type of organization

Results

To help estimate the rate of ash (*Fraxinus*) death, cities were divided into groups based on the year EABs were confirmed by the Illinois Department of Agriculture (IDA) in their community (Table 2).

Year infested	Number of municipalities	Loss of original ash population
2006	2	41%
2007	3	36%
2008	3	9%
2009	8	15%
2010	15	15%
2011	16	8%
	Total: 47	Average: 21%

Table 2. Cities grouped by year of infestation showing what percent of the original ash population was removed in 2011 (MAMS 2011)

Once trees are infested, most are able to live for 3-5 years before seeing symptoms, and then a few more years before the trees die from the disruption of vascular tissue. One study that looked at the gradual decline and mortality rate was published in 2012 by Dr. Dan Herms, The Ohio State University. This study, of the Upper Huron River Watershed in southeast Michigan, shows a slow progression of loss during the first eight years of infestation (Figure 1). This was not seen in Illinois.

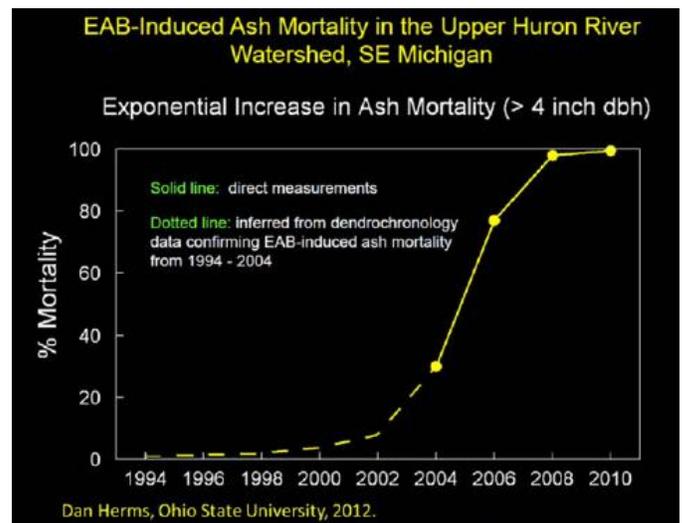


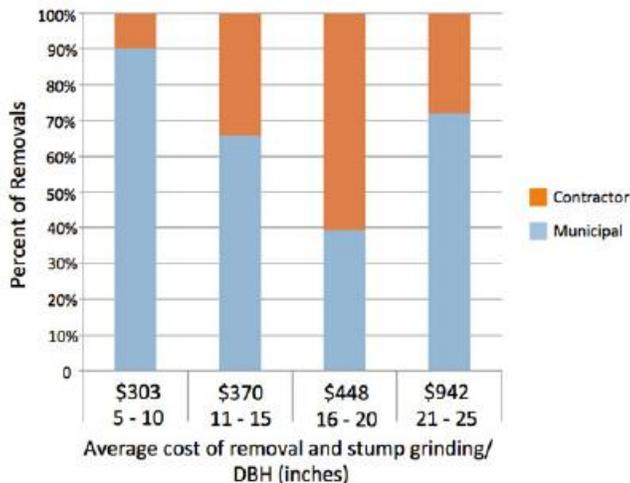
Figure 1. Chart by Dan Herms showing the rate of ash mortality due to the emerald ash borer

Since Michigan was infested before any management or chemical options were known, this can be considered the most unadulterated data on the EAB and the most natural “death curve”. The Illinois “death curve” that was calculated by the results of the MAMS is much different from the Herms study. When looking at the Chicago-region’s “death curve” be reminded that municipalities had more management options, unlike Michigan. A few variables need to be considered when looking at the rate of ash loss in Illinois. In 2009, the Insecticide Options for Protecting Ash Trees from Emerald Ash Borer (Herms, et al. 2009) published data from several insecticide trials. These data showed that insecticides can be a viable option for protecting trees. So, more recently infested cities may have trees that are treated, which would reduce the percent of removals and EAB infested trees. The MAMS data show a steep increase in ash loss starting at year four, which is four years earlier than the Herms publication. One possible explanation for the difference is that Illinois municipalities, having seen the destruction in earlier infested states, preemptively removed trees rather than waiting for them to die. When it came to the MAMS they may have tallied these early removals as ‘ash loss,’ rather than preemptive removal (post-survey personal communication).

One unexpected outcome of the MAMS 2011 was that it showed municipalities that were found positive in 2011 were still planting ash in 2006. After the infestation was found in 2006, the IDA made a recommendation to stop planting ash in the State of Illinois. Unfortunately, for some municipalities, ash trees had been planted and paid for in contracted nurseries years before EAB was a concern. In post-survey communications it was indicated that some municipalities that had purchased ash went ahead and planted the trees instead of disposing of them.

Ash Removals and Costs

Ash trees are being removed for a variety of reasons based on the municipality’s management plans. Most public ash trees have been removed because they had been identified as being EAB infested, these removals account for 85% (2012) and 64% (2011). Ash reduction programs accounted for 12%



Graph 1. Percent of removal costs and labor based on ash tree DBH

(2012) and 19% (2011), storm damage for 2% (2012) and 13% (2011), and other undefined reasons for <1% (2012) and 4% (2011). Storm damage removals were higher in 2011 due to severe weather in the region. In the 2012 survey, twelve municipalities indicated that they were aggressively removing ash preemptively (ash reduction). Of the twelve municipalities practicing ash reduction, seven are not chemically treating trees, five are only treating a small number of valuable trees and removing the rest, and three are discouraging residents from treating public trees.

Whether removals were done in-house or by a contractor depended on whether the municipality had a forestry department, or forester, the number of forestry or public works employees, and equipment. Several municipalities with small or no staff used contractors for all removals. Large departments were able to do removals in-house, but primarily removed trees up to 20” DBH (Graph 1). The results of the MAMS 2011 (Graph 1) showed that as tree’s DBH increased, more contractors were used for removals. An exemption seen in the 21-25” DBH category illustrates six municipalities, of the 77, that have large forestry departments that had the equipment and personnel to do these large removals.

The calculation of removal and stump grinding costs for in-house work was difficult to calculate, because they varied depending on whether equipment costs were included with labor, disposal of waste, etc. The dollar amounts in Graph 1 are for contract removals, which were easier to calculate, because of existing invoices. Because of the varying ways to calculate in-house removals, it was not possible to determine whether it was more economical to use contractors or do the work in-house. Costs of removals and stump grinding may also vary on the number of trees being removed by contractors, the county in which they exist, and a variety of other variables that were not considered when the surveys were written.

Damage Caused by Ash Trees

By the end of 2012 5.4% (5 of 93) of the MAMS 2012 participants indicated that dead EAB-infested trees had caused property damage, 94.6% (88 of 93) reported no property damage. In the five cases when damage occurred, four were private property damaged by public trees. One case was public property damaged by a public tree. The costs of the private property damage were \$200 - 10,000. No personal injuries were reported in the 2012 MAMS.

Chemical Management

Of the 93 municipalities responding in the 2012 MAMS 61 are not treating with insecticides, 28 are treating, and 4 are treating only experimentally. Of municipalities that are treating, most are using contractors to treat large trees, usually with stem injections, while smaller trees treated with soil drenches are being done in-house. Most respondents considered trees 12-15” DBH to be ‘large’. On average municipalities are treating 50-350 trees, with a preference of

blue, black and white ash over green ash trees. A few municipalities reported that they are treating thousands to tens of thousands of ash trees and removing only trees in poor condition or in poor locations. Municipalities that reported that they are treating are doing so to prolong the life of individual trees, which are usually highly valued specimens in the community. Some are using chemical treatments as a way to space out removals over a longer, more manageable, period of time. Others are hoping to treat until this initial “wave” of EAB passes through the region, with the hopes of saving the trees and discontinuing treatments in the future, whether this is possible is still to be seen.

When asked about the municipal involvement in the public’s treatment of public trees, 54% said they were not involved, 25% distribute information on treatment options, 20% issue permits before treatment, 6% require residents to use municipal-approved contractors, 4% keep documentation of which trees were treated, and 1% of the 93 municipalities has a 50/50 cost-share program where the municipality and the resident split the cost of the treatment. Of the 61 municipalities that are not treating trees, a few are insisting that residents not treat public trees because they cannot promise that the trees will not be removed as part of their ash reduction program.

Of the municipalities that are treating with chemicals to manage EAB, they were asked if a difference could be seen between the treated and untreated trees. Of the 28 municipalities 71% said they could see a difference, while 29% said they could not see a difference. Comments from the 71% reported seeing a dramatic night and day difference between treated and untreated trees, as well as seeing some symptomatic trees improve after treatment (usually at least a year or two after treatment). Of the 29% that saw no difference, most claimed that they thought it might be too soon after treatment to see a result, because they had been treated in 2012. Others questioned whether the trees were too infested at time of treatment to respond to chemicals.

The active ingredients that were used by municipalities were imidacloprid (Xytect, Merit, Imicide, and Pointer), emamectin benzoate (Tree-äge), dinotefuran (Safari), azadirachtin (TreeAzin), and some were using products purchased from hardware stores (no pesticide license required). The majority of municipalities used different chemicals for different size trees (57%), while others used the same chemical for all sizes (43%). Tree-äge was used more for large trees, while imidacloprid was used on small trees; dinotefuran was used evenly among all sizes.

Costs of chemical treatments were calculated for in-house and contractor applications (Table 1). For Tree-äge and imidacloprid soil injections and drenches, contractors were slightly less expensive than municipal applications. This reduction in cost could be explained by the hiring of summer interns by contractors to do applications. Some municipalities

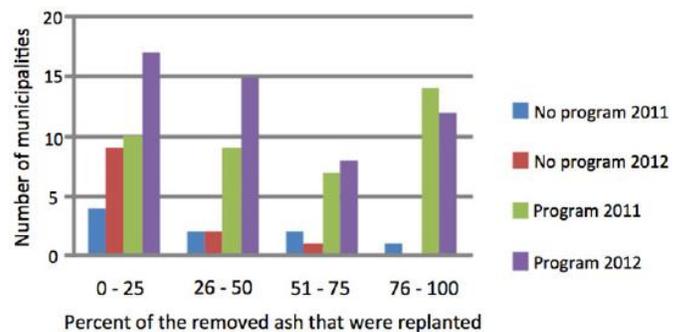
are contracting chemical applications so removals can be done in-house, which is more cost effective.

EAB Ordinances

In the 2011 survey, 77 municipalities reported on the existence of ordinances that govern the removal of infested public and private ash trees (Graph 2). Of the 77, 45 municipalities stated that the ordinances were largely modeled after DED ordinances. Enforcing the removal of private trees is reported as difficult, because unlike DED, EAB kills over several years. Many are opting to enforce the removal of private trees when less than 15% of the canopy is remaining. In some cases, when private trees begin to fail and the homeowner is unable to pay for the removal, some municipalities are removing the tree then putting a lien on the property until the expense is paid back.

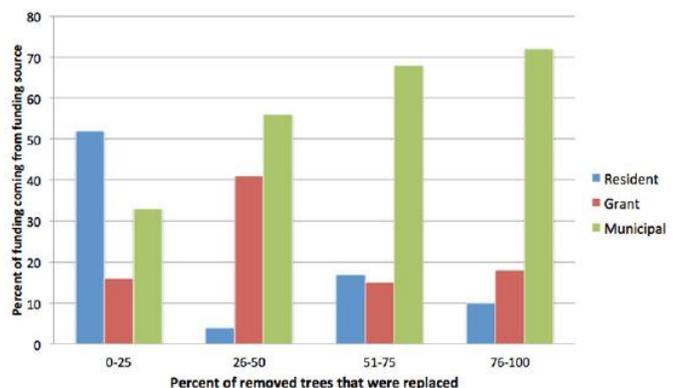
Reforestation

Having tree replacement or planting programs, and funding sources for planting, appear to be integral factors that impact whether removed trees are being replaced. Survey results



Graph 2 Percent of reforestation based on whether municipalities had replacement programs

from both years showed 78% of the responding municipalities had established a replacement program. Whether these programs were established prior to the introduction of EAB was not specified in the survey. Municipalities with replacement programs had a higher replant rate than cities without a program (Graph 3). Replanting programs may include: regularly tree planting, planting scheduled into annual work plans, allowing residents to plant on parkways, and having a cost-share program with the residents.



Graph 3. Percent of removed trees that were replaced based on funding source

Based on the results of the 2011 MAMS, the percent of the removed ash trees that were replaced is dependent on the funding sources for purchasing and planting trees (Graph 3). The results show that when residents are expected to pay for more than 50% of the tree and replanting, there is a low percentage of replanting. The highest percent of replanting was seen when municipalities funded at least 50% of the tree purchasing and replanting costs.

Summary

The introduction of the emerald ash borer has impacted the urban forest in a way that hasn't been seen since DED. Municipalities have many factors to consider when making management decisions. The budget, personnel, and

	Municipal (\$)	Contractor (\$)
Tree-age	6.50	5.59
Imidacloprid	2.00	1.23
Soil injection & drench		
Unspecified treatment	3.53	6.35

Table 1. Costs of chemical Tree-age, soil injected and drenched imidacloprid, and unspecified treatments based on the results of the 2012 MAMS

expectations determine management tactics used for community, making nearly all management plans different. The management plans can be grouped into three categories: 1) chemically treat all ash trees and remove only small or undesirable trees, 2) preemptively remove all ash trees, or 3) treat the most desirable trees while gradually removing excessive or low-quality ash trees. Municipalities that were infested before they were able to develop management plans were usually not afforded the chance to use chemical controls early enough to be effective. And many of these have not been able to keep up with removals, and have standing dead public ash trees. The use of insecticides to manage how quickly trees expire appears to be a viable option, especially when the goal is to space out removals over time.

Public agencies are in a difficult position with EAB management. In the early days of EAB one of the major concerns was the loss of trees and the destruction of the urban forest. Now, with the extensive tree death, public safety has become a bigger concern. These departments are being forced to reallocate funds from other program areas. In 2011, with the shortage of snowfall, some public works departments were able to take money from snow removal budgets and put it into ash management and replanting. The shortage of staff, money, equipment, and time may result in the dead trees becoming liabilities.

The emerald ash borer has been devastating everywhere it has been introduced. For most municipalities the expenses of managing the devastation has cost more than most have imagined. The impact of losing 20-40% of the trees in cities, and sometimes as high at 80% in individual neighborhoods has left a lot of work left to do. As difficult as it may sound, there is some good that can come from EAB. This infestation

has forced municipalities to be more proactive in their urban forest management than they would have been otherwise. More municipalities have tree inventories, than seven years ago, which is the most valuable tool when planting trees for the future. After DED eradicated most of the American elms, green and white ash were one of the five most commonly planted trees, other species included: linden (*Tilia* sp.), silver maple (*Acer saccharinum*), honeylocust (*Gleditsia tricanthos*), and Norway maple (*Acer platanoides*). EAB has affirmed the necessity for planting a diverse variety of tree species. Many municipalities are adopting the 30%-20%-10% rule when it comes to tree planting. This means in a given area no more than 30% of a family, 20% of a genus, and 10% of a species will be planted. This will help avoid disasters like DED and EAB from happening again.

Citations:

Herms DA, McCullough DG, Smitley DR, Sadof C, Williamson RC, and Nixon PL. 2009. Insecticide options for protecting ash trees from emerald ash borer. North Central IPM Center Bulletin. 12 pp.

Herms, Dan. 2012. Presentation: EAB-Induced Ash Mortality in the Upper Huron River Watershed, SE Michigan. http://www.oardc.ohio-state.edu/hermslab/images/The_Emerald_Ash_Borer_Invasion_Ecological_impacts_and_management_options.pdf. Accessed 7/12/13.