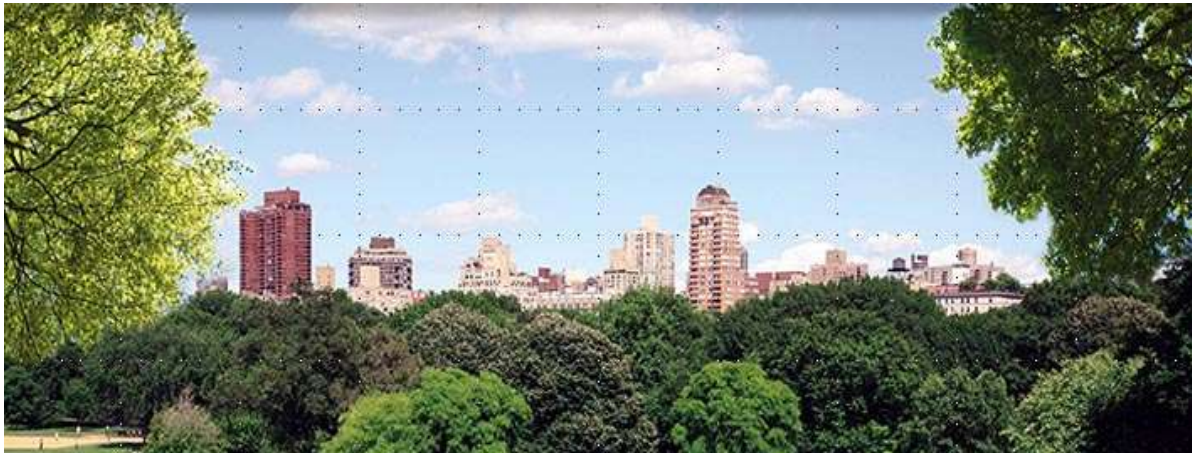


Environmental & Urban Wood Reclamation

An IIT Interprofessional Project



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The Interprofessional Projects (IPRO[®]) Program at Illinois Institute of Technology

An emphasis on multidisciplinary education and cross-functional teams has become pervasive in education and the workplace. IIT offers an innovative and comprehensive approach to providing students with a real-world project-based experience—the integration of interprofessional perspectives in a student team environment. Developed at IIT in 1995, the IPRO program consists of student teams from the sophomore through graduate levels, representing the breadth of the university’s disciplines and professional programs. Projects crystallize over a one- or multi-semester period through collaborations with sponsoring corporations, nonprofit groups, government agencies, and entrepreneurs. IPRO team projects reflect a panorama of workplace challenges, encompassing research, design and process improvement, service learning, the international realm, and entrepreneurship. (Refer to <http://ipro.iit.edu> for information.)

The *Environmental & Urban Wood Reclamation IPRO 350* team project represents one of 46 IPRO team projects for the spring 2009 semester that involved over 500 students, 40+ instructors and 30+ sponsors, community partners and other collaborating organizations.

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Illinois Emerald Ash Borer Wood Utilization Network, Team and Guidance Committee

Michele Beaulieux, WorkinMotion, and Guidance Committee Staff, Wood Utilization Team
Laureen Blissard, Past Chair, U.S. Green Building Council – Chicago Chapter
Cate Brady, Participant in the Wood Utilization Network
Jeffery Coath, EAB Program Supervisor, USDA
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Mark Duntemann, Owner, Natural Path Urban Forestry Consultants, an ad hoc resource for the study
Tom Gargrave, Regional Forester, Illinois Department of Natural Resources
Edith Makra, Community Trees Advocate, The Morton Arboretum and Chair, Wood Utilization Team

City of Evanston, Illinois

Mark Younger, Municipal Arborist

Village of Oak Park, Illinois

Jim Semelka, Urban Forestry Superintendent

Village of Wilmette, Illinois

Kevin Sorby, Forester
John Kemppainen, Forester (EAB)

Executive Summary

This report summarizes the work of a multidisciplinary undergraduate student team organized via the Interprofessional Projects (IPRO) Program at Illinois Institute of Technology. The work was conducted during the spring 2009 semester that spanned a 14-week period from January through April 2009.

The project was focused to the needs and interests of the Illinois Emerald Ash Borer Wood Utilization Network, a loose network of over 100 interested people. The Illinois EAB Wood Utilization Team (WUT) is comprised of 14 participants serving as the decision-making body that sponsored this IPRO project.

The challenge of the IPRO team was to identify and characterize the range of opportunities associated with the use of urban timber that has become available due to the infestation of the emerald ash borer (EAB) and infection by Dutch elm disease (DED) in communities located in the greater Chicago area in Northeastern Illinois. The findings of this study are intended to contribute to an understanding of the market feasibility of urban wood based on its qualities, local volumes and uses. This could lead to exploring ideas for a marketing/outreach/coordination alliance that encourages, facilitates and develops higher order uses of urban timber.

Since the discovery of EAB in Detroit in 2002, it is estimated that over 25 million ash trees have been infested throughout Michigan, Illinois and Indiana. All of these trees will inevitably die; however, the timber of infested trees is virtually unharmed and can be used as a valuable resource. This will represent a continuing concern until the infestation can be controlled more effectively. Currently, a substantial amount of the timber is ground into chips to be used as mulch, and is therefore not being used at its highest possible value and best use. As a result, since a large portion of the remaining Ash and Elm tree populations in Northeastern Illinois are expected to be infested by EAB and infected with DED over the next 10 years, there is significant interest among arborists, state and local governments, and commercial interests in exploring the feasibility of developing higher-order uses for urban timber in a systematic and significant way.

The IPRO team began its work through information gathering and conducting research that involved arborists and other industry professionals within the municipalities of Evanston, Oak Park and Wilmette. The team obtained tree inventory data from each of these three communities, including the number, type and diameter class of trees that have been or are expected to become infested due to EAB and infected due to DED, as well as data for trees expected to die of old age. Although the team gathered some tree inventory data related to trees located on private property, for the purposes of this project and in the interests of creating conservative cost and impact calculations, only tree inventory data for trees located on public property was considered. Using the tree inventory data we obtained, the team determined the costs incurred by each respective municipality based on each tree's individual diameter class.

Currently, local communities such as Oak Park require homeowners with infested ash and infected elm trees on private property to remove the trees at their own expense, and thus disposition of such urban lumber is not monitored or coordinated by the municipalities. It is recommended that trees infested with EAB and infected with DED on private property should be investigated at a later date, as the estimated inventory for these trees appears large enough to merit attention. The indications are that this private property inventory may further support the development of a sustainable urban timber enterprise over the next several years.

The IPRO team developed a broad view of the urban wood opportunity by identifying and surveying local organizations and companies that could use urban wood. This included cabinet shops, Illinois Department of Corrections Industrial Services Division, City Colleges of Chicago, Habitat for Humanity, and the Wood Forest Service Products Laboratory in Wisconsin.

After extensive research on different ways to use wood harvested from ash trees infested by EAB, the team discovered that the Wood Laboratory at Michigan State University (MSU), under the direction of Dr. Donatien Pascal Kamdem, Professor of Wood Science, is also developing uses for this timber. The Wood Laboratory at MSU is an associate member of the Wood Forest Service Products Laboratory. An effort to establish an urban wood initiative in Northeastern Illinois would benefit by establishing an affiliation with both the US Forest Service Wood Products Laboratory in Wisconsin and the Wood Laboratory at MSU.

The IPRO team also contacted companies that contract with communities to cut down infested trees in order to estimate the costs incurred by these companies. While such companies did not share their cost data with the IPRO team due to competitive concerns, the team was able to obtain data from the Illinois Field Office of the United States Department of Natural Resources. This data was useful in illustrating the price point level for urban timber. Based on this information and the inventory data obtained, the IPRO team determined the approximate cost and profit associated with obtaining, processing and reusing urban timber. It should be noted that the actual costs incurred by tree service companies merits further investigation. Given more time, it should be possible to characterize such businesses by requesting formal quotations for actual work and analyzing the organization and cost structure of a typical company. This could also be effective if the ownership of any such companies is approached to consider their role as partners in developing a marketing alliance of some sort that can benefit everyone involved.

Based on interviews, tree inventory data, market research and findings, the IPRO team's conclusions and recommended next steps for moving forward are summarized as follows:

- Review and follow-up with survey respondents identified via this study in order to develop more extensive conversations, personal visits and perhaps focus groups with those who have an interest in learning more about use of urban timber and helping to broaden awareness about its use for various high level applications. This should span those who have an interest in using Ash and Elm timber in education and training settings, commercial building and artistic sectors, as well as those who are interested in serving the market for such timber.
- Establish a relationship with prominent wood product utilization research programs around the country to share information and support any mutual interests in urban wood use, including in particular those identified in the course of this study, namely, the Wood Laboratory at Michigan State University and the US Forest Service Wood Products Laboratory in Wisconsin. An additional notable program is associated with the Thumel Business Center, University of Baltimore, host of the Urban Wood Utilization Forum in 2007.

- Survey the population and characteristics of Ash and Elm trees on private property, since such populations have the potential to represent a significant volume of urban timber that could be used in high level applications.
- Encourage municipalities to play a leadership role in creating education and awareness programs related to the opportunity associated with urban timber, and in the process coordinating those who own private property with Ash and Elm tree populations and those who may be encouraged to participate in the development of higher order uses for such urban timber.
- Study in greater detail the supply chain and the economics of urban timber reclamation, including transportation, processing and other aspects of business infrastructure/overhead investment in order to understand the barriers to urban timber market development, key conditions to market entry, and appropriate incentives that may nurture and encourage such development.

1. Purpose & Objectives

The emerald ash borer (EAB) is a beetle from Asia that was unknown in North America until 2002, when a significant number of ash trees in the state of Michigan and in Windsor, Ontario, Canada began dying. Identified as *Agrilus planipennis* Fairmaire (Coleoptera: Buprestidae), the EAB is now found in Canada and 13 US states – including the State of Illinois since June 2006. If not controlled, EAB infestation could destroy the ash tree species in North America. While infested ash trees eventually die and must be removed, the wood remains unaffected.



Just as significant, Dutch elm disease (DED) has been a serious problem in Illinois for many years. DED is caused by *Ophiostoma novo-ulmi* and *Ophisotma ulmi*, transferred from tree to tree by the native elm bark beetle and the European elm bark beetle.

In addition to EAB and DED, likely thousands of other trees are removed from urban and suburban landscapes periodically due to old age, and many more felled as a result of storms, utility line interference, construction and other real estate development. The resulting material contributes to a volume of timber that may be collectively referred to as “urban wood.”

The Illinois Emerald Ash Borer Wood Utilization Network (WUN) is a loose network of over 100 interested people. The Illinois EAB Wood Utilization Team (WUT) is comprised of 14 participants serving as the decision-making body that sponsored this undergraduate multidisciplinary student IPRO project team. WUT created a "guidance committee" of wood marketing experts to support an IPRO team organized via the Intereprofessional Projects (IPRO) Program at Illinois Institute of Technology. This particular team followed on the work of two

previous semester teams prior to the collaboration with WUT that had focused on exploring new business models to support a market for high value uses for Emerald Ash Borer infested wood.

It is a worthwhile but non-trivial challenge to consider how to create a market for urban wood that has the potential for use in applications higher in value than mulch or pallets. For example, furniture and other objects have been created using wood from infested Ash trees via a studio project of IIT College of Architecture students in collaboration with The Morton Arboretum. Even so, there are traditional market barriers to creating a significant and sustainable impact based on such high level uses for infested ash wood. This includes lack of awareness among potential users of ash wood, overcoming resistance to change, structuring effective supply chain and distribution process, understanding factors associated with economies of scale, pricing and competitiveness, establishing a viable communication and advocacy network, and instituting incentives, competitions or other promotional techniques that support a marketing strategy.

The purpose of the IPRO team is to study and evaluate the potential uses of urban wood, i.e., that which is harvested or reclaimed from an urban environment, for societal benefit. The IPRO team was charged with developing an understanding of the range of companies, nonprofit organizations, schools or government entities with an interest in and ability to use urban timber, at what volume, in what condition, and at what price, if any, they would be willing to pay. The aim is to achieve the highest use possible, but this can represent different grades for different trees and different parts of the same tree. The social benefits of donation to nonprofit institutions, such as vocational and rehabilitation institutions, is also to be considered.

This study has four objectives in the context of communities in the greater Chicago area:

1. Identify and assess the range of uses for urban timber that has succumbed to EAB, DED, age and urban development. This includes a characterization of the quantity and quality of urban timber that is currently available and suggested uses for it.
2. Explore the possible target markets for application of urban timber, and identify representative public and private entities.
3. Develop the framework for a cost-benefit analysis based on information gathered via interviews with each municipality as well as from other organizations, and apply the framework if relevant data becomes available in the course of the project.

4. Propose three different courses of action that can be taken by the Emerald Ash Borer Wood Utilization Team going forward.

The data, information and insight gathered and developed through this project helps to scope the range of issues related to the market feasibility of urban wood based on its qualities, local volumes and uses. This may ultimately support the process of stimulating, facilitating and developing a market for urban wood, specifically ash and elm, by highlighting uses that represent higher value and benefit to society and the economy while respecting the environment.

2. Organization & Approach

The IPRO team assessed potential uses of urban wood through (1) close collaboration with Guidance Committee members, (2) interviewing community and institutional representatives; and (2) identifying and investigating conceptually similar applications. Collaboration with the Guidance Committee included regular communication via the IPRO 350 iGroup, e-mails, phone calls or status review meetings with the aim of sharing perspectives and information as well as integrating suggestions and recommendations within the purpose and scope of the project and to the extent that time and resources permitted.

The work of the IPRO team undertaken in this project addresses the challenges and opportunities associated with the death, removal and alternative use of millions of trees as a result of emerald ash borer (EAB) and Dutch elm disease (DED). This has been accomplished by working with arborists, foresters and other professionals associated with the City of Evanston and villages of Oak Park and Wilmette, as well as other professionals associated with the Illinois Emerald Ash Borer Wood Utilization Team.

At the outset, the IPRO team reviewed the background, qualifications and strengths of its members which led to an organization designed to achieve the project's objectives. (Refer to the roster of team members on the following page.) The roles and responsibilities of team members evolved as the project progressed over the course of the 15-week semester.

In addition to this final report, the IPRO team's work is documented via a project plan, midterm presentation, final presentation and an abstract/brochure and exhibit/poster as part of the IPRO Projects Day event on May 1, 2009. The project outcomes provide feasibility-related information, insight, conclusions and recommendations to the Guidance Committee. With respect to the three studied communities, the aim has been to: (1) identify potential quantity, quality and uses of urban wood; (2) provide elements of a cost benefit analysis that incorporates all relevant costs; and (3) propose a preliminary course of action with respect to the use of urban wood.

Environmental & Urban Wood Reclamation IPRO 350 Team (Spring 2009)				
Name	Major	Year/ Level	Skills	Assignments
David Connelly	Finance, construction management	4	Knowledge of wood working, business planning, MFS and OPASS research.	Project plan, municipality interview/research, sub-team leading, market research, final presentation.
Philip Haywood	Architecture	4	Cabinetmaker and furniture building, desktop publishing.	Project plan, municipality interview/research, overall leading, final report, brochure, final presentation
Maksym Ostapenko	Computer Information Systems	3	Web-development, programming.	Project plan, municipality interview/research, midterm presentation, final report, final presentation.
William Perkins	Computer Science	3	Programming.	Project plan, municipality interview/research, midterm presentation, final report, final presentation
Nicholas Sahm	Architecture	5	Team building skills, entrepreneurship, architecture, cad, design.	Project plan, municipality interview/research, midterm presentation, market research, poster, final presentation.
Keegan Springfield	Business	3	Knowledge of urban wood, online sales.	Project plan, municipality interview/research, midterm presentation, market research, final presentation
Jesse Stepniewski	Business	3	Market research, business planning.	Project plan, municipality interview/research, sub-team leading, market research, final presentation
Joshua Cabrera	Architecture	4	AutoCAD, 3D MAX, Sketchup, Photoshop, Illustrator, Flash, Dreamweaver, Ms Office...etc	Project plan, municipality interview/research, sub-team leading, final report, poster, final presentation.

Table 1. Environmental & Urban Wood Reclamation IPRO 350 Team Profile

3. Analysis & Findings

Regarding the regional context for the Ash tree utilization challenge, as of November 2008, the State of Illinois increased quarantine regulations covering the transportation of wood from EAB-infested trees. Transportation of urban timber from EAB-infested trees is regulated at the State and Federal levels of government. Regulations could become more stringent, but currently wood from EAB-infested trees can be transported within the EAB quarantine area (shown below in Figure 1.) The City of Evanston and villages of Oak Park and Wilmette are within this area.



Figure 1. Emerald Ash Borer Quarantine Boundaries in Illinois (November 2008).

The analysis and findings pertaining to this investigation are supported by the municipal studies for the City of Evanston, Village of Oak Park and Village of Wilmette included in the following parts of this section. The studies considered the local municipal environment in terms of the existing inventory of trees of various species, the current approaches used to address EAB and DED tree removal and disposal, and the local lumber business environment.

All three municipalities studied have Tree City USA status and are deeply committed to maintaining a rich and diverse tree population for the benefit of their residents, businesses and visitors. The three municipalities are also interested in exploring opportunities for creating greater awareness about higher value uses of ash and elm timber that is becoming available due to infestation. This includes encouraging and facilitating economically competitive approaches to the supply, distribution and sale of ash and elm timber, as well as creating a community of interest that extends to those in a position to transform such timber into highly-valued products.

Highlights of Interview and Research Findings

The following represents a small sampling of the response to IPRO team inquiries about interest in working to develop higher level uses for timber from infested ash and elm trees:

Habitat for Humanity – Illinois. The Better Built program provides contacts, materials and resources for local Habitat affiliates who seek help in building more sustainable houses. In addition, they assist interested affiliates in exploring other practical and affordable green building options.

US Forest Service Wood Products Laboratory. “A new structural biocomposite product developed by researchers at the US Forest Service Wood Products Laboratory can add value to low-value biomass to help mitigate costs associated with fuel reduction treatments, invasive species management and enhance the sustainability of renewable resources.”

Niles North High School. Utilization of wood is undertaken by Niles North High School’s Theatre Arts Programme. Theatre production sets are designed and built in-house by students in Stagecraft, Play Production, and Advanced Theatre Studio classes.

Illinois Department of Corrections. The Illinois Department of Corrections implements a furniture department in many of their prison facilities. These men and women are voluntarily

employed in meaningful work situations that aid in developing usable skills and positive work habits.

Horigan Urban Forest Products, Inc. An environmentally friendly Chicago private business specializing in taking urban trees and creating wood products. Since this business is already achieving the aim of putting this urban wood to its highest use, Horigan has proven to be a great model and source of innovation.

The Urban Wood Reclamation Process

The urban wood reclamation process is shown below. It indicates the urban wood “supply chain,” beginning with the sources of urban wood, its removal, alternative process streams and end-uses.

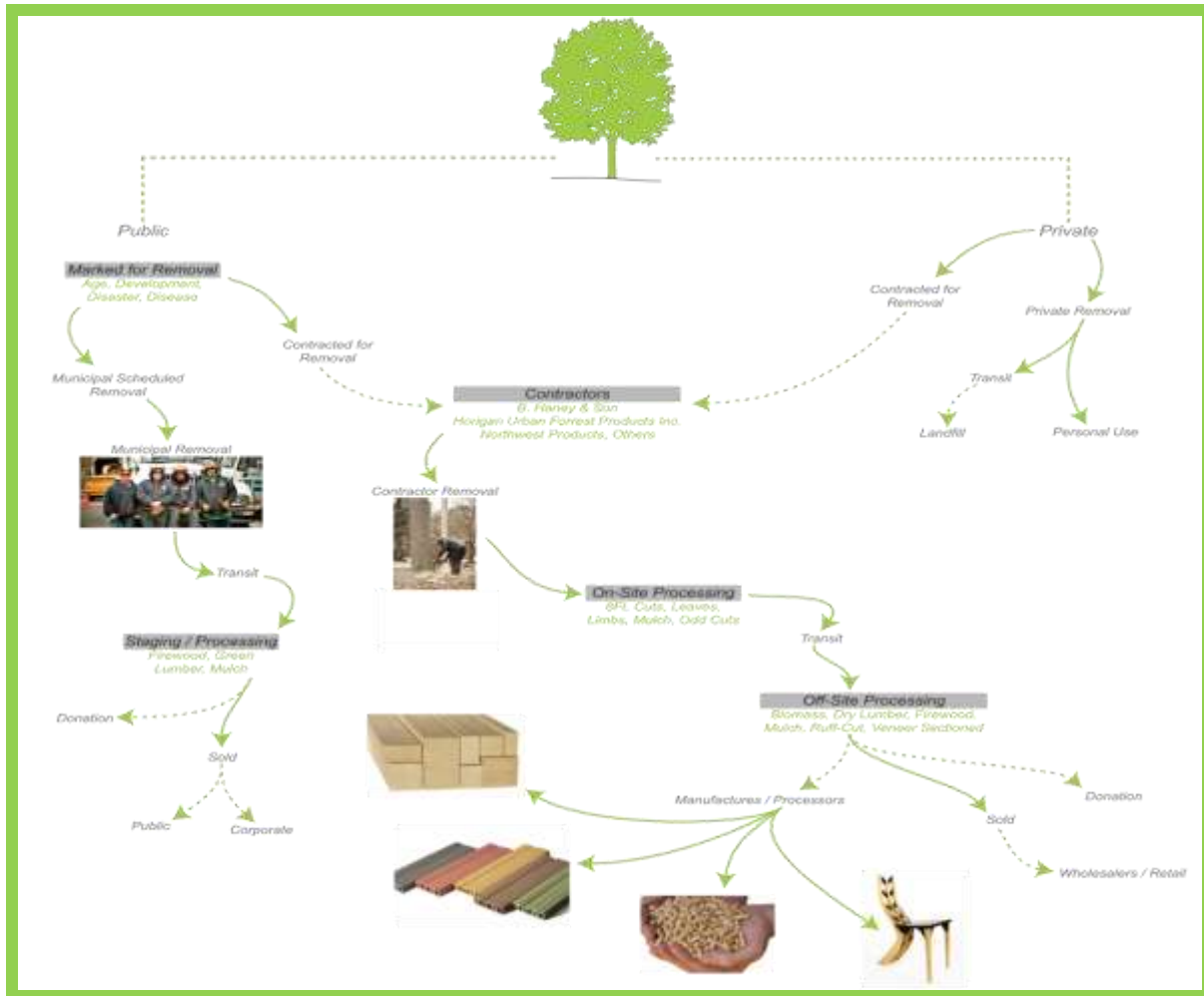


Figure 2. The Urban Wood Reclamation Process

The following two tables indicate pricing associated with various timber species in Illinois in 2007-2008 as well as typical costs associated with tree removal in the three studied communities.

COMMON PRICES PAID TO ILLINOIS TIMBER PRODUCERS			
SPECIES	2007 F.O.B. MILL	2008 F.O.B. MILL	2008 AVG PRICE F.O.B. MILL
ASH	\$290.00	\$150.00 - \$250.00	\$200.00
RED OAK	\$390.00	\$300.00 - \$500.00	\$400.00
WHITE OAK	\$600.00	\$350.00 - \$600.00	\$475.00
MAPLE	\$490.00	\$350.00 - \$750.00	\$550.00
CHERRY	\$700.00	\$400.00 - \$850.00	\$625.00
BLACK WALNUT	\$1,030.00	\$750.00 - \$1,400.00	\$1,075.00
ELM	\$230.00	\$150.00 - \$200.00	\$175.00
*FREIGHT-ON-BOARD (F.O.B.) PRICE PAID FOR TIMBER DELIVERED TO MILL			
*PRICES PAID ARE PER THOUSAND BOARD FEET – (\$ PER M BD. FT)			
*ILLINOIS DEPARTMENT OF NATURAL RESOURCES 2008			

Table 2. Common Prices Paid to Illinois Timber Producers

TREE REMOVAL COST PROJECTIONS IN EVANSTON, OAK PARK AND WILMETTE					
Species	Number of Trees	Average Diameter (Inches)	Average Tree Removal Costs/Tree*	Costs Incurred by Community	Board Feet
Evanston					
Ash	4,000	14	\$350	\$1,400,000	540,000
Elm	3,300	23	\$575	\$1,897,500	2,326,500
Oak Park & Wilmette					
Ash	3,684	24	\$600	\$2,210,400	2,829,312
Elm	3,144	30	\$750	\$2,358,000	3,772,800
*All costs based upon assumptions for next ten years					

Table 3. Ash and Elm Tree Removal Cost Projections in Evanston, Oak Park and Wilmette

3.1 City of Evanston Study

Study Team Members: Philip Haywood, Maksym Ostapenko and Jesse Stepniewski

Opportunity Profile

The City of Evanston is promoting a green and sustainable environment. Products like furniture and cabinetry made from urban timber will thus be more highly valued in its market. As a result, urban timber has the potential to achieve its highest and best use, rather than its lowest uses, i.e., as pallets and mulch that represent current uses in Evanston.



The City of Evanston is unique in that all tree removal is handled by city crews. Elm and ash trees represent a primary concern for Mark Younger, Arborist, City of Evanston, due to the large numbers that will need to be removed in the near future. Ash accounts for nearly 14 percent of all parkway and park trees in Evanston: 4,000 are on public property and approximately 8,000 are estimated to be on private property. The average diameter is 14 inches, average length is 12-20 feet, and 80-90 percent of the trees

are usable as lumber. Elm represents a smaller but still significant number of trees: 3,300 trees on public property and approximately 6,600 are estimated to be on private property. The average diameter is 23 inches, average length is 18-28 feet, and 90 percent of the trees are usable as lumber (refer to the following table).

Tree Species	Public trees	Private trees	Average diameter (inches)	Average length (feet)	Usable as lumber (%)
Ash	4000	8000	14	12-20	80-90
Elm	3300	6600	23	18-28	90

Table 4. Characteristics of the Ash and Elm Tree Population in Evanston, Illinois

The spread of EAB and DED will kill a significant number of these trees, and thus there will be a significant amount of timber available for use.

Industry Overview

According to the Illinois Department of Agriculture, as of November 2008 the State of Illinois has increased quarantine rules and regulations regarding the transportation of trees infested with EAB. The transportation of timber needs to be explored and researched further, as it is reasonable to expect that transporting trees that are infested with EAB will become increasingly difficult and more expensive if both State and Federal Regulations become stricter.

The City of Evanston owns equipment used to cut down trees that are confirmed as infested. Northwest Wood Products removes infested timber and scraps from the Evanston storage facility and uses the material to create pallets and mulch. This approach has multiple benefits: arborists are pleased that lumber from the felled trees has sustainable uses, Evanston does not incur transportation or disposal costs, and Northwest Wood Products obtains free lumber. Nevertheless, Evanston aspires to find a better end-use for its felled trees, i.e. as furniture, millwork and building material for local public buildings.

Urban timber is gaining greater attention today among sawmills than it has had in the past, at least partly because they are equipped with systems that help prevent metal objects in the wood from causing damage. The team identified and contacted sawmills near Evanston that either currently work with urban timber or would be willing to do so. This may include providing hauling services, sawing, drying and storage. A profile of contacted sawmills follows.

	G. H. Woodworking & Sawmill	Horigan Urban Forest Products	Basten Enterprises	The Russell Mill
Portable Sawmill	Y	Y	N	Y
Kiln Dry	N	Y	N	Y
Urban Timber	Y	Y	Y	Y
Staging	Y	Y, 8000 board ft	Y	Y
Transportation	Y	N	Y	Y
Cost	Varies	\$5-\$6.25/board ft	\$60 (cutting + transporting)	Varies
Experience with Infested Ash	Y	Y	N	N
Customer Base	Homeowners, landscape companies	Retail customers	Local municipalities, retail customers	Retail customers
End Fate of Logs	Mantles, doors, custom millwork	Lumber	Firewood, various millwork	Lumber, flooring, molding
Specialization	Reproduction millwork	Urban timber	No specialization	Hardwood

Table 5. Profile of Selected Sawmills Near Evanston, Illinois

Market Analysis

There are, potentially, numerous public and private institutions that could use urban timber. This study focused on representative potential users in the public sector, including K-12 schools, vocational schools, community colleges and Illinois Department of Corrections.

Urban timber could also have value to local businesses, builders or architects that can capitalize on its “green” qualities. A representative list is included below. This opportunity was confirmed in discussions with several major suppliers with an interest in distributing the lumber, including Aetna, Woodcraft, Wood World, Rockler and Owl Lumber.

Local Evanston-Area Business	Specialty
All Tech Builders	Timber frame construction
Graceland Construction, LLC	Timber frame construction
Janssen Signature Homes, LLC	Timber frame construction
Barna Log Homes of Chicagoland	Log cabin design and construction
Expedition Log Homes	Log cabin design and dealer
Thos. Moser	Custom cabinet manufacture

Table 6. Local Evanston-Area Businesses with Potential Interest in Urban Timber.

Resources and Capabilities

The City of Evanston replants 98 percent of all parkway and park trees but does not replace trees removed from natural areas. The rate of replacement of trees that are removed from private property is not monitored by the City of Evanston. On average it takes 10-15 years for a tree to grow from the planting stage to one that can be used for lumber if it must be removed. Trees are a renewable resource, but require a substantial amount of time to develop.

Conclusions

The City of Evanston underutilizes its urban wood due to such constraints as time and budget, and affected by lack of a market infrastructure to stimulate new applications. It is estimated that 80 percent of its trees are usable for lumber applications, yet most of the wood is either ground into chips for mulch or converted into pallets. An estimated 1.7 million board feet of lumber is not used in higher value applications. Evanston currently has an agreement with Northwest Wood Products to dispose of urban wood for free, but our research identified other possible markets. Evanston has a substantial amount of urban wood that can have higher value uses. The remaining 20 percent of the trees can still be used as mulch, a viable non-lumber use for wood.



3.2 Village of Oak Park Study

Study Team Members: David Connelly and Nicholas Sahn

Opportunity Profile

Currently, there are approximately 19,000 trees comprised of 107 different species that are



located on public property within the Village of Oak Park. Figures 3 and 4 on the following page depict the number of ash, elm and Norway maple trees located on public property within Oak Park that are expected to die over the next ten- to twelve-year period. Almost 2,600 ash trees may become infested with EAB, nearly 1,000 elm trees will die, and approximately 700-800 Norway maples will die of old age. Within 10 years, nearly 40 percent of Oak Park's urban forest will be transformed to a composition of different species and average tree size.

EAB and DED will significantly affect public and private land owners. An estimated 5,000 – 7,000 ash trees could become infested with EAB, with another 2,000 – 3,000 trees located on private property similarly infected with DED. During a difficult year, 5 to 10 percent of elm trees on public land are lost to EAB, and the same level of loss is likely on private land.

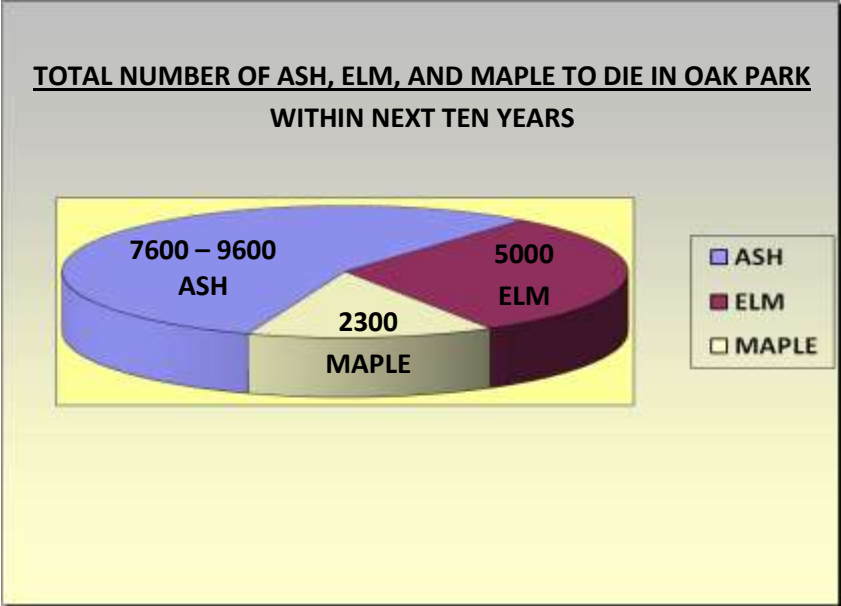


Figure 3. Number of Ash, Elm, and Norway Maple Trees to die over a 10-12YearPeriod (on public and private land) (Norway maple estimated for parkway land only)
Source: Village of Oak Park.

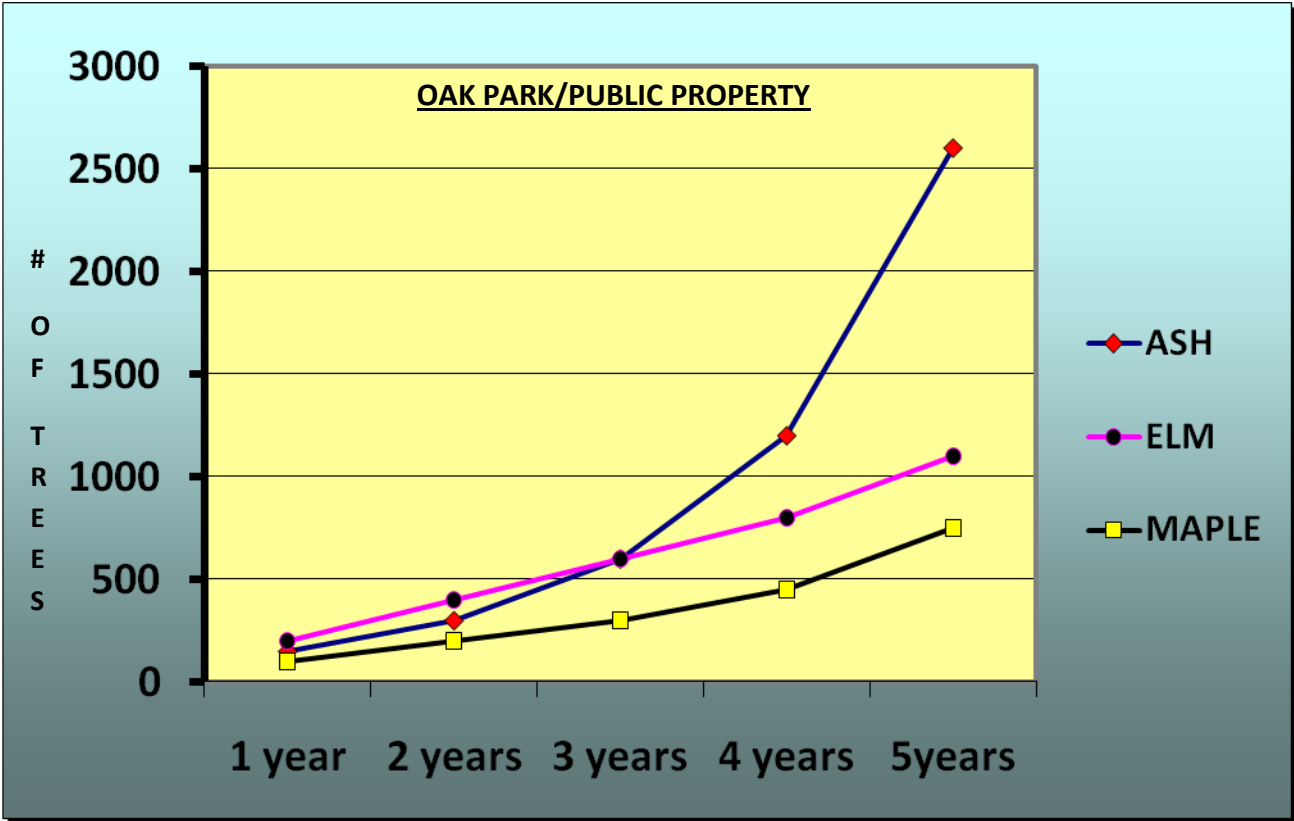


Figure 4. Ash, Elm and Maple Trees Expected to Die Over a Five-Year Period.

The species distribution for Oak Park by diameter class, represented in Figures 5 and 6 below, is a significant factor that is taken into consideration when ranking general species desirability and general size requirements of those species.

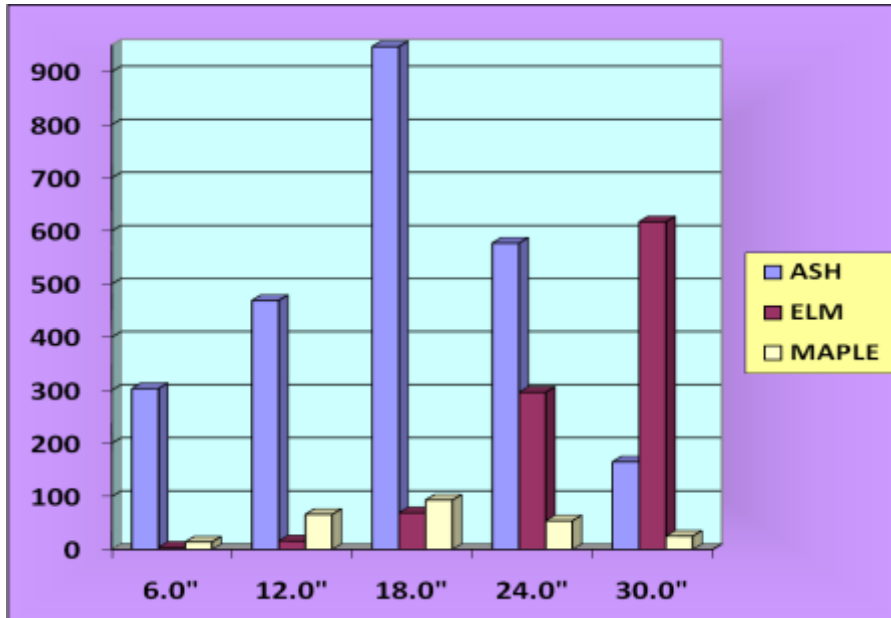


Figure 5. Numbers of Ash, Elm and Maple Trees in Oak Park Between 6.0" – 30.0"

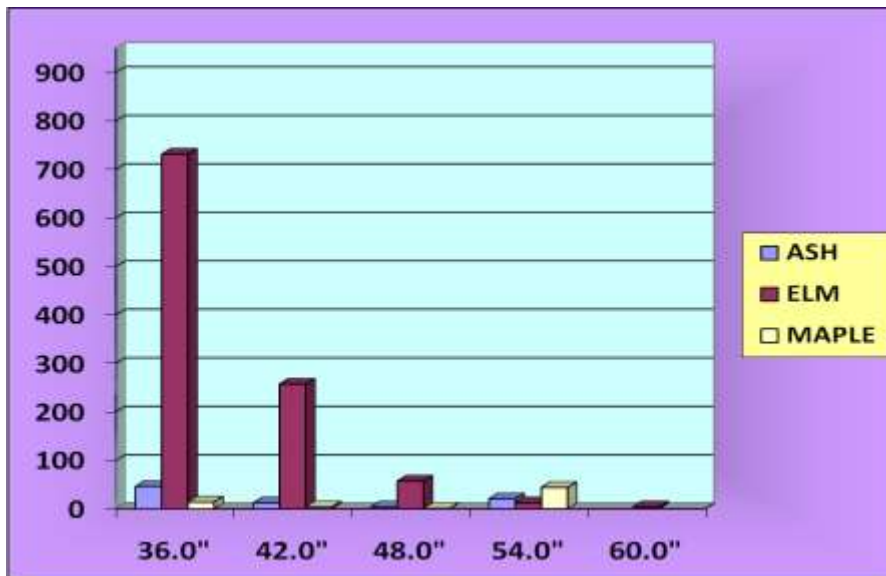


Figure 6. Numbers of Ash, Elm and Maple Trees in Oak Park Between 36.0" – 60.0"

According to Sam Sherrill, author of “Harvesting Urban Timber,” urban timber is evaluated in terms of two criteria: 1) desirability of wood species, and 2) general size. Each criterion is ranked as best, good, fair or poor, as indicated in Table 7 below.

	Desirability of Wood Species	General Size
Best	Walnut, butternut, ash, oaks, cherry and paulownia	16.0” diameter or larger at small end of log; 10’ or longer in length
Good	Maple, elms, fruitwoods, basswood, cedar and sycamore	14.0” diameter or larger at small end of log; 8’ or longer in length
Fair	Pine, mulberry, beech and red and silver birch	12.0” diameter or larger at small end of log; 8’ or longer in length
Poor	Gum, pin oak, aspen and cottonwood	Small length or diameter; oblong, knots, branches, holes, rot and metal

Table 7. Urban Timber Ranking by Desirability of Wood Species and General Size.

Industry Overview

Currently, Oak Park contracts with a tree service company, B. Haney & Son, to remove urban trees that have become infested with EAB and infected with DED, as well as other trees that have died from old age. According to the current agreement that Oak Park has with B. Haney & Son, it costs the Village of Oak Park an average of \$25.00 per diameter inch to have urban trees removed.

Ash and Elm trees vary in their susceptibility to disease. There are over 11 different types of ash trees in Oak Park, all of which are susceptible to EAB. Only the American elm tree species is susceptible to the fungus that causes DED.



3.3 Village of Wilmette Study

Study Team Members: Joshua Cabrera, William Perkins, Keegan Springfield

Opportunity Profile

The team performed its study in consultation with the Village of Wilmette Public Works Department. The first step was to profile the current stock of trees in Wilmette. The chart below identifies the four trees that comprise a large segment of Wilmette’s tree population. These four tree species comprise 67 percent of Wilmette’s total tree population, offering a perspective on the level of impact of EAB and DED and thus availability of resulting urban timber.

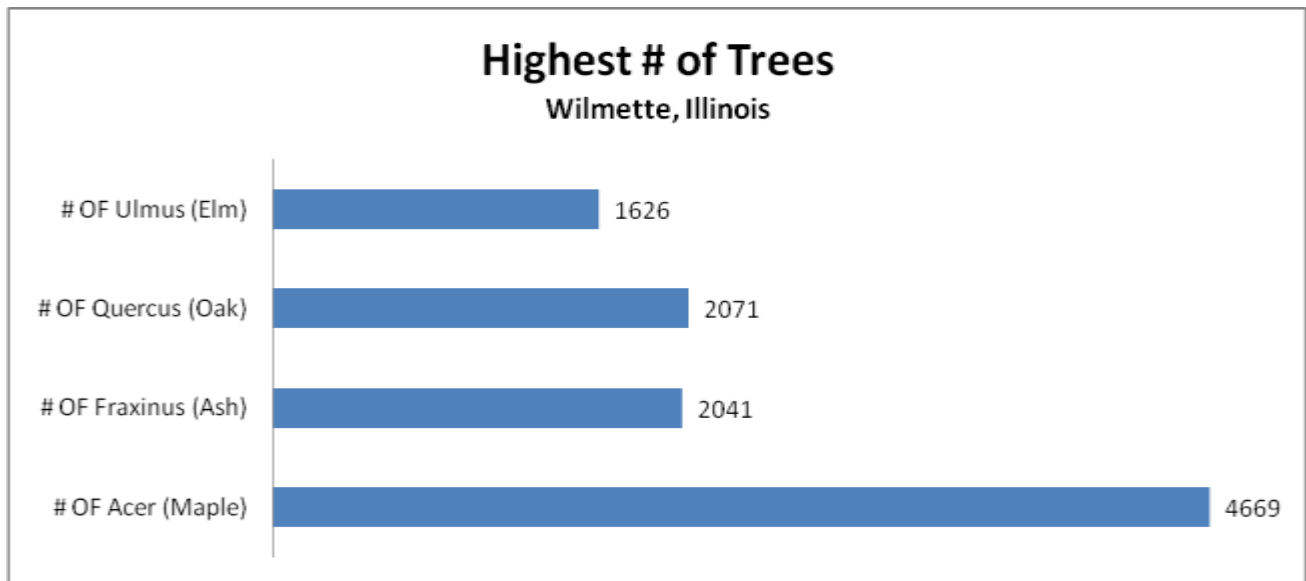


Figure 7. Number of Trees by Four Most Common Species in Wilmette, Illinois.

Due to EAB infestation, ash trees are of primary concern. Therefore this section focuses solely on ash trees and their potential to be used by Wilmette. Wilmette began their EAB management program in 2006, when EAB was first discovered within the community’s tree population. Since then, on the order of 700 infested ash trees have been removed by Wilmette. The number is expected to steadily increase in the future. Wilmette has operated under the

assumption that they will lose all of their ash trees. Figure 8 below shows the number of trees lost to EAB from 2006 – 2008.

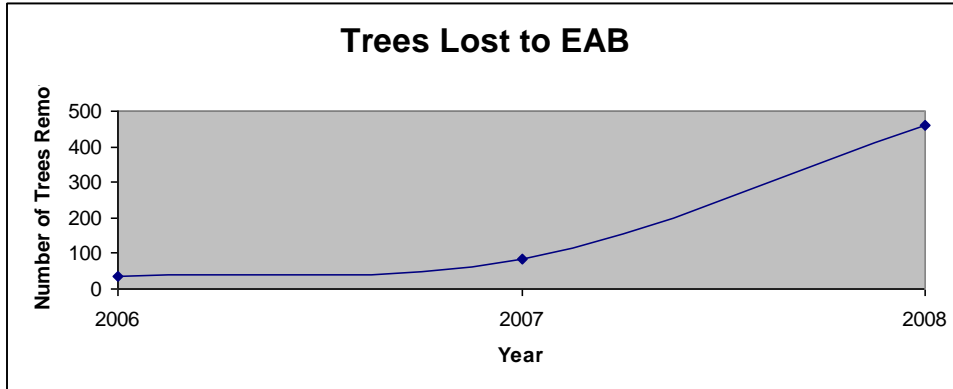


Figure 8. Trees Lost to EAB in Wilmette.

There were 2,855 ash trees on public property. (Wilmette has no jurisdiction over ash trees on private property or on Park District property.) Ash tree removals in Wilmette have risen steadily: 46 in 2006, 202 in 2007, and 460 in 2008. Currently, there are three different species of ash trees comprising Wilmette’s ash tree population. Figure 9 depicts ash tree removal by species in 2008. Green ash represented the largest number removed at 397, followed by white ash at 58.

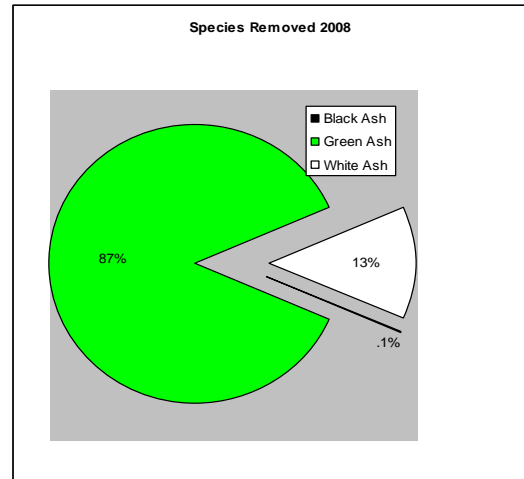


Figure 9. Ash Trees Removed in Wilmette by Species in 2008.

Wilmette incurs an average cost of \$325 to remove each tree infested with EAB. Additional typical costs include stump grinding (\$25), site restoration (\$25), and the cost of planting a new tree (\$300), which brings the total replacement cost to \$675 per tree. With 2,855 Ash trees on public land in Wilmette, an estimated cost of replacing all Ash trees lost to EAB is on the order of \$2 million at current cost levels, not taking inflation into consideration. The cost of hiring a forester to oversee such operations is on the order of \$70,000 a year over eight years, bringing the total to an estimated \$2.5 million. (This does not include the cost of removal and restoration for trees located on private or park district property.) Over a two-year period from

2009 to 2010, Wilmette plans to remove 650 trees and replant 333. This work will continue in 2011, when the village plans to remove 235 trees. From 2011 and 2012, 918 trees will be replanted. Figure 10 below offers an estimated timeline for this removal and replacement process.

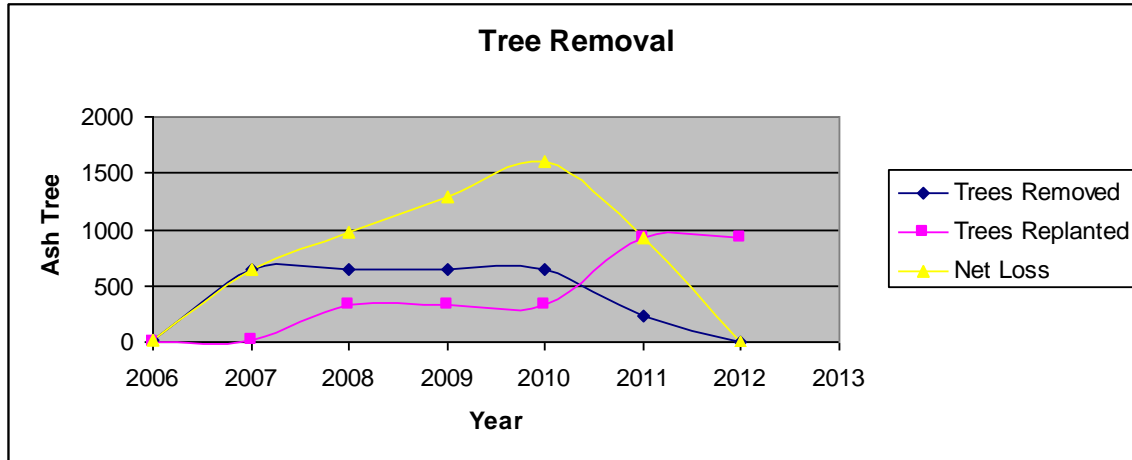


Figure 10. Ash Tree Removal from 2006-2013 in Wilmette, Illinois.

Industry Overview

The Village of Wilmette budget allocation for EAB management is \$202,000 for 2009. Wilmette currently uses a tree service company, Nels J. Johnson Tree Expert Company, to remove all infested trees that are equal to or greater than 12” DBH for all species of trees. The Village itself removes all infested trees that are less than 12” DBH. In addition, there are several contractors that are available from time-to-time for landscaping, emergency and other services. Such contractors could be integrated in any communication efforts aimed at EAB utilization.

Market Analysis

Like the City of Evanston and Village of Oak Park, the Village of Wilmette participates in Tree City USA, a program that awards excellence to communities that preserve and improve their urban tree canopy. Currently, its participation does not encompass extensive high level reuse of removed urban timber. Such harvested material is primarily used to create wood chips for landscaping applications. The tops of the trees are always chipped, but the bottom of the tree is often used as logs or for other purposes.

In one instance, Wilmette created butcher block counter tops to be used in one of the city's buildings; however, this was a special project and does not reflect Wilmette's current general use of urban timber.

There is considerable potential for finding higher value uses for this harvested wood. Considerations include: profitability, sustainability, highest possible use, and most efficient use. There is considerable opportunity for innovative and entrepreneurial thinking to find uses for ash wood beyond mulch. For example, one application promoted by the president of Wilmette in 2007 was focused to creating Little League baseball bats from treated ash wood.

3. Conclusions & Recommendations

The IPRO team's conclusions and recommendations are summarized below. This includes recommended next steps to advance a strategy for supporting development of a marketing infrastructure/network/community/alliance for urban wood utilization.

Conclusions

- Urban wood is generated in significant quantities to be a viable source of wood.
- While the supply of urban wood is harvested in small quantities at a time, this can be managed through effective inventory control processes.
- There are businesses that are already using urban wood; however, they represent a fragmented market. By conducting additional comprehensive surveys to identify businesses using wood products in general, the aim should be to foster interaction among these businesses to stimulate urban wood utilization.
- Potential end users of urban wood are reluctant to utilize this wood in place of their established supplies and via a new or different supply chain. However, most have shown a willingness to utilize urban wood, if it can be demonstrated to represent a quality product that offers competitive economics. Given the quality of urban wood that is comparable to forest trees, simply raising awareness can help to stimulate use.
- Government regulation that restricts disposal and shipment of wood infested with EAB is a barrier to greater use of urban timber. This may be mitigated with documented treatment of infested wood and compliance agreements that support distribution with an acceptable level of verification and traceability. Given current regulations, distribution within a local area, i.e., state quarantine zone, offers opportunities for use, particularly if a local economy is big enough to support the supply.
- While forest management in communities is above average, there remains a lack of effective communication between forest management programs and relevant businesses and community representatives to elevate urban wood to its highest use level.

- Efforts like those being fostered by the studied municipalities and the Illinois EAB WUT and others represent an important bridge to help establish and maintain effective connections.

Recommendations

Municipalities-to-Contractors. Since the municipalities of Evanston, Oak Park, and Wilmette currently contract their work through second party contractors, the aim could be to change the contractual agreements currently standing between municipalities and contractors to ensure that the wood material harvested is put to its highest possible use. The municipalities have shown a willingness to change their contracts to incorporate this mandate. Since legally binding, the contractors will either utilize the wood themselves, or sell it to a third-party that agrees to apply the wood in higher uses.

Municipalities-to-Small Business/Non-Profits. In conducting surveys on possible end users of harvested urban wood, a number of businesses have shown interest in utilizing this urban wood for projects ranging from fiberboard processing to furniture building. While the quantities of wood being utilized by these small businesses are small compared to the availability, there are a myriad of businesses that, taken as a whole, can form a significant segment of possible end users. These users span private, public and non-profit users. Ideally, personal relationships between all parties involved should be fostered to ensure that in processing of urban wood, its highest potential use can be realized.

Municipalities-to-Large Scale Businesses. Through our research phase, a number of large-scale businesses were identified as possible end users of urban wood. These are primarily energy generation companies that convert biomass to electricity/heat. Since these businesses use a large amount of “woody” material, the inclusion of localized urban wood harvest stocks can play an important role in these power generation facilities.

Additional recommended next steps:

- Review and follow-up with survey respondents identified via this study in order to develop more extensive conversations, personal visits and perhaps focus groups with those who have an interest in learning more about use of urban timber and helping to broaden awareness about its use for various high level applications. This should span those who have an interest in using Ash and Elm timber in education and training

settings, commercial building and artistic sectors, as well as those who are interested in serving the market for such timber.

- Establish a relationship with prominent wood product utilization research programs around the country to share information and support any mutual interests in urban wood use, including in particular those identified in the course of this study, namely, the Wood Laboratory at Michigan State University and the US Forest Service Wood Products Laboratory in Wisconsin.
- Survey the population and characteristics of ash and elm trees on private property, since such populations have the potential to represent a significant volume of urban timber that could be used in high level applications.
- Encourage municipalities to play a significant role by working with business to create education and awareness programs focused to the opportunity associated with urban timber. In the process, municipalities can help facilitate communication between those property owners with ash and elm tree populations and those in business who may be encouraged to participate in the development of higher order uses for such urban timber.
- Study in greater detail the supply chain and the economics of urban timber reclamation, including transportation, processing and other aspects of business infrastructure/overhead investment in order to understand the barriers to urban timber market development, key conditions to market entry, and appropriate incentives that may nurture and encourage such development. In addition, consider creative contemporary approaches, including web-based social networking and other business models that may be adapted to serving the needs of the urban timber reclamation community, including:
 - The Central Hub Facility Model: “FedEx” for urban wood
 - The Urban Wood Exchange Model: “E-Bay” for urban wood

APPENDIX

1. WORKING LIST OF POTENTIAL CONTACTS
2. SAMPLE SURVEY
3. REFERENCES
4. RESPONDENT DATA
5. URBAN WOOD EXCHANGE CONCEPT

Appendix 1. Working List of Potential Contacts

The list of potential contacts is included below. The actually respondent data set is included in Appendix 4 and includes additional organizations interviewed in the course of the study, including:

- Habitat for Humanity – Illinois
- Salvage One
- Grass Roots Energy
- Niles North High School
- Illinois Department of Corrections
- USDA Wood Education and Resource Center
- 3DEF Fiberboard

Sawmills

G. H Woodworking & Sawmill

Contact Name: Gerry Hamm
Telephone: 847.526.9301
Email: GHWoodworking@comcast.net
Website: www.ghwoodworking.com

Basten Enterprises

Contact Name: Tom Basten
Telephone: 815.675.6863
Email: bastenent@aol.com
Website: N/A

Horigan Urban Forest Products

Contact Name: Bruce Horigan
Telephone: 847.568.1340
Email: ehorigan@sbcglobal.net
Website: www.horiganufp.com

The Russell Mill

Contact Name: Charles Prymula
Telephone: 847.395.5190
Email: therussellmill@gmail.com
Website: N/A

Community Colleges

Richard J. Daley College

Contact Name: Kathy Poulsen
Telephone: (773) 838-7500 ext. 7539
Email: kpoulsen@ccc.edu
Website: www.daley.ccc.edu

Harry S. Truman College

Contact Name: Gracie Gast
Telephone: (773) 907-4477
Email: ggast@ccc.edu
Website: www.trumancollege.cc

Harold Washington College

Contact Name: Anna Blum
Telephone: (312) 553-3190
Email: ablum@ccc.edu
Website: www.hwAshington.ccc.edu

Wilbur Wright College

Contact Name: N/A
Telephone: (773) 777-7900 ext. 8500
Email: N/A
Website: www.wright.ccc.edu

Malcolm X College

Contact Name: Clarence Johnson
Telephone: (312) 850-7016
Email: cjohnson258@ccc.edu
Website: www.malcolmx.ccc.edu

College of DuPage

Contact Name: N/A
Telephone: (630) 942-2380
Email: N/A
Website: www.cod.edu

Olive Harvey College

Contact Name: Angela Arrington-Jones
Telephone: (773) 291-6100 ext. 6297
Email: aarrington@ccc.edu
Website: www.oliveharvey.ccc.edu

College of Lake County

Contact Name: Melanie Scherer
Telephone: (847) 543-2084
Email: mscherer@clcillinois.edu
Website: www.clcillinois.edu

Elgin Community College

Contact Name: Sharon Konny
Telephone: (847) 214-7367
Email: skonny@elgin.edu
Website: www.elgin.edu

Harper College

Contact Name: Sheila Quirk-Bailey
Telephone: (847) 925-6623
Email: N/A
Website: harpercollege.edu

Joliet Junior College

Contact Name: David Agazzi
Telephone: (815) 729-9020 ext. 6647
Email: dagazzi@jjc.edu
Website: www.jjc.edu

Moraine Valley Community College

Contact Name: Andrew Duren
Telephone: (708) 974-5203
Email: duren@morainevalley.edu
Website: www.morainevalley.edu

Morton College

Contact Name: Susan Felice
Telephone: (708) 656-8000 ext. 382
Email: Susan.Felice@morton.edu
Website: www.morton.edu

Oakton Community College

Contact Name: Doreen Schwartz
Telephone: (847) 635-1632
Email: doreen@oakton.edu
Website: www.oakton.edu

Triton Community College

Contact Name: Sean Sullivan
Telephone: (708) 456-0300, Ext. 3240
Email: ssulliva@triton.edu
Website: www.triton.edu

Waubonsee Community College

Contact Name: N/A
Telephone: (630) 466-7900, ext. 5747
Email: N/A
Website: www.waubonsee.edu

High Schools near Evanston/Wilmette**Evanston Township**

Contact: Marilyn Madden
Telephone: 847-424-7000
Email: maddenm@eths.k12.il.us
Website: www.eths.k12.il.us/

Niles North

Contact: Robert Freeman
Telephone: (847) 626-200
Email: robfre@niles-hs.k12.il.us
Website: www.niles-hs.k12.il.us/North/

Niles West

Contact: Kaine Osburn
Telephone: (847) 626-2500
Email: kaiohb@niles-hs.k12.il.us
Website: www.niles-hs.k12.il.us/west/

Loyola Academy

Contact: David McNulty
Telephone: (847) 256-1100
Email: dmcnulty@loy.org
Website: www.goramblers.org/

New Trier

Contact: Jan Borja
Telephone: (847) 446-7000
Email: borjaj@newtrier.k12.il.us
Website: www.newtrier.k12.il.us/

Regina Dominican High School

Contact: Kathy Rzany
Telephone: (847) 256-7660
Email: krzany@rdhs.org
Website: www.rdhs.org/

Glenbrook North High School

Contact: Paul Pryma
Telephone: (847) 272-6400
Email: PPryma@glenbrook.k12.il.us
Website: gbn.glenbrook.k12.il.us/

Notre Dame High School

Contact: Dan Tully
Telephone: (847) 965-2975
Email: dtully@ndhsdons.org
Website: www.ndhsdons.org/

Maine East High School

Contact: Steven Isoye
Telephone: (847) 692-8321
Email: sisoye@maine.k12.il.us
Website: east.maine207.org/

High Schools near Oak Park

Oak Park and River Forest High School

Contact: Nathaniel Rouse
Telephone: (70) 383-0700
Email: nrouse@oprfs.org
Website: oprfs.org/

Fenwick High School

Contact: James Quaid
Telephone: (708) 386-0127
Email: jquaid@fenwickfriars.com
Website: www.fenwickfriars.com/fenwick/site/default.asp

Proviso East High School

Contact: Milton Patch
Telephone: (708) 344-7000
Email: mpatch@pths209.org
Website: east.pths209.org/index3.asp

Other

Kramer Tree Specialists, Inc.

Telephone: (630) 293-5444

Appendix 2. Survey Form

URBAN WOOD UTILIZATION SURVEY

If you or your organization uses any type of wood products, please read this.

The Illinois Institute of Technology is studying the resource of urban timber and its many uses. Currently, a large surplus of urban timber is available because of the Emerald Ash Borer infestation which is killing millions of trees throughout the Midwest.

Even though these millions of trees are forced to be cut down, the wood quality is still virtually perfect. In addition to the millions of Ash trees, other species are removed every day due to old age, storm damage, or building development. Presently, many of these trees are chipped into mulch, yet their high quality timber could be used for many other high-quality uses. We are investigating and promoting the use of this urban timber for its highest possible use. We would greatly appreciate your brief response to the following questions.

Thank you.

Course IPRO 350: Illinois Institute of Technology

Survey

1. What type of wood products do you or your organization use? (e.g., plywood, hardwood lumber, mulch, veneer)
2. What species of wood do you typically use?
3. What quantity of wood do you consume? (e.g., 5000 board feet/month)
4. What do you use the wood products for? (e.g., furniture, firewood, building construction)
5. What is current cost of your wood products? (example: \$6.00/board foot, \$17/cubic yard)
6. Who are your current suppliers for wood products?
7. Would you be interested in using urban timber in your process?
8. What would it take to consider using urban timber?
9. Does your business/organization participate in sustainability programs?
10. If not, have you considered implementing a sustainability program? (This could be used as a cost-saving, or profit boosting program in addition to helping the environment.)
11. Would you be willing to use urban timber even if it cost more than its non-urban counterpart?
12. Is there anyone else in your organization who would be interested in sustainability and/or the use of urban timber? If so, please provide name and contact information.
13. Can you suggest any other organizations who might be interested in the use of urban timber?
14. Does this issue raise any new ideas / thoughts that you think we should know about?

Appendix 3. References

- Bratkovich, S. M. (2006). *Utilizing Municipal Trees: Ideas From Across the Country*. Retrieved March 19, 2009, from Urban Forestry Index: www.urbanforestryindex.com.
- Bratkovich, S., Bowyer, J., Fernholz, K., & Lindburg, A. (2008). *Urban Tree Utilization and Why It Matters*. Minneapolis: Dovetail Partners.
- Cesa, E. T., Lempicki, A. E., & Knot, H. J. (2003). *Recycling Municipal Trees*. New Jersey: USDA Forest Services.
- Falk, B. (1997). Wood Recycling: Opportunities for the Woodwaste Resource. *Forest Products Journal* , 47 (6), 17-22.
- Falk, R. H., & McKeever, B. D. (2004). *Recovering Wood for Reuse and Recycling*. Madison: Forest Products Laboratory.
- Forest Products Laboratory. (2004). *Wood-Plastic Composites*. Madison: Forest Products Laboratory.
- Hunt, J. F., & Supan, K. (2006). Binderless fiberboard: Comparison of fiber from recycled corrugated containers and refined small-diameter whole treetops. *Forest Products Journal* , 56 (7/8), 69-74.
- Illinois Department of Natural Resources. (2007). *Accomplishment Report 2007 – Illinois*. Springfield: Illinois Department of Natural Resources.
- Jerrold, W. E., Rudie, A. W., Williams, S. R., & Wegner, H. T. (2008). Integrated Biomass Technologies. *Forest Products Journal* , 58 (6), 6-16.
- LeVan-Green, S.L., and J. Livingston. 2001. Exploring the use for small-diameter trees. *Forest Products Journal* 51: 10–21.
- MacFarlane, D. W. (2007). Quantifying Urban Saw Timber Abundance and Quality in Southeastern Lower Michigan, U.S. *Arboriculture & Urban Forestry* , 33 (4), 253-263.
- Malcolm, F. B. (2000). *A Simplified Procedure for Developing Grade Lumber From Hardwood Logs*. Madison,: Forest Products Laboratory.
- Matheny, N.P., and J.R. Clark. 1994. A Photographic Guide to the Evaluation of Hazard Trees in Urban Areas. 2nd edition. International Society of Arboriculture, Urbana, IL.
- McKeever, David B. 2002. Domestic market activity in solid wood products in the United States, 1950-1998. Gen. Tech. Rep. PNW-GTR-524. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 76 p. www.fs.fed.us/pnw/pubs/gtr524.pdf.
- McKeever, David B. and Skog, Kenneth E. 2003. Urban tree and woody yard residues -Another wood resource. Res. Note FPL-RN-290. Madison, WI: U.S. Department of Agriculture, Forest Service, Forest Products Laboratory. 4 p. www.fpl.fs.fed.us/documnts/fplrn/fplrn290.pdf.
- Noble, S. (2002). *Improving Hardwood Log Values: A Manual for Training Expert Buckers*. Old Forge: Northeastern Loggers' Association.

- Nzokou, P., S.M. Pankras, and D.P. Kamdem. 2006a. Preservative treatment of Ash wood from emerald Ash borer (*Agrilus planipennis*) infested trees. *Forest Products Journal* 56:69–72.
- Pitis, Olivian T. 1999. U.S. Forest Products Exporters and the Information Superhighway. Masters Thesis. Louisiana State University. Baton Rouge.
- Poland, T.M., and D.G. McCullough. 2006. Emerald Ash borer: Invasion of the urban forest and the threat to North America's Ash resource. *Journal of Forestry* 104:118–124.
- Rast, E.D., D.L. Sonderman, and G.L. Gammon. 1973. A Guide to Hardwood Log Grading. GTR-NE-1, U.S.D.A. Forest Service, Northeastern Forest Experiment Station.
- Solid Waste Association of North America. 2002. Successful Approaches to Recycling Urban Wood Wastes. Gen. Tech. Rep. FPL-GTR-133. U.S.D.A., Forest Service, Forest Products Laboratory, Madison, WI.
- USDA Forest Service, Forest Products Laboratory (USDA). 1999. Wood Handbook: Wood as an Engineering Material. Gen. Tech. Rept. FPL-GTR-113. Forest Prod. Soc., Madison, WI. 463 pp.
- USDOE. 2008. Ethanol Myths and Facts. Biomass Program: Energy Efficiency and Renewable Energy. U.S. Department of Energy. www1.eere.energy.gov/biomass/.
- U.S. Environmental Protection Agency. 2003. Municipal solid waste in the United States: 2001 Facts and figures. EPA 530-S-03-011. www.epa.gov/epaoswer/nonhw/muncpl/pubs/msw2001.pdf.
- U.S. Census Bureau. (2002). *Census of Population and Housing, Demographic Profiles: Illinois*. Washington: U.S. Census Bureau.
- Village of Wilmette. (2008). *Resident Handbook*. Wilmette: Village of Wilmette.
- Vlosky, R. P., & Pitis, O. T. (1999). *A Comparison of the U.S. Forest Products Industry and Other U.S. Industries*. Baton Rouge: Louisiana Forest Products Laboratory.
- Wallace, R. (2007). *Building Materials Go From TrAsh to Treasure*. Madison: Forest Products Laboratory.
- Wegner, T. (2008). *Forest Biorefinery and Biomass Utilization*. Madison: Forest Products Laboratory.
- Winandy, J.E., J.F. Hunt, C. Turk, and J.R. Anderson. 2006, Emergency housing systems from three-dimensional engineered fiberboard. USDA Forest Serv., Forest Products Laboratory. 2005. General Technical Report No. GTR-FPL-166. 10 pp.
- Yao, J. 1978. Hardboard from municipal solid waste using phenolic resin or black liquor as a binder. *Forest Prod. J.* 28(10):77-82.

Appendix 4. Respondent Data

Respondent Data: Habitat for Humanity

Notes:

- Initial Contact via phone....
- Has shown interest in how urban wood can be utilized by their new sustainability program being incorporated into their affordable housing unit.
- Further collaboration to be done via email exchange with their public resources department.
- Email sent out on Tuesday, April 14, 2009
- Awaiting further response

Respondent Data: Salvage One

1840 W Hubbard St Chicago, IL 60622

(312) 733-0098

Company Description: Custom Furniture, Recycled/Rehab Furniture, Furniture Gallery

Notes:

- Initial Contact via phone....
- Has shown interest in how urban wood can be turned into furniture in their in-house shop.
- Has shown a reluctance to utilize the wood, but if shown to be more cost effective than current contract with their contractor, interest will rise accordingly. Is cognizant of customers willing to pay more for urban trees from local sources. (Sustainability minded customers)
- Further correspondence to be over phone.
- Further contact to be initiated by Wednesday, April 15, 2009

Respondent Data: Grass Roots Energy, Inc.

28751 N Rand Rd Wauconda, IL 60084

(847) 526-5888

Company Description: High Efficiency Fireplace equipment, supplies, etc.

Notes:

- Initial Contact via phone....
- Has shown interest in how urban wood can be sold as fuel for fireplaces. More specifically, willing to sell products, but unable to produce them, example being wood pellets for fuel.
- Has shown a reluctance to utilize the wood, but if shown to be more cost effective, interest will rise accordingly. Is also cognizant of customers willing to pay more for urban trees from local sources. (Sustainability minded customers)
- Further correspondence to be over phone.
- Further contact to be initiated by Wednesday, April 15, 2009

Respondent Data: Niles North (Niles West) High School

What type of wood products do you or your organization use?

(example: plywood, hardwood lumber, mulch, veneer, etc.)

Hardwood Lumber

What species of wood do you typically use?

Oak, Maple

What quantity of wood do you consume?

(example: 5000 board feet/month)

Did not have exact information but said it was not much

What do you use the wood products for?

(example: furniture, firewood, building construction, etc.)

Building sets for fine arts productions

What is current cost of your wood products?

(example: \$6.00/board foot, \$17/cubic yard, etc)

Could not attain

Would you be interested in using urban timber in your process?

Yes

What would it take to consider using urban timber?

If it fits in the budget and is easily attainable

Does your business/organization participate in sustainability programs?

Skokie Sustainable Environmental Advisory Commission

If not, have you considered implementing a sustainability program?

(This could be used as a cost – saving, or profit boosting program in addition to helping the environment.)

School Board Meetings always have sustainability issues within the agendas

Would you be willing to use urban timber even if it cost more than its non-urban counterpart?

No, no room in budget

Is there anyone else in your organization who would be interested in sustainability and/or the use of urban timber? If so, please provide name and contact information.

N/A

Can you suggest any other organizations who might be interested in the use of urban timber?

Skokie Sustainable Environmental Advisory Commission

Does this issue raise any new ideas / thoughts that you think we should know about?

No new ideas we should know about but likes the concept behind our research and what we are trying to do

Respondent Data: Illinois Department of Corrections

Contact Name: Saul Raymond, Assistant CEO of Correctional Services

Telephone: (217) 558-2200 ext 7014

Mr. Raymond responded that his assistant, George Bowen, is very knowledgeable about wood and its various uses, and indicated that he would be happy to introduce us to explore how the Illinois Department of Corrections could collaborate with IIT and the Illinois Ash Borer Wood Utilization Team.

Respondent Data: USDA Wood Education & Resource Center

Ed Cesa, Deputy Director

Wood Education and Resource Center

Northeastern Area State & Private Forestry

USDA Forest Service,

Princeton, WV

Phone: 304-285-1530

FAX: 304-285-1505

Cell: 304-376-1607

<http://www.na.fs.fed.us/werc/>

Summary Notes:

- Interview preformed over phone
- Wrote Article RECYCLING MUNICIPAL TREES cataloging 16 case studies of municipal tree use from across country
- Suggested speaking with Jessica Simons 734-761-6722-105
<http://www.semircd.org/ash/>
- Partnerships
 - Promoting Municipal Tree Utilization
 - New Jersey Forestry Services
 - Seeing the Big Picture of Urban Forest Management
 - Urban and Community Forestry Program, State of California
 - Connecting Tree Owners With Woodworkers
 - Harvesting Urban Timber Program, Cincinnati, Ohio
- Service Firms to contact
 - Supplying Free Wood for Artisans
 - Able Tree Service, Missoula, Montana
 - Giving New Life to Old Utility Poles
 - Trees-n-More, Berryton, Kansas
 - Networking to Utilize All Wood Residue
 - West Coast Arborists, Inc., Anaheim, California
- Entrepreneurs to contact
 - Part-Time Recycler Provides Benefits to Consumers
 - 2nd Chance Woods, Berryton, Kansas
 - Selling Handcrafted Products From Salvaged Logs
 - Urban Forest Woodworks, Logan, Utah
 - Recycling Woody Materials From a Landfill
 - Slater Industries Demolition Landfill, Lewisville, North Carolina

Respondent Data: 3DEF Fiberboard:

Dr. John F Hunt

One Gifford Pinchot Drive

Madison, Wisconsin 53726

Phone: 608-231-9200

Fax: 608-231-9544

<http://www.fpl.fs.fed.us/index.html>

Summary Notes:

- Interview performed over phone
- Have used Mr. Horigan before to use produce product
- Interested in using material
- Wondered why transit is a issue
- Can use whatever we give
- Trying to start 3DEF
- Suggested that using methane and heat for energy production
- Emailing an Excel worksheet to calculate material quantity and cost
- Contact Bruce Horigan again

Respondent Data: Unattributed Respondent #1

“I think this urban timber initiative is great! We just saw about four trees removed from the neighborhood because of the Emerald Ash bore disease. I watched the trees being chipped and hauled away, and I was hoping that something could be done to use the wood, rather than dispose of it all.

We got your email through our website. We sell Amish built furniture. It is all solid hardwood, oak, 1/4 sawn oak, maple, cherry and rarely hickory. Never Ash. Our producers in Northern Indiana use Amish lumber yards who get their wood from Michigan. We like to think we sell pretty green, fairly traded, local products.

I don't think we'll be able to get the Amish to buy your ash lumber. Thanks for what you are doing though!”

Respondent Data: Unattributed Respondent #2

“At the end of the month we have an Expo with all of our producers showing their wares. I can ask them what the pros and cons are to ash wood. I know that they only want to build using hard woods. Cherry is the softest hardwood that we regularly have furniture built from.

I will do a little homework here on Ash wood, and then when at the expo, I can ask a few more direct questions. I believe we will be trying to convince the Amish lumber yard to deal Ash wood.”

Respondent Data: Sawmills

Organization: G. H Woodworking & Sawmill
Contact Name: Gerry Hamm
Telephone: 847.526.9301
Email: GHWoodworking@comcast.net
Website: www.ghwoodworking.com
Portable sawmill: Available
Kiln dry: Not available
Urban Timber: Yes
Staging: Available
Transportation: Available
Cost: Varies
Experience with Infested Ash: Yes
Customer Base: Homeowners, landscape companies
End fate of logs: Mantles, doors, custom millwork
Specialization: Reproduction millwork

Organization: Horigan Urban Forest Products
Contact Name: Bruce Horigan
Telephone: 847.568.1340
Email: ehorigan@sbcglobal.net
Website: www.horiganufp.com
Portable sawmill: Available
Kiln dry: Available
Urban Timber: Yes
Staging: Available, 8000 board ft
Transportation: Not available
Cost: \$5-\$6.25/board ft
Experience with Infested Ash: Yes
Customer Base: Retail customers
End fate of logs: Lumber
Specialization: Urban timber

Organization: Basten Enterprises
Contact Name: Tom Basten
Telephone: 815.675.6863
Email: bastenent@aol.com
Website: N/A
Portable sawmill: Not available
Kiln dry: Not available
Urban Timber: Yes
Staging: Available
Transportation: Yes
Cost: \$60 (cutting + transporting)
Experience with Infested Ash: No
Customer Base: Local municipalities, retail customers
End fate of logs: Firewood, various millwork
Specialization: No specialization

Organization: The Russell Mill
Contact Name: Charles Prymula
Telephone: 847.395.5190
Email: therussellmill@gmail.com
Website: N/A
Portable sawmill: Available
Kiln dry: Available
Urban Timber: Yes
Staging: Available
Transportation: Available
Cost: Varies
Experience with Infested Ash: No
Customer Base: Retail customers
End fate of logs: Lumber, flooring, molding
Specialization: Hardwood

Respondent Data: Community Colleges and Public Libraries

Interviews performed with fifteen community colleges of Chicago area that are listed in Appendix A showed that there are only few community colleges that are interested in utilizing urban wood or using urban wood products for various projects. Usually, these projects are small carpentry works that performed on special occasions and require sheets of plywood of size 1/2 and 3/4 inch. Other maintenance works are not performed on a routine basis and it is hard to specify how much wood is needed. For colleges that offer art and woodworking classes, students are responsible to buy their own wood and bring it to class. This may be the opportunity – college may offer their students to buy pieces of urban wood we supply for art classes.

Public libraries reflect the similar situation – they do not require any constant supply of wood for their maintenance works. However there are carpentry work done once in a while that requires carpentry work and in the case of libraries, they buy the wood for crafts projects for kids

themselves. Usually oak or maple is utilized – this provides us with an opportunity to replace oak with Ash wood.

Demand for urban lumber and other urban wood products from community colleges and public libraries are very minuscule so that they cannot be considered as major customers. However, they expressed a significant interest in using urban wood furniture made from local trees in their facilities to improve their “green” and community supportive image.

Community Colleges

Organization: Richard J. Daley College
Contact Name: Kathy Poulsen
Telephone: (773) 838-7500 ext. 7539
Email: kpoulsen@ccc.edu
Website: www.daley.ccc.edu
Interview: “Did not respond on calls and e-mails.”

Organization: Harold Washington College
Contact Name: Anna Blum
Telephone: (312) 553-3190
Email: ablum@ccc.edu
Website: www.hwashington.ccc.edu
Interview: “Not using any wood currently.”

Organization: Malcolm X College
Contact Name: Clarence Johnson
Telephone: (312) 850-7016
Email: cjohnson258@ccc.edu
Website: www.malcolmx.ccc.edu
Interview: “Little use for plywood ½ and ¾ inch sizes. No art projects”

Organization: Olive Harvey College
Contact Name: Angela Arrington-Jones
Telephone: (773) 291-6100 ext. 6297
Email: aarrington@ccc.edu
Website: www.oliveharvey.ccc.edu
Interview: “Did not respond on calls and e-mails.”

Organization: Harry S. Truman College
Contact Name: Gracie Gast
Telephone: 773.907.4477
Email: ggast@ccc.edu
Website: www.trumancollege.cc
Interview: “Little maintenance work using plywood. No current art projects, but when they are, students are responsible to bring their own wood”

Organization: Wilbur Wright College
Contact Name: Charles P. Guengerich
Telephone: (773) 777-7900 ext. 8500
Email: N/A
Website: www.wright.ccc.edu
Interview: “Did not respond on calls and e-mails.”

Organization: College of DuPage
Contact Name: N/A
Telephone: (630) 942-2380
Email: N/A
Website: www.cod.edu
Interview: “Students buy wood separately for art classes.”

Organization: College of Lake County
Contact Name: Melanie Scherer
Telephone: (847) 543-2084
Email: mscherer@clcollinois.edu
Website: www.clcollinois.edu
Interview: “Little carpentry work every month, no need for constant supply.”

Organization: Elgin Community College
Contact Name: Sharon Konny
Telephone: (847) 214-7367
Email: skonny@elgin.edu
Website: www.elgin.edu
Interview: “Did not respond on calls and e-mails.”

Organization: Harper College
Contact Name: Sheila Quirk-Bailey
Telephone: 847.925.6623
Email: N/A
Website: harpercollege.edu
Interview: “Not interested at all.”

Organization: Joliet Junior College
Contact Name: Agazzi, David
Telephone: 815-729-9020 ext. 6647
Email: dagazzi@jjc.edu
Website: www.jjc.edu
Interview: “Students buy wood separately for art classes.”

Organization: Moraine Valley Community College
Contact Name: Andrew Duren
Telephone: (708) 974-5203
Email: duren@morainevalley.edu
Website: www.morainevalley.edu
Interview: “Mainly use plywood – 1/2 and 3/4 inch sheets, and pine boards – 1x4, 2x4 and 2x2.”

Board feet are about 200 linear feet.”

Organization: Morton College
Contact Name: Felice, Susan
Telephone: (708) 656-8000 ext. 382
Email: Susan.Felice@morton.edu
Website: www.morton.edu
Interview: “Do not wish to respond, since it doesn’t apply to them”

Organization: Oakton Community College
Contact Name: Doreen Schwartz
Telephone: 847-635-1632
Email: doreen@oakton.edu
Website: www.oakton.edu
Interview: “No maintenance wood required, for art projects students bring their own wood”

Public Libraries

Organization: Skokie Public Library
Contact Name: Carolyn A. Anthony
Telephone: 847.673.7774
Email: canthony@skokielifrary.info
Website: www.skokielifrary.info
Interview: “Carpentry project on a rare occasion. Also use some wood for kids' craft projects. Usually it's oak or maple.”

Organization: Evanston Public Library
Contact Name: Mary Johns
Telephone: 847.448.8650
Email: director@epl.org
Website: www.epl.org
Interview: “The Evanston Public Library does not procure wood on a routine basis for maintenance or

Organization: Triton Community College
Contact Name: Sean Sullivan
Telephone: (708) 456-0300, Ext. 3240
Email: ssulliva@triton.edu
Website: www.triton.edu
Interview: “Not interested at all.”

Organization: Waubensee Community College
Contact Name: Sobek, Dr. Christine
Telephone: (630) 466-7900 ext. 2300
Email: csobek@waubonsee.edu
Website: www.waubonsee.edu
Interview: “Did not respond on calls and e-mails.”

repair. Currently they use no wood for craft projects whatsoever.”

Organization: Oak Park Public Library
Contact Name: Deirdre Brennan
Telephone: 708.383.8200
Email: dbrennan@oppl.org
Website: www.oppl.org
Interview: “Currently not interested.”

Organization: Wilmette Public Library
Contact Name: Ellen Clark
Telephone: 847.256.5025
Email: ebclark@wilmette.lib.il.us
Website: www.wilmettelibrary.info
Interview: “Currently not interested.”

Appendix 5. Urban Wood Exchange Concept



Presented at the
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at
Purdue University
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by

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Executive Summary

An estimated 3.8 billion board feet of timber, or about 25% of annual US lumber production is removed from cities and suburbs annually. That is roughly enough wood to build about 275,000 environmentally friendly new homes, and of this, only a small fraction is being currently recycled. Most of this “urban wood” currently becomes mulch or firewood in city municipalities, or is discarded in landfills.

In the Chicago metropolitan area, roughly 7,000 public trees are removed annually due to old age, infestation, and storm damage. This urban wood also ends up as mulch/firewood, or in landfills, even though in Chicago there are numerous sawmills locally that can process and sell it.

Part of the problem has been a public/private business perception that this urban wood is of inferior quality. The truth is that with appropriate minimal measures, urban wood is just as good as forest trees. In fact, since these trees need to be brought down regardless, putting them to a better use would be more socially/environmentally responsible than current practices. Therefore the Urban Wood Exchange was begun. The purpose of the Urban Wood Exchange is to aid in the:

1. Creation of a viable urban wood industry that would generate demand for urban wood.
2. Creation of job opportunities in underserved communities through the use of this urban wood.
3. Promotion of an innovative environmentally sustainable business.
4. Raising of public/private awareness of the current issues with urban trees, and how they can be resolved within their communities.

The Urban Wood Exchange will facilitate the highest use of this local wood. By serving as an intermediary, it will initially bring both existing business that deal with urban wood, as well as create a market for this urban wood. Long term, The Urban Wood Exchange’s vision is to become an electronic ecosystem for the identification, shipment, processing and trade of this currently undervalued local resource. Chicago is the birthplace of the trading exchange (Chicago Board of Trade, Chicago Mercantile Exchange, Chicago Climate Exchange) and the logical launch pad for this business. When these efforts come to fruition, the premise is that the same model used for Chicago can be applied nationally to all cities and suburbs that currently underutilize their urban wood stocks.

Product Description

The Urban Wood Exchange would be an electronic marketplace to connect all those who source urban wood, to those who process the wood to into products, and finally the end user of the finished product. Also, the web site would be creating awareness and education about the quality of the wood, in a view to change the perception of “no value” attached to the wood. The business would be a facilitator for meeting the needs of each of these segments. Our business model is tailored toward the brokerage model, in which we bring sellers and buyers together to

enter into a fulfilling business relationship, that could range from business-to-business (B2B), business-to-consumer (B2C), or consumer-to-consumer (C2C) markets.

This Electronic Urban Wood Exchange will provide a portal through which wood that would otherwise be discarded can be put to its highest possible use back into the hands of businesses and individuals in these communities

The Product

The Urban Wood Exchange is organized around three core areas, Buyers/Sellers, Education, and the Online Store.

The Buyers/Sellers unit is the main database for searching raw wood products. Here sellers will post their raw wood for sale. Buyers will be able to search this database according to criteria such as type of wood, sized dimensions, quantity of wood available, price (per linear foot, or otherwise), as well as the length of time since harvesting/posting.

The Educational unit will be where all users of the Urban Wood Exchange can look up industry standards, so as to help them understand all the processes involved with wood. It will also provide information on businesses and organizations that deal with this wood. This unit will also aid in raising awareness about wood issues.

The Store unit will deal primarily with finished wood products, but will have the same basic structure as the Buyers/Sellers unit. The only difference between the two will be the selling of unrefined (raw) wood versus refined (finished) wood products. The Store unit however, will allow the buyer to customize their bought wood through the same portal, either through the same seller, or through an intermediary seller who would take the raw wood product and turn it into what the buyer requests.

This Urban Wood Exchange will help streamline the way the wood ends up, either just as a raw unfinished product, or through transaction agreements made through the portal with many different parties involved, to achieve a quality finished product.

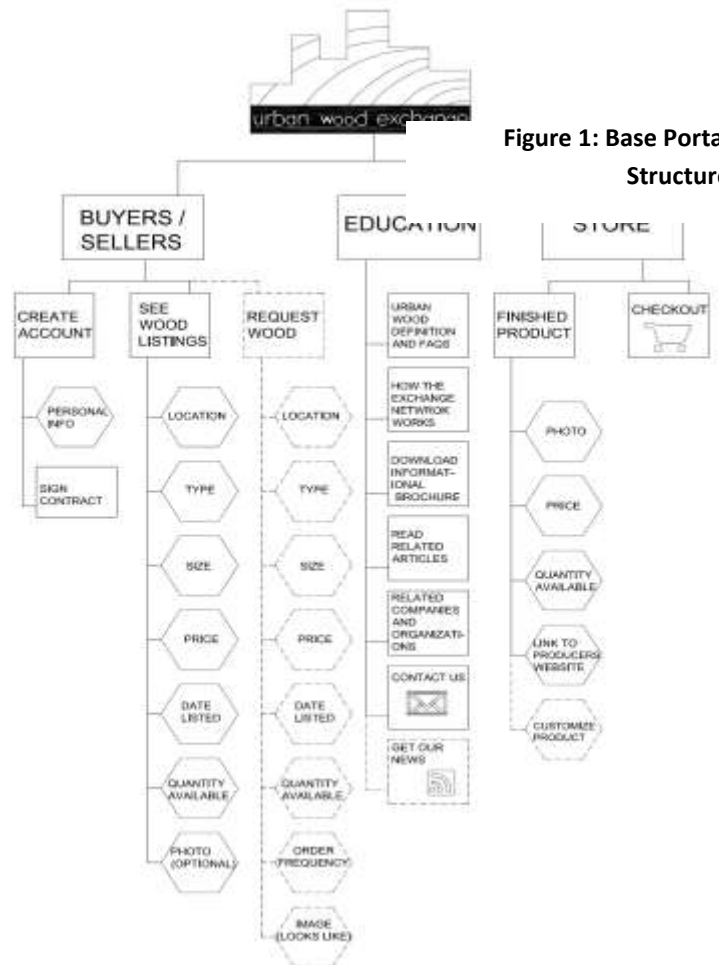


Figure 1: Base Portal Structure

Market Analysis

It was discovered that with trees within residential/business areas (urban forest) coming down because of storm damage, old age, accident damage, and various insect infestation (for example, the current Emerald Ash Borer (EAB) infestation in the city of Chicago), there is the need to create a viable urban wood industry that would generate a demand for urban wood. We also discovered that the Urban Wood market, despite been underdeveloped, is a fragmented market in which most of the companies or people in that market are acting individually. One example is Horigan Urban Forest Products located in Chicago, which deals specifically with urban wood, yet deals with small quantities of wood at a time. So we saw this as a good opportunity to pull the market together under a unified service (Urban Wood Exchange). This, we believe makes sense because through a single internet company like ours, we can pull together a large portion of the market so that it is no longer a fragmented market, but a portal which can encompass all these businesses/individuals who deal with urban wood. The Urban Wood Exchange will also help to bring other sources of urban wood into the market. Some examples include:

The Private Sector:	Distributors, Furniture Shops, Architects, and Contractors.
The Public Sector:	Public Works Departments and IL Department of Corrections
The Non-Profit Sector:	Chicago universities, community/vocational and High Schools

Initial contact with these groups in Chicago has met with overwhelmingly positive responses. Public sector as well as non-profit organizations have shown the most interest in seeing that this urban wood be put to a higher use.

Competitive Analysis

Competitive Overview

Since the Urban Wood Exchange deals solely with providing the framework to facilitate movement of wood from suppliers to users, it does not have any major business competition in the formal sense. The competition is the current market, in the sense that the best or most economical method is already in place. Yet the market itself has not been further facilitated by the recent surge in sustainability initiatives. The current and future market is undergoing a shift by looking at products not solely for the product value itself, but also of the processes involved in bringing the product to the user. The Urban Wood Exchange is meant to bring the old fashioned, fragmented market to more flat or openly available market to all of those dealing with urban wood.

In fact, since the Urban Wood Exchange deals with bringing businesses and individuals together, it would actually help those businesses and individuals become part of a larger market than the previously mentioned fragmented market which currently exists.

Potential Partners/Competitors

It is important to note however, that potential competition does exist with online companies such as eBay, Ubid, Amazon, and Google (Google Product Search). These online companies, especially eBay, may look at the Urban Wood Exchange as potential competition, and may possibly seek to adapt or create a system which would pose as a direct competitor to the Urban Wood Exchange.

Competitive Advantage

The Urban Wood Exchange would set itself apart from its competitors by providing both suppliers and users a system which is geared not solely for the selling/buying of refined wood products, but a system which encompasses all wood products, from raw (green) wood, to finished products such as furniture. Instead of only two parties (buyer/seller) creating a one way transaction, the Urban Wood Exchange would enable multiple parties to negotiate with each other with the ultimate buyer able to customize what the end product would be. It is also important to point out that services such as eBay are not utilized by government agencies (ex. Public Works Departments), or many medium to large scale businesses, but by individuals selling limited products to other individuals. Instead, the Urban Wood Exchange will be where all users; private, public, non-profits and individuals can interact to utilize this urban wood.

Partnering Strategy

Potential partnerships for the Urban Wood Exchange include such organizations as:

- The Forest Preserve District of Cook County
- The Illinois Department of Natural Resources
- The US Environmental Protection Agency
- The US Fish & Wildlife Service
- The USDA Forest Service
- The WUT (Wood Utilization Team)
- The City of Chicago
- Chicago Public Works Department
- Sustainability Programs
 - US Green Building Council, LEED Program
 - US Habitat for Humanity Green Program
- The Illinois Department of Corrections (Furniture making Program)
- Local Universities/High Schools (Wood Shop Programs)
- Other existing urban wood businesses/individuals

The essence of the Urban Wood Exchange concept is to transform raw wood.....not into a low-order use.....but into a highly-valued use