Tree Care Plan

Updated 2013
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1. Purpose

The purpose of this plan is to establish a clear set of policies and procedures for management of the campus forest at the University of Illinois at Chicago (UIC). The specific objectives laid out aim to maximize the health and benefits of both individual trees and the forest as a whole. Trees have the potential to provide many benefits to the campus, including improved aesthetics, removal of air pollutants, carbon sequestration, improved wildlife habitat and microclimate modification, among others. However, in order to maximize these benefits trees must be properly managed. This plan aims to lay out the steps necessary to achieve such management.

Specific objectives of the plan include:

1. Develop a policy for tree maintenance, including pruning, planting, removals and preservation.
2. Establish a campus tree advisory committee.
3. Maximize the benefits of carbon sequestration and air pollutant removal provided by campus trees.
4. Increase the use of the campus forest as an educational and outreach tool for the campus and surrounding community.

Tree Campus USA

This plan is being established, in part, to fulfill one of the requirements for UIC to achieve recognition by the Arbor Day Foundation as a Tree Campus USA.

Note: The policies and guidelines set forth in the plan do not necessarily constitute official University policy. However, the Campus Tree Advisory Committee is currently attempting to have the plan adopted as the official forest management plan for UIC.
2. Campus Forest Summary

a) Background

i. UIC Background
UIC is a public research university located south and west of the Loop in Chicago, Illinois. The university was formed in 1982 by the consolidation of two University of Illinois campuses – The Medical Center Campus and Chicago Circle Campus. Enrollment at the school in the Fall 2013 semester included 16,660 undergraduate students, 8,186 graduate students and 2,743 professional students, for a total of 27,589 students1.

Figure 2.1. Location of UIC within the Chicagoland region.

UIC contains three geographically separate areas which are referred to as the East, West, and South Campus. The entire UIC campus is approximately 240 acres in size2.

ii. Campus Forest Background
The UIC campus forest is defined as all trees that fall within the boundaries of the campus or are close enough to the campus (on boulevards, parkways, etc.) that their benefits directly extend to the campus. This plan covers all trees considered to be part of this forest, including some trees that are not located on campus property. Because benefits of these neighboring trees often extend onto the campus, UIC often takes responsibility for their management. Approximately 16% of trees within the UIC campus forest are not on UIC-owned property.

b) Campus Forest Metrics

i. Campus Forest Inventory
A complete inventory of trees on the UIC campus was conducted between May and October of 2011, and reevaluated in 2013 when 5,298 trees were identified and measured. In completing the inventory, measurements were taken that conform to input needs for i-Tree Eco (part of i-Tree Tools v.4.0), an urban forest management tool developed by the U.S. Forest Service. i-Tree Eco estimates the ecosystem services provided by a specified forest3. Measurements taken include the following:
The following is a summary of the campus tree inventory and the benefits provided by the trees, as calculated through the inventory and by i-Tree Eco.

**ii. Species diversity**

The UIC campus contains at least 101 different tree species. However, as some genera (Malus, for example) have not been identified to the species level this number is likely an underestimate. Table 2.1 shows the ten most common trees on the UIC campus. As can be seen from the table, honeylocust is by far the most common species on campus, comprising nearly 19% of all trees.

<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Common Name</th>
<th>2011 Count</th>
<th>2013 Count</th>
<th>Percent of Total</th>
<th>Percent Change from 2011</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Gleditsia triacanthos</em></td>
<td>Honeylocust</td>
<td>1017</td>
<td>1007</td>
<td>18.9%</td>
<td>-1%</td>
</tr>
<tr>
<td><em>Malus spp.</em></td>
<td>Crabapple</td>
<td>617</td>
<td>595</td>
<td>11.5%</td>
<td>-4%</td>
</tr>
<tr>
<td><em>Fraxinus pennsylvanica</em></td>
<td>Green ash</td>
<td>409</td>
<td>361</td>
<td>6.8%</td>
<td>-12%</td>
</tr>
<tr>
<td><em>Tilia cordata</em></td>
<td>Littleleaf linden</td>
<td>350</td>
<td>348</td>
<td>6.5%</td>
<td>-1%</td>
</tr>
<tr>
<td><em>Pyrus calleryana</em></td>
<td>Callery pear</td>
<td>241</td>
<td>241</td>
<td>4.5%</td>
<td>0</td>
</tr>
<tr>
<td><em>Acer rubrum</em></td>
<td>Red maple</td>
<td>221</td>
<td>263</td>
<td>5.0%</td>
<td>19%</td>
</tr>
<tr>
<td><em>Amelanchier spp.</em></td>
<td>Serviceberry</td>
<td>210</td>
<td>209</td>
<td>3.9%</td>
<td>0%</td>
</tr>
<tr>
<td><em>Celtis occidentalis</em></td>
<td>Northern hackberry</td>
<td>198</td>
<td>192</td>
<td>3.6%</td>
<td>-3%</td>
</tr>
<tr>
<td><em>Acer platanoides</em></td>
<td>Norway maple</td>
<td>196</td>
<td>193</td>
<td>3.6%</td>
<td>-2%</td>
</tr>
<tr>
<td><em>Fraxinus americana</em></td>
<td>White ash</td>
<td>167</td>
<td>141</td>
<td>2.6%</td>
<td>-16%</td>
</tr>
</tbody>
</table>

Table 2.1. Breakdown of the ten most common trees on the UIC campus.
iii. **Native species**

The U.S. EPA lists three characteristics to define a native plant:

1. They have evolved within a particular region over thousands of years.
2. They have adapted to the geography, hydrology, and climate of their particular region.
3. They have typically evolved within communities, meaning that they have evolved together with other plants. Because of this, they have evolved to adapt not only to each other but to native species of animals as well.

These three characteristics make it so that no single plant is able to dominate a landscape, as all plants have evolved to hold each other in check.

50.6% of trees at UIC are native to the state of Illinois. 53.6% of East Side trees and 48.5% of West Side trees are native. These numbers were determined by i-Tree, using their database of
trees known to be native to the state. These numbers give a general indication of the native character of the campus forest, but do not take the specific climate or history of UIC into consideration. Therefore, the numbers can be used as a general reference, but not as a determinant of the actual prevalence of native species on campus.

iv. **Age class breakdown**

Trees were put into one of three age classes:

**Young:** Trees recently planted that have not yet become fully established in the landscape.

**Semi-mature:** Trees that have become established in the landscape, having not yet reached their full-grown size.

**Mature:** Trees that have reached full-grown size.

<table>
<thead>
<tr>
<th>Location</th>
<th>Young</th>
<th>Semi-Mature</th>
<th>Mature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Count</td>
<td>Count</td>
<td>Count</td>
</tr>
<tr>
<td>West Side</td>
<td>594</td>
<td>746</td>
<td>747</td>
</tr>
<tr>
<td></td>
<td>28.5%</td>
<td>35.7%</td>
<td>35.8%</td>
</tr>
<tr>
<td>East Side</td>
<td>370</td>
<td>1615</td>
<td>1304</td>
</tr>
<tr>
<td></td>
<td>11.2%</td>
<td>49.1%</td>
<td>39.6%</td>
</tr>
<tr>
<td>Entire Campus</td>
<td>964</td>
<td>2361</td>
<td>2051</td>
</tr>
<tr>
<td></td>
<td>17.9%</td>
<td>43.9%</td>
<td>38.2%</td>
</tr>
</tbody>
</table>

Table 2.2. Age class breakdown of campus trees.

As a whole, over 60% of trees on the campus are young or semi-mature, meaning that they can be expected to increase in size in the future. Their associated benefits, such as carbon sequestration and pollutant removal, can also be expected to increase as these benefits typically increase until a tree has reached mature size.

v. **Canopy coverage with maps**

Through the combination of tree measurements and ArcGIS software, canopy coverage on the UIC campus was calculated at 17%. 16% of the East Side and 18% of the West Side are covered by tree canopy. This calculation accounts for all surface area of the campus forest, as diagrammed in Figure 2.3.
Figure 2.3. Tree locations at UIC.
c) **Campus Forest Benefits**

i. **Carbon sequestration and storage.**

Carbon is a gas released by both human and non-human processes. It is widely agreed that carbon in the atmosphere is a significant contributor to climate change. Carbon sequestration, through either living (such as trees) or non-living mechanisms is often seen as one potential remedy to this problem. Trees remove carbon from the air for use in photosynthesis. Much of the carbon that they absorb becomes stored in the woody parts of the tree.

i-Tree calculates that the UIC campus forest collectively stores about 1.7 million pounds of carbon. Over 70,000 pounds of carbon are sequestered by campus trees annually. This is equivalent to the amount of carbon saved by recycling 11.2 tons of waste instead of sending it to a landfill or saving 3,600 gallons of gasoline every year.6

![Figure 2.4. These two American elms (Ulmus americana), near the intersection of Seeley Ave. and Grenshaw St. on the west side of campus, collectively store about 7,500 pounds of carbon.](image)

<table>
<thead>
<tr>
<th>Location</th>
<th>2011 Carbon Stored (lbs)</th>
<th>2011 pounds per tree</th>
<th>2013 Carbon Stored (lbs)</th>
<th>2013 pounds per tree</th>
<th>Percent Change from 2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>East Side</td>
<td>1,041,513</td>
<td>316.7</td>
<td>1,045,748</td>
<td>323.8</td>
<td>0.4%</td>
</tr>
<tr>
<td>West Side</td>
<td>645,975</td>
<td>309.5</td>
<td>629,674</td>
<td>304.19</td>
<td>-2.5%</td>
</tr>
<tr>
<td>Entire Campus</td>
<td>1,687,488</td>
<td>313.9</td>
<td>1,675,421</td>
<td>316.23</td>
<td>-0.7%</td>
</tr>
</tbody>
</table>

Table 2.3: Breakdown of carbon storage by campus trees

<table>
<thead>
<tr>
<th>Location</th>
<th>2011 Carbon sequestered per year (lbs)</th>
<th>2011 pounds per tree</th>
<th>2013 Carbon sequestered per year (lbs)</th>
<th>2013 pounds per tree</th>
<th>Percent Change from 2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>East Side</td>
<td>44,106</td>
<td>13.4</td>
<td>44,079</td>
<td>13.65</td>
<td>-0.1%</td>
</tr>
<tr>
<td>West Side</td>
<td>26,831</td>
<td>12.9</td>
<td>26,225</td>
<td>12.66</td>
<td>-2.3%</td>
</tr>
<tr>
<td>Entire Campus</td>
<td>70,937</td>
<td>13.2</td>
<td>70,304</td>
<td>13.26</td>
<td>-0.9%</td>
</tr>
</tbody>
</table>

Table 2.4: Breakdown of carbon sequestration by campus trees.
ii. Pollutant removal

Another benefit calculated by i-Tree for the campus forest is the amount of several pollutants removed by each tree. i-Tree compares pollution removal capabilities of each tree to levels of air pollution measured at a weather station at Chicago’s O’Hare International Airport. Trees mainly remove air pollutants by uptake via leaf stomata, with additional pollutants being removed by the leaf surface. Once inside the leaf, gases diffuse into intercellular spaces and may be absorbed by water films to form acids or react with inner-leaf surfaces.

Removal was calculated for the following pollutants:

**Carbon monoxide** (CO) – Carbon monoxide (CO) is a colorless, odorless gas emitted from combustion processes. CO causes harmful health effects by reducing oxygen delivery to the body’s organs (like the heart and brain) and tissues. At extremely high levels, CO can cause death.

**Ozone** (O₃) - Ground-level ozone is not emitted directly into the air, but is created by chemical reactions between oxides of nitrogen (NOx) and volatile organic compounds (VOC) in the presence of sunlight. Breathing ozone can trigger a variety of health problems including chest pain, coughing, throat irritation, and congestion.

**Nitrogen Dioxide** (NO₂) - forms from emissions from cars, trucks and buses, power plants, and off-road equipment. NO₂ contributes to the formation of ground-level ozone and fine particle pollution and is linked with a number of adverse effects on the respiratory system.

**Particulate Matter** (PM-10) - a complex mixture of extremely small particles and liquid droplets. PM-10 indicates matter with a size of 10 micrometers or less. It is particles of this size that generally pass through the throat and nose and enter the lungs. Once inhaled, these particles can affect the heart and lungs and cause serious health effects.

**Sulfur Dioxide** (SO₂) - Current scientific evidence links short-term exposures to SO₂, ranging from 5 minutes to 24 hours, with an array of adverse respiratory effects including bronchoconstriction and increased asthma symptoms. The largest sources of SO₂ emissions are from fossil fuel combustion at power plants (73%) and other industrial facilities (20%).
Figure 2.5. This Norway maple (Acer platanoides), north of the School of Public Health West, removes 30.9 ounces of ozone (O₃) from the air every year.

### Table 2.5. Breakdown of pollutant removal services performed by campus trees.

<table>
<thead>
<tr>
<th>Location</th>
<th>CO</th>
<th>O₃</th>
<th>NO₂</th>
<th>PM10</th>
<th>SO₂</th>
<th>Total</th>
<th>Percent Change from 2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>East Side</td>
<td>852.1</td>
<td>14,953.00</td>
<td>6,454.00</td>
<td>9,943.60</td>
<td>2,611.90</td>
<td>34,814.60</td>
<td>41.4%</td>
</tr>
<tr>
<td>West Side</td>
<td>441.2</td>
<td>6,396.40</td>
<td>2,853.40</td>
<td>3,631</td>
<td>1,306.70</td>
<td>14,629.00</td>
<td>0.3%</td>
</tr>
<tr>
<td>Entire Campus</td>
<td>1,293.30</td>
<td>21,349.40</td>
<td>9,307.30</td>
<td>13,574.90</td>
<td>3,918.60</td>
<td>49,443.50</td>
<td>26.1%</td>
</tr>
</tbody>
</table>

### Table 2.6. Breakdown of monetary value of pollutant removal services performed by campus trees.

<table>
<thead>
<tr>
<th>Location</th>
<th>CO</th>
<th>O₃</th>
<th>NO₂</th>
<th>PM10</th>
<th>SO₂</th>
<th>Total</th>
<th>Value ($) per year of pollutants removed in 2013 dollars</th>
</tr>
</thead>
<tbody>
<tr>
<td>East Side</td>
<td>26.5</td>
<td>2795.10</td>
<td>1226.4</td>
<td>1332.9</td>
<td>137.0</td>
<td>5,517.9</td>
<td></td>
</tr>
<tr>
<td>West Side</td>
<td>17.4</td>
<td>1,794.17</td>
<td>783.6</td>
<td>664.2</td>
<td>88.6</td>
<td>3,308.3</td>
<td></td>
</tr>
<tr>
<td>Entire Campus</td>
<td>43.9</td>
<td>4549.7</td>
<td>2009.9</td>
<td>1997.2</td>
<td>225.6</td>
<td>8,826.3</td>
<td></td>
</tr>
</tbody>
</table>

### ii. Compensatory value breakdown

The compensatory value of every tree on campus was determined through i-Tree. The value of each tree determined by i-Tree is an estimate of the cost it would take to replace all of the benefits of a tree. These benefits include not only pollutant removal and carbon sequestration and storage, but aesthetics as well.
<table>
<thead>
<tr>
<th>Location</th>
<th>Total Value</th>
<th>Value per tree</th>
</tr>
</thead>
<tbody>
<tr>
<td>East Side</td>
<td>$3,103,328</td>
<td>$961.10</td>
</tr>
<tr>
<td>West Side</td>
<td>$1,748,152</td>
<td>$844.50</td>
</tr>
<tr>
<td>Entire Campus</td>
<td>$4,851,480</td>
<td>$915.72</td>
</tr>
</tbody>
</table>

Table 2.7. 2013 Compensatory value of campus trees.

Figure 2.6. At $8,364, this northern hackberry (*Celtis occidentalis*) has the third highest compensatory value of any campus tree, according to i-Tree. It is located near the northeast corner of the Student Recreation Facility.
3. Goals and Strategies

The goals of those managing the UIC campus forest must align with the goals of the campus community as a whole. The goals should also align with, and help work towards, goals and strategies in other related management plans such as the UIC Climate Action Plan\(^9\) and UIC Strategic Plan\(^10\). The UIC Climate Action Plan, completed in 2010, lists strategies such as capturing stormwater onsite, reducing irrigation and the use of native species. The 2010 UIC Campus Master Plan lists goals of a reduced urban heat island effect and increased landscape standards including the increased use of native species and updating of the campus tree database. This plan also aligns with several goals in the 2008 Chicago Climate Action Plan\(^11\), such as decreasing water use and adapting landscapes to respond to climate change. All of these strategies are addressed in the sections below.

a. **Campus Forest Metrics**

i. **Biodiversity**

**Goal: Increase campus tree biodiversity**

Barker\(^12\) recommends planting no more than 5% of an urban forest with trees of the same species and 10% of the same genus. UIC should strive to meet these levels. Doing so is beneficial for several reasons. One benefit is that having a balanced makeup helps lessen susceptibility to insects and diseases that predominantly affect one species or genus. This can help prevent associated catastrophic loss.

There are three species of tree that exceed the 5% level, as shown in Table 3.1. One species, honeylocust, accounts for almost one in every five trees on the campus. Planting of these trees should be avoided unless their prevalence decreases to an acceptable level in the future. Species of crabapple (*Malus spp.*) may also exceed these levels, but this genus was not identified to the species level.

<table>
<thead>
<tr>
<th>Latin Name</th>
<th>Common Name</th>
<th>Count</th>
<th>Percent of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Gleditsia triacanthos</em></td>
<td>Honeylocust</td>
<td>1007</td>
<td>19.1</td>
</tr>
<tr>
<td><em>Fraxinus pennsylvanica</em></td>
<td>Green ash</td>
<td>361</td>
<td>6.8</td>
</tr>
<tr>
<td><em>Tilia cordata</em></td>
<td>Littleleaf linden</td>
<td>348</td>
<td>6.5</td>
</tr>
</tbody>
</table>

Table 3.1. Species present at higher than recommended levels on the UIC campus.

There are 3 genera that exceed the recommended limits. Again, *Gleditsia* is by far the most common tree on campus.
<table>
<thead>
<tr>
<th>Genus</th>
<th>Percent of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gleditsia</td>
<td>19.0</td>
</tr>
<tr>
<td>Acer</td>
<td>13.7</td>
</tr>
<tr>
<td>Malus</td>
<td>11.2</td>
</tr>
</tbody>
</table>

Table 3.2. Genera present at higher than recommended levels on the UIC campus.

*The genus *Fraxinus* is no longer on the list as it has decreased from 10.7% in 2011 to 9.5% in 2013.*

However, trees should not be selected for planting simply because they fall below the acceptable limits. Richards\(^1\)\(^3\) discourages the use of numerical limits on one species or genus if it leads to planting trees that are untested or unsuited for a location. Trees must therefore be selected based on their suitability for the unique characteristics of the site where they are to be planted.

UIC should not become too focused on meeting the species or genus limits in the near future, as the predominance of a few species will make doing so difficult. It is difficult to know when the campus might fall below acceptable limits. Instead of setting a timeframe for meeting the recommendations, the current numbers can be used as a guide on what not to continue planting and to get an idea of how big an effect a species- or genus-specific disease or insect might have if introduced to campus.

**Emerald Ash Borer**

There is an increasing threat to ash trees in North America, and especially the Chicago area, from the emerald ash borer (*Agrilus planipennis*). The borer affects trees of the genus *Fraxinus* and has killed a significant number of these trees in affected areas. In some areas of infestation, *Fraxinus* loss has been 100%\(^1\)\(^4\). This is especially concerning to UIC because 9.5 percent of trees in the campus forest are of the genus *Fraxinus*. Because of the large number of susceptible trees on the campus, the campus must be prepared for significant tree loss in the near future. We already experienced a 1% loss in the emerald ash in two years. If UIC experienced more loss from the borer, it would see a significant reduction in both the number of trees on campus and the size of the tree canopy within a short period of time.

UIC currently removes any ash showing signs of emerald ash borer infestation. Neighboring ash trees are also often removed. Other treatment options, such as insecticides are likely too expensive for consideration at this time. The impact that the borer will likely have on the campus forest serves as evidence of the need for greater campus tree diversity to prevent such a large impact by an insect that affects only one genus of tree.
ii. **Native Species**

**Goal: Increase the prevalence of native tree species to 65% by 2030.**

50.6% of the trees in the UIC forest are native to the state of Illinois, according to i-Tree results. UIC should strive to increase this to 65% by the year 2030. Doing so will afford UIC the benefits of an increased native population, such as resistance to native pests and reduced maintenance. It may be difficult to increase numbers much above this point because of the amount of trees already on campus. An increase in native species prevalence will be accomplished by replacing dead, dying or diseased exotic species with native ones.

One debate about planting native species is whether future changes to an area's climate should be taken into account in defining what plants are considered native. It is generally predicted that northeastern Illinois will see a rise in average temperatures in the future. It is also predicted that the area will see more extreme temperature events (both hot and cold) and will experience more extreme precipitation events. These events are expected to happen over a time span not long enough to allow native species to adapt. Therefore, the question arises as to whether or not species more adapted to the expected future climate of the area should be favored over native species that are more adapted to current conditions.

UIC should generally plant trees that will be adapted to the predicted future climate, but with a bias towards trees that are native to the area. Therefore, it can be considered satisfactory to plant a species of tree not traditionally considered to be native, as long as the benefits of doing so will outweigh any potential detriment. This viewpoint is reflected in the recommended species list for the campus in Appendix B. The City of Chicago also maintains a list of recommended trees for planting that considers the projected future climate of the area.

The list is available at:  
iii. **Age Diversity**

**Goal: Attain at least a 20% prevalence for each age class by 2030**

An even-aged population of trees is easier to manage than one with a diversity of age classes, as management decisions are likely similar for trees of the same age class. However, a more diverse population may be more stable as it will reduce the chance of tree loss should a catastrophic event affect one age class. As with species diversity, it may make sense to concentrate trees of similar age in close proximity to each other to make management more efficient as long as this does not work against the overall goal of age diversity. This is satisfactory, so long as the campus forest as a whole strives to attain age diversity.

As can be seen in Table 2.2, the West Side of UIC has greater age diversity than does the East Side. Only 11.2% of trees on the East Side are in the “young” age class, compared with 28.5% on the West Side. This means that, if no further planting were to take place that it may be easier for existing trees to replace those that are lost on the West Side. Therefore, it makes sense to concentrate planting activities on the East side to make up for the discrepancy.

iv. **Tree Canopy Percentage**

**Goal: Increase campus tree canopy coverage to 25% by 2030**

17% of the UIC campus is currently covered by tree canopy. This includes all areas of the campus, including buildings, open space, parking lots, sidewalks, etc. This also takes into account areas located on city of Chicago property that fall within the campus forest, as defined in the campus forest summary. While a significant portion of the UIC campus must
remain unforested for a variety of reasons, the canopy coverage for the campus could still be increased. An analysis using ArcGIS and aerial imagery determined that the optimal canopy coverage that UIC should strive for is approximately 25%. Such a stocking level would allow for increased forestry benefits, while still allowing ample space for other needs.

b. Campus Forest Benefits

i. Carbon Sequestration and Pollutant Removal

**Goal: Increase carbon sequestration and pollutant removal services by 15% by 2030**

UIC should strive to improve the amount of environmental benefits provided by its forest by planting trees that do the most efficient job of removing air pollutants and sequestering carbon.

There is evidence to show that deciduous, hardwood trees do a more efficient job of sequestering carbon and removing pollutants than do softwood trees, or conifers. Species with high leaf circumference to area and surface volume are also more efficient. Another factor to consider is the longevity and mature size of the tree to be planted. Trees that grow larger and live longer are able to sequester more carbon over their lifetime. An important thing to remember is that the carbon that a tree stores during its lifetime is released back into the atmosphere once the tree dies and decomposes. To increase carbon sequestration and pollutant removal, UIC should strive to plant trees that have greater capabilities in providing these services.

A stand of trees provides maximum pollutant removal and carbon sequestration when it consists of trees of varying canopy height and width. This is a result of maximum wind exposure to the canopy. Where possible, UIC should attempt to establish stands with this characteristic.

ii. Tree Survival

**Goal: Increase existing tree management expenditures by 10% by 2015**

It is much more economical to manage for survival of existing trees than it is to spend money on planting new, replacement trees. As mentioned above, larger and more mature trees also have increased benefits over younger trees. Because of this, UIC should strive to increase its expenditures on maintaining existing trees over the planting of new ones. Doing so will help to ensure the health of these trees going forward. Accomplishing this will mean either diverting funds from tree planting or other services not associated with existing tree management or increasing available funds.
iii. **Education**

The UIC campus forest presents an excellent opportunity to educate students, visitors and the community about the benefits of trees in urban areas. UIC should strive to use the campus forest as an educational tool in the following ways:

**Service learning projects**

**Goal: Perform at least 3 tree-related service projects every year starting in 2012**

Service learning projects present an excellent opportunity for students and community members to get hands-on experience in improving the campus forest. Examples of projects might include tree planting, pruning, other general maintenance and updating the campus tree inventory.

In September of 2011, an interactive tree walk was organized to educate the campus community about the benefits of individual trees. Signs were placed on specific trees to indicate pollutant removal, carbon sequestration and overall value for each tree. The signs also contained a QR code, linking passersby to a website with more information about UIC’s campus forest and Tree Campus USA recognition efforts.

In 2013, a dozen UIC staff and students helped plant 2 crabapple trees on Morgan Street and also tagged trees noting their environmental and financial benefits to humans.

In 2014, interns inventoried nearly 300 trees and has been dedicated to keeping an up-to-date inventory of the 5,000 trees on and around campus. The College of Dentistry also participated in the tagging noting benefits of the trees surrounding the College of Dentistry.

See all service learning projects and photographs at [https://sustainability.uic.edu/treecampus](https://sustainability.uic.edu/treecampus)
Arbor Day Obsvance

**Goal: Hold a well-publicized Arbor Day observance on campus every year**

In Illinois, Arbor Day takes place on the last Friday in April. UIC has held Arbor Day observances in the past, and should continue to do so in the future. Such an observance might include highlighting the benefits and importance of campus trees through a presentation or planting of a tree on Arbor Day to mark the occasion. See the annual events at [https://sustainability.uic.edu/treecampus](https://sustainability.uic.edu/treecampus)

Tree Campus USA

**Goal: Maintain Tree Campus USA certification on an annual basis**

In 2011, UIC began work towards achieving recognition as a Tree Campus USA by the Arbor Day Foundation for the first time. The benefits of recognition include national recognition, a healthier campus community, student engagement and campus pride. Recognition involves meeting five standards:

1. Campus Tree Advisory Committee
2. Campus Tree Care Plan
3. Campus Tree Program with Dedicated Annual Expenditures
4. Arbor Day Observance
5. Service Learning Project

UIC expects to meet all five standards to achieve certification for 2011. However, the campus must be recertified every year, so it is important that the standards are completed or continued in subsequent years. The last two standards will have to be re-planned in the future. A celebration and observance should be held once the campus receives notification of certification.

c. **Expenditures**

**Goal: Increase all tree care-related expenditures by 10% by 2015**

The University allocates funding on an annual basis for tree care activities. A graduate assistant was hired for May to December to administer the Tree Campus USA program. Considering a student population of 27,309 in 2011, this budget works out to about $2.56 per student. The Arbor Day Foundation recommends a budget of $3 per student for schools participating in the Tree Campus USA Program. UIC should strive to achieve this level. A graduate assistant was not hired in 2012 or 2013, so therefore the funds dedicated to this position in 2011 were re-allocated to other tree care-related activities.
<table>
<thead>
<tr>
<th></th>
<th>2011 Budget ($)</th>
<th>2013 Budget ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graduate assistantship</td>
<td>19,202</td>
<td>0</td>
</tr>
<tr>
<td>Planting</td>
<td>14,538</td>
<td>93,624</td>
</tr>
<tr>
<td>Maintenance</td>
<td>34,000</td>
<td>40,311</td>
</tr>
<tr>
<td>Removal</td>
<td>16,000</td>
<td>56,817</td>
</tr>
<tr>
<td>Volunteer</td>
<td>1,980</td>
<td>11,322</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>85,720</strong></td>
<td><strong>202,074</strong></td>
</tr>
</tbody>
</table>

Table 3.3 Summary of tree-related expenditures in 2011 and 2013

The ultimate limiting factor in managing the campus forest is the availability of funds to do so. It may be difficult to increase funding from the University for tree-related management. However, the University can look to improve resources by gaining funding from outside sources.

**Grants**
Several foundations and agencies offer grants that could be used to aid in the management of the campus forest. UIC should explore the possibility of receiving funds from these sources. Possible funding sources include:

A. The TREE Fund ([www.treefund.org](http://www.treefund.org))
The TREE Fund offers funding for scientific research into critical urban tree care issues, arboriculture education programs in schools and leadership and resources for workforce development programs.

B. Tree Campus USA planting events
The Arbor Day Foundation awards select Tree Campus USA campuses for planting events every year. Through tree planting events, the Arbor Day Foundation provides up to 100 free trees to selected schools, along with professional assistance and guidance for planting of the new trees.
4. Management Staff

Several different individuals and campus departments provide input on the management of the campus forest. Facilities Management is ultimately responsible for tree care management decisions.

a. **Management Levels**

   The departments and individuals who are directly or indirectly involved with the management of the campus forest include:

   i. **Facilities Management**

      Facilities Management is ultimately responsible for the care of trees on the campus. They are responsible for planting, pruning, removals and other miscellaneous work. A member of the department shall also sit on the Campus Tree Advisory Committee.

   ii. **Faculty**

      Faculty shall be involved in the Campus Tree Advisory Committee and shall otherwise be consulted for advice on tree care-related activities when their subject matter expertise is needed (e.g. soil science, urban ecology, etc).

   iii. **Students**

      Besides serving on the Campus Tree Advisory Committee, students should be involved in the management of the campus forest through participation in volunteer activities and in putting forth ideas for how campus trees should be managed. The campus should strive to get students involved in tree management

   iv. **City of Chicago**

      About 16% of trees within the UIC campus forest are located on property of the city of Chicago, not the University. Therefore, management of these trees is ultimately the responsibility of the city. However, as these trees have a direct benefit for the campus, UIC often takes the initiative in their care. As these trees are the property of the City, any work to be performed on them must be coordinated with the Chicago Bureau of Forestry. A representative from the Bureau will also serve on the Campus Tree Advisory Committee.

b. **Campus Tree Advisory Committee**

   This plan authorizes the establishment of a Campus Tree Advisory Committee, which fulfills Standard 1 of Tree Campus USA requirements. The Committee shall provide guidance for tree care management decisions and outreach into the community. While ultimate management decision-making will not fall to the Committee, input from members shall be used in making tree care related decisions.
The committee shall consist of at least one member from each of the following groups:

1. Students
2. Faculty
3. Facility Management
4. Community

The Committee was formally established in October of 2011. Initial members include:

Pablo Acevedo, Associate Director of Grounds at UIC
Janet Backs, PhD student in Ecology and Evolution
Darlene Ebel, Director, Facility Information Management at UIC
Cynthia Klein-Banai, Associate Chancellor for Sustainability at UIC
Andrew Lueck, Masters in Urban Planning and Policy student
Douglas Lynch, PhD student in Ecology and Evolution
Roberta Mason-Gamer, Associate Professor and Director of Graduate Studies, Department of Biological Sciences
Joseph McCarthy, Senior City Forester at the City of Chicago
Jason Palagi, PhD student in Ecology and Evolution
Colin Smalley, graduate student in Earth and Environmental Sciences at UIC

Each committee member shall serve a term of one year. Committee membership will be approved by the UIC Office of Sustainability. The Committee will be limited to 10 members. The Committee will meet at least once every 3 months, or on an as-needed basis.

All Tree Care Committee minutes and members are listed online at https://sustainability.uic.edu/treecampus/tree-advisory-committee/

c. **Tree Care Plan Enforcement**

The Facilities Maintenance Department shall have ultimate enforcement responsibility for the tree care plan and its policies, as this department is ultimately responsible for tree care management decisions. Therefore, it is the responsibility of this department to ensure that the standards and policies contained within the plan are being followed. Assistance in enforcement may be provided by members of the Campus Tree Advisory Committee.
5. Management Policies

Tree management at UIC should strive to further the goals set forth in Section 3. There is a limited amount of funds available for tree management. The following management policies strive to maximize the benefit derived from these funds and foster a healthy, safe campus forest.

a. Tree Maintenance

All tree maintenance shall conform to ANSI A300 standards in order to promote the health and structural integrity of trees. The safety of the campus community should be the top priority in managing campus trees. Therefore, maintenance tasks should first be performed to ensure that no trees present a hazard. Maintenance for tree health and aesthetic purposes may proceed after this has been accomplished.

i. Pruning

All pruning shall conform to ANSI A300 standards. As is allowed by budgetary constraints, tree pruning should preventive rather than reactionary so as to minimize structural and safety issues early on. Proper pruning can lead to reduction in storm damage and safety issues in the future. To accomplish this, a tree pruning schedule should be developed that allows for trees to be pruned on a regular cycle. Pruning priority should be given to trees based on age class. Priority should be given in the following order:

1. Young trees. The first priority in pruning should be given to young trees. Pruning young trees frequently will help prevent structural problems in the future. The goals of young tree pruning include promoting a strong central leader and proper branch spacing.
2. Semi-mature trees. Semi-mature trees should be pruned to promote proper structure and to alleviate safety and aesthetic concerns. Trees may need to be raised or reduced to provide proper clearance to infrastructure or neighboring plants.
3. Mature trees. Mature trees should be pruned to remove large dead limbs and alleviate other safety issues. Structural pruning may be needed to correct problems that have developed over the tree’s lifetime, or to provide proper clearance to infrastructure or neighboring plants.
4. Overmature Trees. Pruning of overmature trees should only take place to mitigate a hazardous situation. This might involve the removal of large dead or cracked limbs, limbs overhanging a parking lot, etc.

Proper pruning procedure

All pruning cuts should be made to ensure the health and safety of the target tree. Cuts should be made so that only branch tissue is cut, with no damage to stem tissue. If a portion of a branch is removed, the branch should be cut back to a point where the remainder of the branch can assume dominance. Branches should be removed before
they reach half the diameter of the branch in which they are attached. No more that 25% of live branches should be removed from a healthy tree in one growing season. A live crown ratio of at least 66% should be maintained for all trees.

![Fig. 5.1. Placement of Proper Pruning Cut. (U.S. Forest Service)](image)

ii. **Cabling and Bracing.**
The purpose of cabling and bracing is to improve or maintain the structural integrity of an individual tree. These actions are generally performed on trees that have poor or unsafe branching to prevent failure in the future. When feasible and cost effective, cabling and bracing can prevent the removal of trees or large branches. Cabling and bracing can often prevent tree failure at a cost that is comparable to tree pruning and removal.

![Examples of formations of cables: A) Single, B) Pared Triangle, C) Box](image)

iii. **Lightning Protection**
Lightning protection systems are often installed to protect high value trees or large trees next to residences or other occupied buildings. Trees of high value are targets for installation because of their monetary or ecological benefits. Trees next to occupied buildings are often targeted for installation because protection systems can have the residual effect of serving as a lightning protection system for the building. Because of the cost to install such systems, a cost-benefit analysis should be performed before a system is installed.

b. **Tree Planting**
Trees must be properly planted to ensure health and safety over their lifespan. Trees need to be carefully selected in terms of species, location and condition to ensure that they will have the best chance of providing maximum potential benefits over their lifespan. While management efforts
and expenses should generally favor caring for existing trees over planting new ones, tree planting can still be justified in several cases. Tree planting can often be used as a tool to draw attention to the campus forest and its benefits. Planting can also be used as a tool for educating the campus on proper tree care through service projects. Planting is justified when such benefits, coupled with the benefits of the planted trees over their expected lifespan outweigh the cost of planting.

i. **Location**

Trees should be planted in a location where they will have the best opportunity to survive, while providing their maximum potential benefits as part of the campus forest. They should not be planted in a location where an overhead obstruction, such as power lines, is lower than the expected mature height of the tree. They should also not be planted in a location where there are obstructions located within the expected mature canopy spread of the tree. Vertical and horizontal obstructions could be either infrastructure or other plants. Selecting a tree with the proper form and size for its location will help alleviate the need for future pruning, reducing maintenance costs. Tree should be planted in a location where roots will have enough space to grow and function properly. Potential benefits of trees should also be considered in selecting a location for planting. For example, planting a tree in a location where it will intercept a large amount of rainwater will help increase the benefits the tree provides over its lifetime.

ii. **Sources**

The University should strive to purchase trees from sources that use locally grown trees. This has the double benefit of receiving trees adapted to the local environment and reduction of tree transportation costs.

iii. **Species**

Tree species should be selected that will help in attaining species diversity goals set forth in Section 3a. Species should also be selected based on the specific location targeted for planting. Attention should be paid to soil type, drainage, available irrigation, potential for vandalism, available sunlight and aesthetic appeal at each location. A list of recommended species is provided in Appendix B.

iv. **Planting Technique**

Proper technique should be followed to allow trees the best chance at long-term survival. The following practices should be followed when planting any tree:

- Plant the tree at the proper depth, so that the root collar is exposed
- Place mulch above the root ball to a depth of 2 inches to moderate soil temperature and help retain soil moisture and nutrients
- Remove at least the top 50% of any wire basket and burlap on ball and burlap trees to remove impediments to root growth
- Ensure that soil in planting hole is of similar texture to that in the root ball, so that movement of water into or out of the root ball will not be impeded.
- Staking of trees is only necessary if the newly planted tree will not stand on its own or under moderate wind. If stakes are installed, they should be removed after one year. They should contact the tree in such a way that will not harm the bark.
- Trees should be properly watered at planting. If proper irrigation is not available at the planting site, watering bags should be installed to ensure proper soil moisture. Newly planted trees should be checked 1-2 times per week to ensure that the moisture level around the root ball is adequate.
- A radius of 24” from the stem should be kept free of turf or other plants.

![Fig. 5.3. Proper Tree Planting](http://hort.ufl.edu/woody/documents/EP314.pdf)

**c. Tree Removal**

Trees shall only be removed when they are hazardous, dead, diseased or unlikely to survive planned construction activities. Trees deemed to be hazardous should be removed immediately by either Facilities Management or a qualified contractor. Other trees considered for removal should be evaluated fully to determine if corrective action is likely to allow them to be viable in the future. The costs associated with keeping or removing a tree should be weighed against the benefits of doing so. Aside from safety, benefits such as aesthetics, carbon sequestration and pollutant removal should also be considered in determining whether or not a tree needs to be removed.

**d. Health Care**

Tree health care should be performed to ensure the health of individual trees and the collective campus forest. When a health care concern is noticed, an appropriate response shall be determined by Facilities Management. Responses might include treatment, removal or no action. The visibility and value of the affected tree and potential effects on neighboring trees should be considered alongside the cost and likelihood of success of prescribed treatment in determining action. In the case of pests being found on campus trees that have potentially devastating effects on trees outside of the campus, the appropriate authority (e.g. Chicago District Forester, State Urban Forestry Coordinator, etc.) shall be notified to determine the appropriate course of action.

Tree health care practices include the following:

**i. Integrated Pest Management**

Integrated pest management (IPM) involves the use of a combination of methods to control pests that could potentially harm trees. Methods might include treatment, cultural controls,
no action, tree pruning, etc. Monitoring of individual trees and stands for signs of a pest outbreak is important. This, combined with an understanding of pest life cycles can be used to prescribe appropriate treatment actions. In the case where treatments are made to suppress an insect or disease infestation, biological controls should be favored over pesticides.

![](image)

Figure 5.4. Insects like the praying mantis can be used to control pests without the need for pesticides. Source: [http://www.bartlett.com/resources/Monitor-Rx.pdf](http://www.bartlett.com/resources/Monitor-Rx.pdf)

ii. **Fertilization/Soil Amendments**

In the case where tree health is impacted by the quality and content of its soil, amendments to the soil may be made to improve the condition of the tree. Amendments may include fertilization, pH modification, drainage improvement, etc. Soil sampling should be performed before any amendments are made to determine the soil characteristics of the site and amendments needed.

iii. **Watering**

Trees should be watered to ensure their health and vigor. Any trees showing signs of water stress (leaf browning, wilting, etc.) should be watered as resources allow. If the prevalence of drought increases as a result of climate change, UIC must be prepared to respond accordingly. Newly planted trees should be watered according to guidelines for tree planting, above.

e. **Protection and Preservation**

All trees should be evaluated for their potential to be preserved when located in an area planned for construction. Trees should only be removed for construction when the cost to preserve them is too significant to justify the loss of potential future benefits. Therefore, benefits such as aesthetics, energy savings, carbon sequestration and pollutant removal, among others should be closely weighed against the cost of preservation. Tree removal decisions shall be made by Facilities Management, with assistance from the Campus Tree Advisory Committee.
Tree Preservation Process

All sites planned for construction where trees may be potentially impacted shall follow five steps to ensure proper tree preservation.

1. Tree Preservation Plan
   A tree preservation plan shall be developed for every construction site where trees may be potentially impacted by construction. Such a plan shall consist of the following:

   a. Map indicating boundary of construction zone and all trees to be potentially impacted. Trees should be placed into the following categories:

      A. Not salvageable.
         1. Trees within the footprint of construction that must be removed to accommodate construction.
         2. Trees in too poor of health prior to construction to make it likely for them to survive disturbance from construction activities.

      B. Low Priority for Protecting
         1. Trees that are below 8” DBH, 20 foot canopy width or 25 foot height
         2. Trees with low value in terms of energy savings, carbon sequestration, aesthetics or pollutant removal
         3. Invasive species

      C. High Priority for Protecting
         1. Trees that are above 8” DBH, 20 foot canopy width or 25 foot height
         2. Trees with a high value in terms of energy savings, carbon sequestration, aesthetics or pollutant removal
         3. Historically significant trees

   b. Plan for preserving all existing trees
      Methodology for preserving the health and structural integrity of all trees on the construction site must be mapped and explained in detail.

   c. Rationale for removing trees
      Before a decision is made to remove any trees, reasoning must be given as to why removal is the best option. Effort must be made to explore preservation options for every tree before removal is decided upon. This includes protection for trees during construction and exploration of construction plan modification to limit tree impact.

2. Tree Protection Zones
   A tree protection zone (TPZ) should be established for all trees selected for preservation. A TPZ is meant to protect the tree’s limbs, trunk and roots from construction damage. The TPZ shall
extend 1 foot from the trunk for each inch in trunk diameter measured at a height of 4.5 feet. Signage shall be placed on the outside of the TPZ which clearly states the purpose of the zone, with instructions to keep construction activities outside of fencing.

![Figure 5.5. Tree Preservation Zones](image)

3. **Pre-Construction Inspection**
   All trees to be protected should be inspected prior to the commencement of construction activities. Documentation, including photographs, should be completed detailing the state of trees prior to construction. Inspection should be performed by a member of the Campus Tree Advisory Committee or a qualified Facilities Management employee.

4. **Inspections During Construction**
   Trees should be inspected at least monthly during construction to ensure that they are being properly preserved. Inspection should be performed by a member of the Campus Tree Advisory Committee or a qualified Facilities Management employee. A proper record should be taken of every inspection performed. Such a record should include photographs of trees being preserved and notes on any work being performed that might be harmful to trees within the protection zone. Construction may be stopped at any location where trees are not being preserved according to plans.

5. **Post-Construction Inspection**
   Trees should be inspected once construction has been completed to ensure proper preservation procedures were followed throughout construction and to inspect the overall health and appearance of trees. If any damage or potential concerns are noted, proper action must be taken to ensure tree health and safety and determine liability.

f. **Tree Damage Assessment**
   Assessment of tree damage caused by any contractor will be the responsibility of Facilities Management, with assistance from the Campus Tree Advisory Committee. Assessment will include determination of the cause of damage and appropriate remedies to return the damaged tree to
health, if possible. Any contractor found to be responsible for damage to trees during construction or other activity shall be held liable. They will be required to fund the replacement cost of any trees lost, or to fund the cost to repair damage to any trees that can be saved. Replacement cost shall be determined using the valuation method established by the Council for Tree and Landscape Appraisers (CTLA). Any individual or entity wishing to appeal a tree damage penalty may request a meeting with Facilities Management, where they can explain why they should not be held liable.

g. **Tree Risk Assessment**
A risk assessment should be performed on trees deemed to be a potential hazard. The assessment should be performed by a qualified employee of Facilities Management or member of the Campus Tree Advisory Committee. A visual assessment should first be performed to determine the general hazard potential of the tree and if further inspection is necessary. Further assessment may be performed if necessary, including a climbing inspection and/or drilling of the tree stem to determine the amount of decay present, etc. Trees located in high traffic areas, with historical significance and those that provide a large amount of other benefits should be favored for inspection over others.

h. **Catastrophic Event Response**
Catastrophic events can cause significant damage to the trees on campus in a short period of time. Catastrophic events might include severe storms, drought or disease/insect outbreak, among others. These events not only affect the health of the trees, but can lead to safety and access issues for those on campus. When such an event occurs at UIC, it is typically the responsibility of maintenance employees to report issues in the area of campus in which they work. Other campus employees, as well as students and visitors, may also report issues. It is ultimately the responsibility of Facilities Management to resolve any issue. Therefore, it is imperative that those reporting issues know who they should contact to receive the fastest response. When campus or parkway trees affect public roadways, city of Chicago employees may respond to resolve the issue. When a catastrophic event occurs, issues should be resolved in the following order:

1. **Safety Issues**
   When responding to an event, it is important to resolve safety issues first. Trees that have been damaged to an extent that they are no longer structurally sound and present a potential hazard should be immediately removed. Large hanging branches should also be removed to eliminate the potential for them to fall and cause injury.

2. **Access Issues**
   Once safety issues have been resolved, any tree damage that limits access to a roadway, sidewalk or path should be cleared. Priority should be given to pathways potentially needed for emergency response and to those that generally experience heavy traffic.

3. **Tree Health Issues**
   Any event that causes damage to trees could potentially affect their health. These issues should be taken care of as time and expense permit, with trees of high value receiving priority.
i. **Forest Product Utilization**

   i. **Debris Re-use**
   When trees are pruned or removed, the resulting debris is generally chipped to ease its disposal. In order to promote overall sustainability on the campus, forestry debris should be kept on campus whenever possible. Leaves and other material with high organic matter content can be turned into mulch, which can then be utilized in a number of landscape applications. When entire trees or large limbs are removed or have fallen, there is the potential to lumber the wood for re-use. This wood can be made into products such as benches, works of art, signs, tables or other wood products for the campus. There are multiple companies in the Chicago area that provide the service of urban wood recycling.

   ii. **Fruit Production**
   The idea of eating locally-grown, organic produce has gained much popularity in recent years. Such food offers the benefit of knowing one’s food source, reducing the distance food must travel to reach the end consumer and reduction in the use of pesticides. UIC could take advantage of these benefits by establishing a small orchard of fruit trees on its campus. Such an initiative could be part of a larger overall effort to establish urban agriculture on the campus. Fruit trees that could be successfully grown on the UIC campus might include various species of apple, pear, sour cherry and plum. Locations for a potential orchard have not been determined, but there are likely several such locations on the campus.

   Besides serving as a source of locally grown food, establishing an orchard on campus would have several benefits. Management of the trees, including pruning, soil amendments and harvesting fruit could provide volunteer opportunities for students. Students from the campus and surrounding schools could visit the orchard to learn about local food production and orchard operations. Fruit from the orchard could also be sold to recoup some of the cost of its management.

j. **Recommended and Prohibited Species**

   Trees recommended for planting are those generally considered to be native to northeastern or central Illinois that do not have a known potential for invasiveness. Those especially beneficial for benefits to wildlife, aesthetics or other reasons are also favored.

   Tree species selection for planting should be based on several factors in addition to those listed in the planting guidelines, above. Trees should also be avoided that have the potential for major disease contraction in the near future.

   A comprehensive list of recommended species is listed in Appendix B. These lists are general for the campus as a whole. However, the specific characteristics of a planting site must be considered in determining an appropriate species.
The campus shall keep a current list of prohibited species. No species on this list is to be planted anywhere on campus. Reasons for a species being placed on the list might include invasive nature or extreme susceptibility to insect or disease, among others. The current list of prohibited species as of the printing of this report is shown in Table 5.1.

<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Common Name</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Fraxinus spp.</em></td>
<td>Ash (Any)</td>
</tr>
<tr>
<td><em>Acer ginnala</em></td>
<td>Amur Maple</td>
</tr>
<tr>
<td><em>Ailanthus altissima</em></td>
<td>Ailanthus</td>
</tr>
<tr>
<td><em>Alnus glutinosa</em></td>
<td>European alder</td>
</tr>
<tr>
<td><em>Rhamnus cathartica</em></td>
<td>European buckthorn</td>
</tr>
<tr>
<td><em>Sorbus aucuparia</em></td>
<td>European mountain-ash</td>
</tr>
<tr>
<td><em>Ulmus pumila</em></td>
<td>Siberian elm</td>
</tr>
<tr>
<td><em>Eleagnus angustifolia</em></td>
<td>Russian-olive</td>
</tr>
<tr>
<td><em>Frangula alna</em></td>
<td>Glossy buckthorn</td>
</tr>
<tr>
<td><em>Morus alba</em></td>
<td>White mulberry</td>
</tr>
</tbody>
</table>

Table 5.1. Prohibited species for planting at UIC.

k. **Prohibited Practices**

Certain practices are known to be detrimental to individual trees and the campus forest as a whole and may interfere with proper management of the campus forest. The following is a list of such practices that shall be prohibited at UIC:

1. No tree shall be planted without the approval of Facilities Management. This prevents the planting of prohibited species and species not suited for a particular location, and allows those managing the campus forest to be up-to-date on the status of all trees planted on campus.

2. No tree maintenance, such as pruning or removal, shall be conducted without the approval of Facilities Management. This prevents maintenance detrimental to the health and safety of trees and maintenance not performed in accordance with ANSI standards.

3. Vandalism of trees is prohibited. This includes the attachment of any type of sign, bicycle or other object to a tree in such a way that may be harmful to the tree.

4. Tree Topping
   - Tree topping involves the improper pruning or removal of limbs without regard for the structure or growth pattern of the tree. This leads to several problems, including:
     - Reduction in potential for the tree to heal
     - Creation of improper crown balance
     - Weak growth of new branches, which can lead to structural and safety issues
6. Communication

The campus should strive to communicate this plan to all members of the campus community who might be impacted by or have an impact on the campus forest. This includes students, faculty, facilities employees, visitors and the surrounding community. Notice of the plan’s adoption should be placed in the UIC newspaper – UIC News. The plan should be communicated to target groups in the following ways:

a. **Students and Faculty**
   The plan should be placed on the website of the UIC Office of Sustainability, Facilities Management and other appropriate campus offices and departments. Doing so will allow students and faculty to easily access the plan at all times. Data from the tree inventory will also be placed online in order to be available to students. Environmentally-focused student groups, such as EcoCampus should also be made aware of the plan.

b. **Facilities Management**
   Facilities Management should keep copies of the plan in its offices for consultation by employees, contractors and visitors and place a copy on their website.

c. **Contractors**
   Any company contracted to perform work that may directly or indirectly affect campus trees should be given a copy of the plan, either as a hard copy or in electronic format. Contractors will need to be especially aware of portions of the plan concerning tree preservation and damage assessment.

d. **Community and Visitors**
   The community should be made aware of the plan through a press release that coincides with UIC’s announcement of Tree Campus USA certification. The announcement should make it clear where members of the community can find a copy of the plan. It should also include information on how they can become involved in management of the campus forest through service projects and other activities.
7. Further Work

This plan strives to be comprehensive in detailing a plan for managing the UIC campus forest. However, more work still needs to be done in order to fully understand and maximize the benefits of the forest and ensure proper management into the future.

a. **Further Study.**
   
   A complete tree inventory of the campus was completed in 2011. However, more work can be done to assess the benefits that campus trees provide.

   i. **I-Tree Eco Sampling**
      
      There are benefits of the campus forest that can be analyzed through i-Tree Eco beyond those looked at in the 2011 inventory. Sampling can be done to analyze the energy savings that the trees and other plants on campus provide. This sampling and analysis should be performed in order to further realize the benefits of the campus forest. It would also serve as a way to attach a dollar amount to other benefits provided.

   ii. **Watershed Benefits**
       
       The trees on campus also provide benefits to the surrounding watershed, including interception of stormwater runoff and groundwater filtration. This could be done through i-Tree Hydro software or analysis in GIS.

   iii. **Soil Analysis**
       
       A detailed soil analysis of the campus should be performed in order to determine the suitability of tree species for specific locations. Soil type should be determined for the entire campus, with more detailed analysis performed where trees are to be planted, or where soil may be affecting the health of trees. Soil samples should be taken in areas where large-scale planting is planned.

   iv. **Tree Hazard Analysis**
       
       All trees on the campus should be evaluated for potential safety and health concerns to ensure that no trees present a hazard. This could be performed by Facilities Management, the Campus Tree Advisory Committee or qualified volunteers.

b. **Campus Education**

   As part of the 2011 inventory, all trees on campus were entered into a GIS database. This database includes detailed information for every tree, including measured tree characteristics, tree location and tree benefits. This information should be available online at [https://sustainability.uic.edu/treecampus](https://sustainability.uic.edu/treecampus)
Figure 7.1. Example of the GIS map of the campus forest available at https://sustainability.uic.edu/treecampus

Such a portal allows students from all disciplines to easily access tree data for use in their work. Maintenance staff more easily make management decisions because they have access to detailed tree information before visiting a site. Community members can also access the data as a way to learn more about the campus forest.
Works Cited


Appendix A. Definitions

ANSI – a private, non-profit organization that oversees the development of voluntary, consensus standards in the United States.

Campus forest – Geographic area containing all trees on the campus of the University of Illinois at Chicago plus those neighboring trees whose benefits directly extend onto the campus.

Carbon sequestration – the process of storing carbon, so as to prevent its release into the atmosphere.

Critical root zone - The area of undisturbed natural soil around a tree defined by a concentric circle with a diameter in feet equal to twice the number of inches of trunk diameter.

Even-aged – a stand of trees that are relatively close to each other in age

Invasive – a plant that has the ability to thrive and spread aggressively outside of its natural range

Leader – The topmost portion of the tree stem that is able to grow more than the lateral branches below.

Live crown ratio - the height of the live crown (the part of the tree with live branches) divided by the total height of the tree.

Mature- a tree that has reached its maximum size

Native – a plant that occurred in an area before human settlement, and has become adjusted over time to the conditions present in the area

Overmature- a tree that has reached a stage of development where it is declining in vigor and health and reaching the end of its natural life span

Root ball - The collection of soil and roots of a tree that has been packaged to aid in transportation of the tree

Semi-mature – an established tree in the landscape that has not yet reached mature size and is still actively growing.

Tree canopy - layer of leaves, branches, and stems of trees that cover the ground when viewed from above

Tree topping - the indiscriminate cutting of tree branches to stubs or lateral branches that are not large enough to assume the terminal role. Other names for topping including “heading,” “tipping,” “hat- racking,” and “rounding over.”

Watershed – a geographic area in which all surface water converges to a single point, where the waters join another water body.

Young – A tree that has been in the ground for an insufficient amount of time to allow it to become established.
## Appendix B. Recommended Tree Planting List

### Large Trees (50+ Foot Mature Height)

<table>
<thead>
<tr>
<th>Tree Species</th>
<th>Common Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acer rubrum</td>
<td>Red maple Acer</td>
</tr>
<tr>
<td>Carya cordiformis</td>
<td>Bitternut hickory</td>
</tr>
<tr>
<td>Carya ovata</td>
<td>Shagbark hickory</td>
</tr>
<tr>
<td>Celtis occidentalis</td>
<td>Northern hackberry</td>
</tr>
<tr>
<td>Cladrastis kentukea</td>
<td>Yellowwood Fagus</td>
</tr>
<tr>
<td>grandifolia</td>
<td>American beech</td>
</tr>
<tr>
<td>Gleditsia triacanthos</td>
<td>Honeylocust</td>
</tr>
<tr>
<td>Gymnocladus dioicus</td>
<td>Kentucky coffee tree</td>
</tr>
<tr>
<td>Juglans cinerea</td>
<td>Butternut</td>
</tr>
<tr>
<td>Juglans nigra</td>
<td>Black walnut</td>
</tr>
<tr>
<td>Liquidambar styraciflua</td>
<td>Sweetgum</td>
</tr>
<tr>
<td>Liriodendron tulipifera</td>
<td>Tulip-tree</td>
</tr>
<tr>
<td>Nyssa sylvatica</td>
<td>Blackgum</td>
</tr>
<tr>
<td>Pinus strobus</td>
<td>Eastern White Pine</td>
</tr>
<tr>
<td>Platanus occidentalis</td>
<td>Eastern Sycamore</td>
</tr>
<tr>
<td>Populus deltoides</td>
<td>Eastern cottonwood</td>
</tr>
<tr>
<td>Quercus alba</td>
<td>White oak</td>
</tr>
<tr>
<td>Quercus bicolor</td>
<td>Swamp white oak</td>
</tr>
<tr>
<td>Quercus imbricaria</td>
<td>Shingle oak</td>
</tr>
<tr>
<td>Quercus macrocarpa</td>
<td>Bur oak</td>
</tr>
<tr>
<td>Quercus muehlenbergii</td>
<td>Chinkapin oak</td>
</tr>
<tr>
<td>Quercus palustris</td>
<td>Northern pin oak</td>
</tr>
<tr>
<td>Quercus rubra</td>
<td>Northern red oak</td>
</tr>
<tr>
<td>Quercus velutina</td>
<td>Black oak</td>
</tr>
<tr>
<td>Robinia pseudoacacia</td>
<td>Black locust</td>
</tr>
<tr>
<td>Salix nigra</td>
<td>Black willow</td>
</tr>
<tr>
<td>Sassafras albidum</td>
<td>Sassafras</td>
</tr>
<tr>
<td>Taxodium distichum</td>
<td>Baldcypress</td>
</tr>
<tr>
<td>Thuja occidentalis</td>
<td>Eastern arborvitae</td>
</tr>
<tr>
<td>Tilia americana</td>
<td>American basswood</td>
</tr>
<tr>
<td>Ulmus rubra</td>
<td>Slippery elm</td>
</tr>
<tr>
<td>Ulmus thomasii</td>
<td>Rock elm</td>
</tr>
</tbody>
</table>

### Medium Trees (35-50 Foot Mature Height)

<table>
<thead>
<tr>
<th>Tree Species</th>
<th>Common Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aesculus glabra</td>
<td>Ohio buckeye</td>
</tr>
<tr>
<td>Betula nigra</td>
<td>River birch</td>
</tr>
<tr>
<td>Betula papyrifera</td>
<td>Paper birch</td>
</tr>
<tr>
<td>Carpinus caroliniana</td>
<td>American hornbeam</td>
</tr>
<tr>
<td>Cercis canadensis</td>
<td>Eastern redbud</td>
</tr>
<tr>
<td>Hophornbeam</td>
<td>Ostrya virginiana</td>
</tr>
<tr>
<td>Juniperus virginiana</td>
<td>Eastern redcedar</td>
</tr>
<tr>
<td>Prunus pensylvanica</td>
<td>Pin cherry</td>
</tr>
<tr>
<td>Prunus serotina</td>
<td>Black cherry</td>
</tr>
<tr>
<td>Prunus virginiana</td>
<td>Chokecherry</td>
</tr>
<tr>
<td>Sorbus americana</td>
<td>American mountain-ash</td>
</tr>
</tbody>
</table>

### Small Trees (<50 Foot Mature Height)

<table>
<thead>
<tr>
<th>Tree Species</th>
<th>Common Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amelanchier laevis</td>
<td>Alleghany serviceberry</td>
</tr>
<tr>
<td>Malus spp.</td>
<td>Apple</td>
</tr>
<tr>
<td>Crataegus crus-galli</td>
<td>Cockspur hawthorn</td>
</tr>
<tr>
<td>Hamamelis virginiana</td>
<td>Common witchhazel</td>
</tr>
<tr>
<td>Cornus florida</td>
<td>Cornus florida</td>
</tr>
<tr>
<td>crataegus mollis</td>
<td>Downy hawthorn</td>
</tr>
<tr>
<td>Viburnum lentoago</td>
<td>Nannyberry</td>
</tr>
<tr>
<td>Cornus alternifolia</td>
<td>Pagoda dogwood</td>
</tr>
<tr>
<td>Ptelea trifoliata</td>
<td>Wafer ash</td>
</tr>
<tr>
<td>Crataegus phaenopyrum</td>
<td>Washington hawthorn</td>
</tr>
<tr>
<td>Ilex verticillata</td>
<td>Winterberry</td>
</tr>
</tbody>
</table>