

Batavia, NY
Street Tree Inventory Report



Prepared for the City of Batavia by the Cornell University
Student Weekend Arborist Team (SWAT)

October 2012

Executive Summary

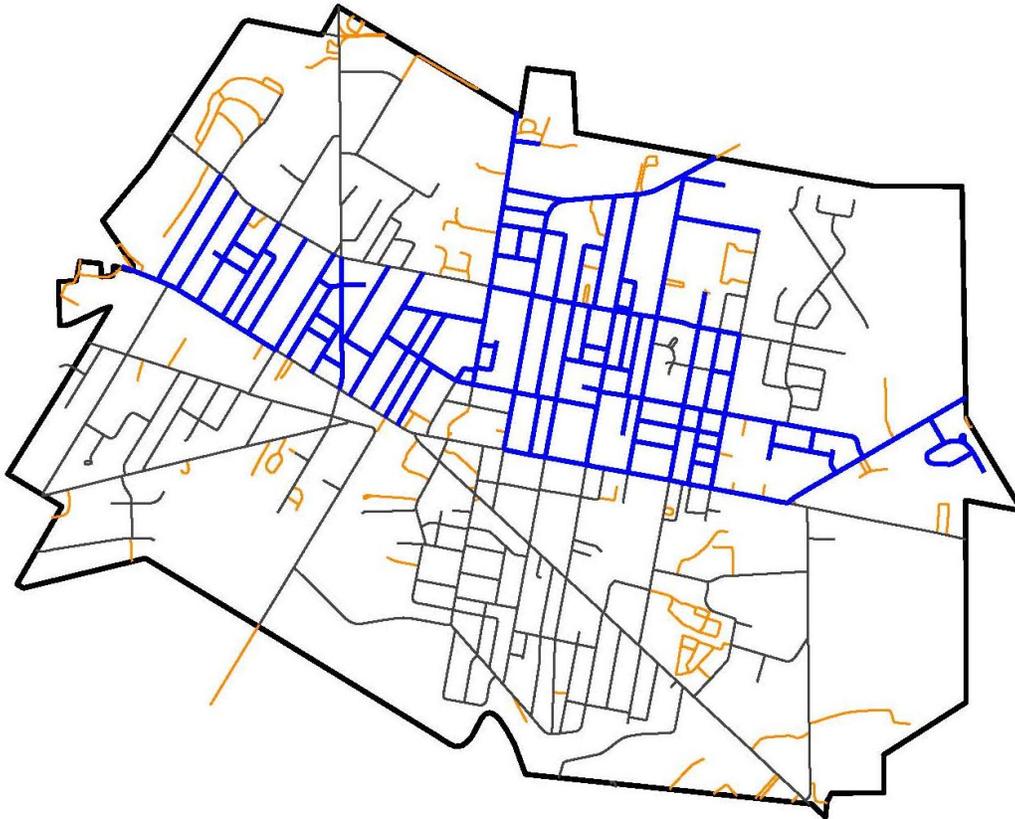
This document reports the findings of a partial street tree inventory conducted by Cornell University's Student Weekend Arborist Team (SWAT) in the City of Batavia, New York on September 23, 2013 following a partial street tree inventory also conducted by SWAT in Batavia on September 24, 2011. Results from both inventories include:

- 730 trees and 292 planting spaces were inventoried in the city's right-of-way in 2012
- 1727 trees and 777 planting spaces were inventoried in the city's right-of-way in 2011 and 2012
- The stocking level of street trees to available planting spaces for inventoried streets is 68.97% of full stocking for 2011 and 2012
- Norway Maple (36.94%) and Silver Maple (20.09%) are the most prevalent street tree species for trees inventoried in 2011 and 2012
- 30.72% of inventoried trees have diameters between 1 – 12" while 69.28% have diameters greater than or equal to 12"

Note: these are partial results – all streets in the city are not yet inventoried – and results for genus and species composition and trunk diameter are likely to change when all streets are inventoried. It is anticipated that the inventory will be completed in 2013.

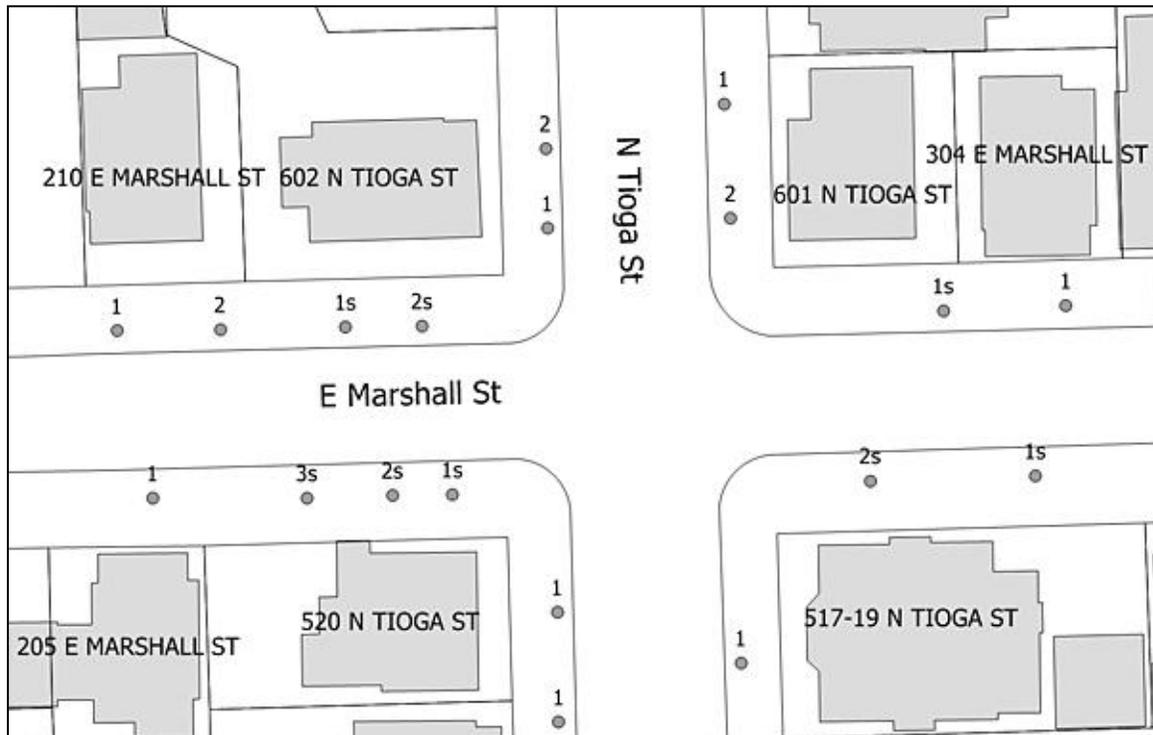
Inventory Methodology

A partial street tree inventory was conducted by Cornell University's Student Weekend Arborist Team (SWAT) in the City of Batavia, NY on September 23, 2012 following a partial street tree inventory also conducted by SWAT in Batavia on September 24, 2011. Trees and planting spaces were inventoried in the city's right-of-way. Streets inventoried in 2011 and 2012 are shown in blue. Street length inventoried is 22.19 miles and is about 40% of all street length planned to be inventoried in the city.



Data was collected in a walking survey with Pharos PDAs equipped with the USDA Forest Service’s i-Tree MCTI/STRATUM PDA utility. Data collected includes the following:

(1) **Tree Location:** Locations for right-of-way trees and planting spaces were established primarily by property address according to a tax parcel shapefile supplied by Genesee County. If an address was unavailable, a location was assigned based upon the next sequential address. Site numbers were assigned for trees and planting spaces at each address. For addresses with multiple trees and/or planting spaces, site numbers were assigned from left to right facing the property. Trees and planting spaces located at street corners were assigned the property address, but if located on a side street different than the property street address, an “s” notation for “side” was made. Likewise, if trees and planting spaces were located on a street to the rear of the property street address, an “r” notation for “rear” was made. Site numbering is illustrated below.



(2) **GPS:** Latitude (Y) and Longitude (X) for right-of-way trees and planting spaces were collected with Garmin 60 CSx GPS receivers typically accurate when WAAS enabled to less than 5 meters. Coordinates were rectified post-inventory to conflate with aerial orthoimagery available from the New York State GIS Clearinghouse.

(3) **Location Site:** Placement of right-of-way trees and planting spaces was assessed by one of five ratings: 1= front yard or lawn; 2 = treelawn

planting strip less than four feet wide; 3 = treelawn planting strip greater than four feet wide; 4 = sidewalk tree pit; 5 = street median.

(4) **Species:** Trees were identified and assigned their respective botanical names. Common names were added subsequent to the inventory.

(5) **DBH:** Trunk diameter at breast height (approximately 4.5 feet above the ground) was measured to the nearest inch. DBH is the most commonly used measure of tree size and age. It is not an absolute measure, however, as relationships between DBH and canopy spread or DBH and tree age vary by species.

(6) **Condition Wood:** The health of a tree's wood (its structural health) was assessed by one of four ratings: 1= Dead or Dying – *extreme problems*; 2 = Poor – *major problems*; 3 = Fair – *minor problems*; 4 = Good – *no apparent problems*.

(7) **Condition Leaves:** The health of a tree's leaves (its functional health) was assessed by one of four ratings: 1= Dead or Dying – *extreme problems*; 2 = Poor – *major problems*; 3 = Fair – *minor problems*; 4 = Good – *no apparent problems*.

(8) **Percent Deadwood:** "Deadwood" refers to branches over two inches in diameter that are dead, dying, or diseased. The percentage of deadwood in the tree canopy was assessed by one of five ratings: 1= less than 10%; 2 = 10 – 25%; 3 = 25 – 50%; 4 = 50 – 75%; 5 = greater than 75%.

(9) **Maintenance Recommendation:** Tree maintenance needs were assessed by one of four ratings: 1 = None – *no maintenance necessary*; 2 = Train – *routine maintenance for a young tree*; 3 = Routine Prune – *routine maintenance of a mature tree*; 4 = High Priority Prune – *a tree requiring immediate maintenance with deadwood 4" in diameter or greater*.

(10) **Consult:** Based on the visual condition of the tree, the need for a certified arborist to be brought in to examine the tree was assessed by one of two ratings: 1 = No Consult; 2 = Consult.

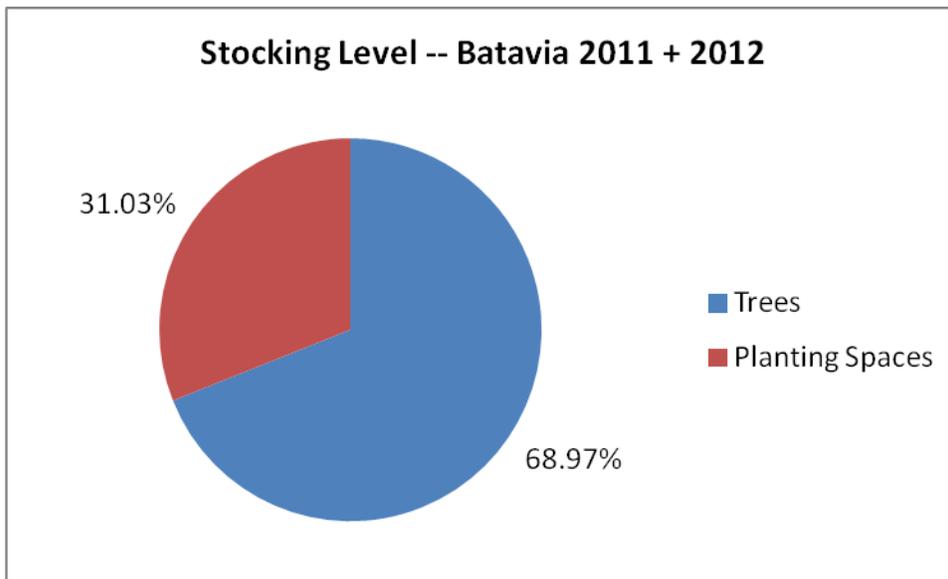
(11) **Wire Conflict:** The presence or absence of single or triple phase overhead utility wires associated with the site was assessed by one of two ratings: 1 = No Wire Conflict; 2 = Wire Conflict.

Street Tree Inventory Summary

Stocking Levels

Two methodologies are commonly used to determine street tree stocking levels. The first compares the number of street trees per mile of street to an ideal 100% stocking level (180 trees per mile of street). The second compares the number of existing street trees to the total number of potential street trees (number of trees plus the number of available planting spaces). This report utilizes the second methodology.

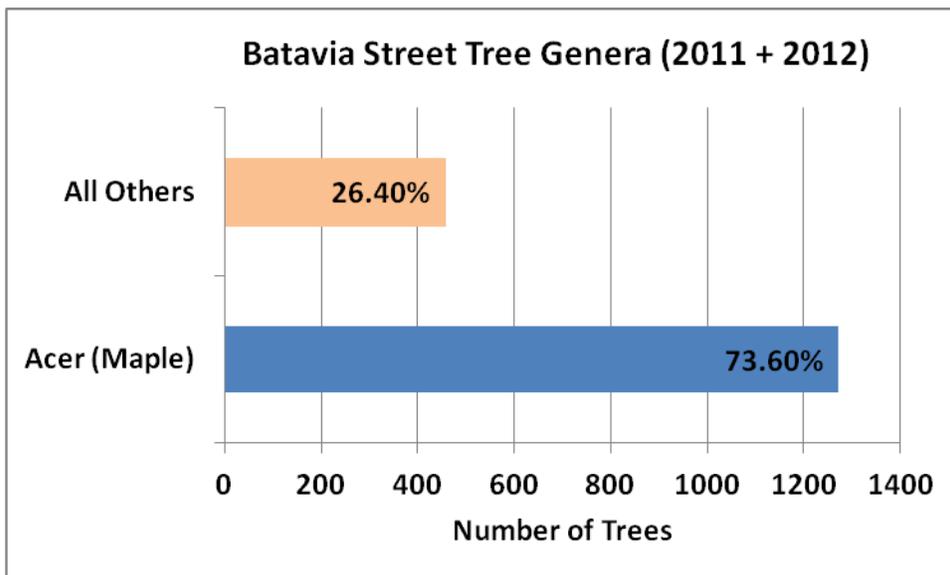
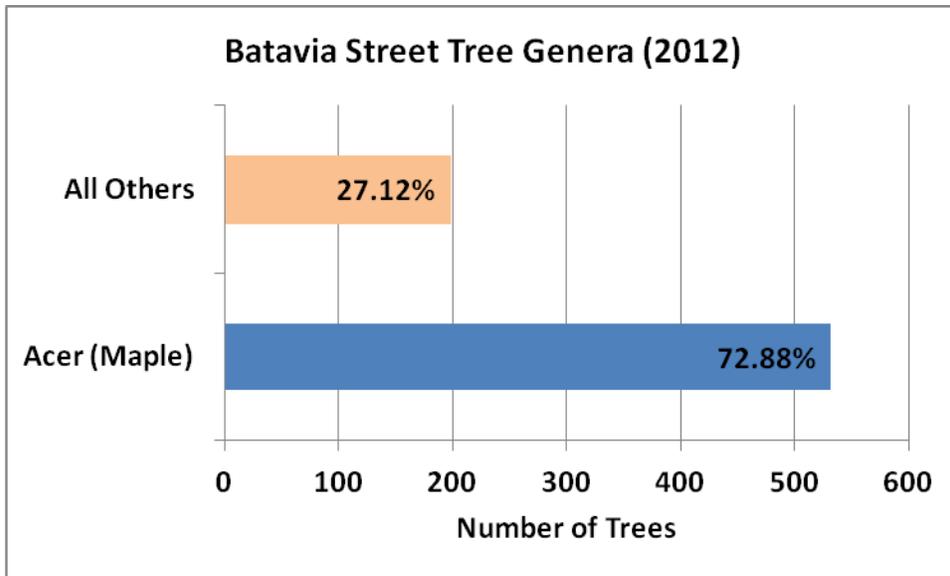
The 2011 and 2012 inventories conducted by SWAT accounted for 1727 trees and 777 planting spaces in the right-of-way. The proportion of trees to potential street trees translates into a 68.97% street tree stocking level (see graph below). A 60% stocking level is the national average and most municipalities have stocking levels between 50 and 75%.



It should be noted, however, that inventoried streets are located mostly in residential neighborhoods with a gridded street network. Streets in these types of neighborhoods are often more densely populated with trees than other neighborhood types such as commercial and cul-de-sac residential neighborhoods. Therefore, it is possible that stocking levels may be lower when additional city streets are inventoried.

Genus and Species Distribution

The partial inventory accounted for an additional 730 trees located in the city’s right-of-way. When added to the 997 trees inventoried in 2011, 1727 trees were inventoried in 2011 and 2012. A significant percentage of the trees inventoried in both years were Maples (*Acer* genus). 72.88% of trees inventoried in 2012 were Maples as were 73.60% of all trees inventoried in 2011 and 2012 (see graphs below).



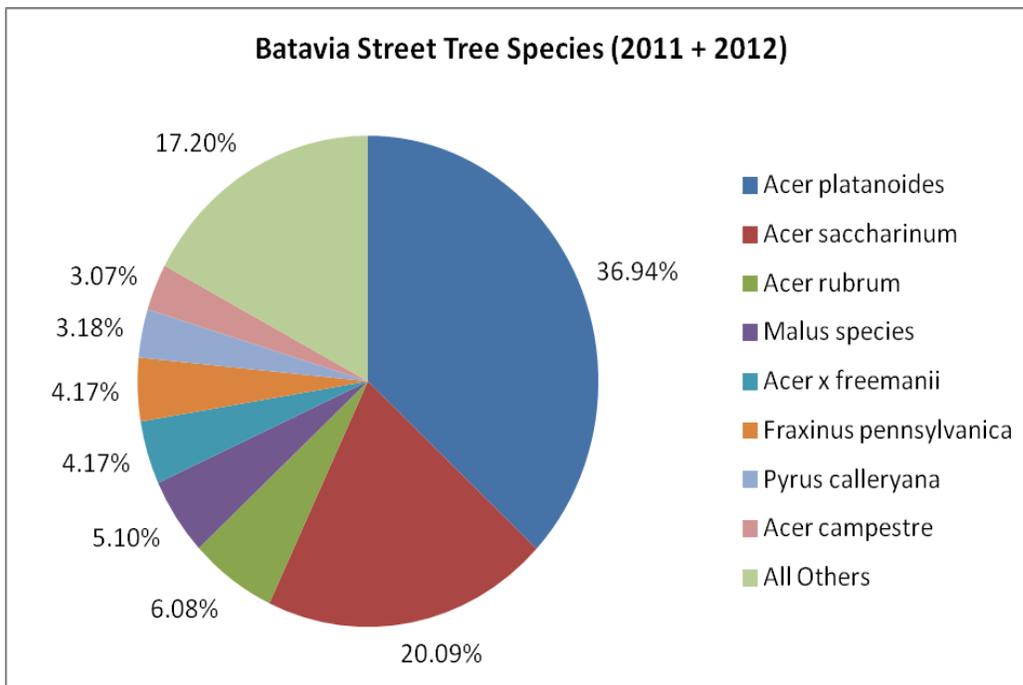
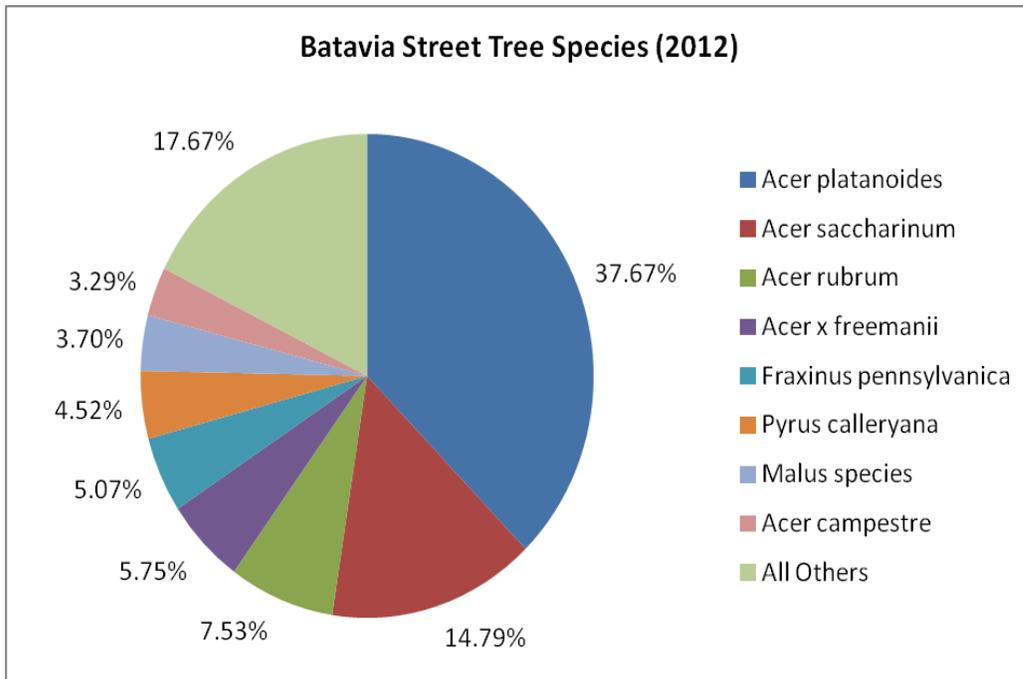
No other genus besides *Acer* accounts for more than 5.10% of all inventoried street trees (see table below).

Genus	Number of Trees	Percentage
<i>Acer</i> (Maple)	1271	73.60%
<i>Malus</i> (Apple)	88	5.10%
<i>Fraxinus</i> (Ash)	87	5.04%
<i>Pyrus</i> (Pear)	56	3.24%
<i>Tilia</i> (Linden)	40	2.32%
<i>Prunus</i> (Cherry)	37	2.14%
<i>Syringa</i> (Lilac)	32	1.85%
All Others	116	6.72%

Within the *Acer* genus, Norway Maple (*Acer platanoides*) accounts for 50.20%, Silver Maple (*Acer saccharinum*) 27.30%, and Red Maple (*Acer rubrum*) 8.26% of all Maples.

Regarding the population of street trees inventoried in 2012, Norway Maple (*Acer platanoides*) accounts for 37.67%, Silver Maple (*Acer saccharinum*) 14.79%, Red Maple (*Acer rubrum*) 7.53%, Freeman Maple (*Acer x freemanii*) 5.75%, Green Ash (*Fraxinus pennsylvanica*) 5.07%, and Callery Pear (*Pyrus calleryana*) 4.52% of all inventoried trees (see graph below).

Regarding the population of street trees inventoried in 2011 and 2012, Norway Maple (*Acer platanoides*) accounts for 36.94%, Silver Maple (*Acer saccharinum*) 20.09%, Red Maple (*Acer rubrum*) 6.08%, Crabapple species (*Malus species*) 5.10%, Freeman Maple (*Acer x freemanii*) 4.17%, and Green Ash (*Fraxinus pennsylvanica*) 4.17% of all inventoried trees (see graph below).

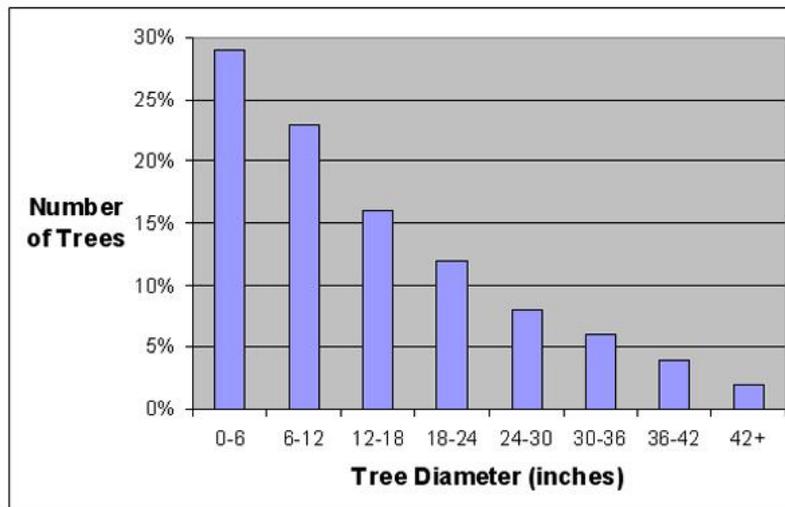


As a general rule, no one tree species should constitute more than 10% of the street tree population and no one tree genus should exceed 20% of the street tree population. For species, percentages of Norway Maple and Silver Maple exceed the 10% rule and indicate these species are overrepresented in the population. For genus, the percentage of trees in the *Acer* genus far exceeds the 20% rule and indicates that Maples are significantly overrepresented in the population.

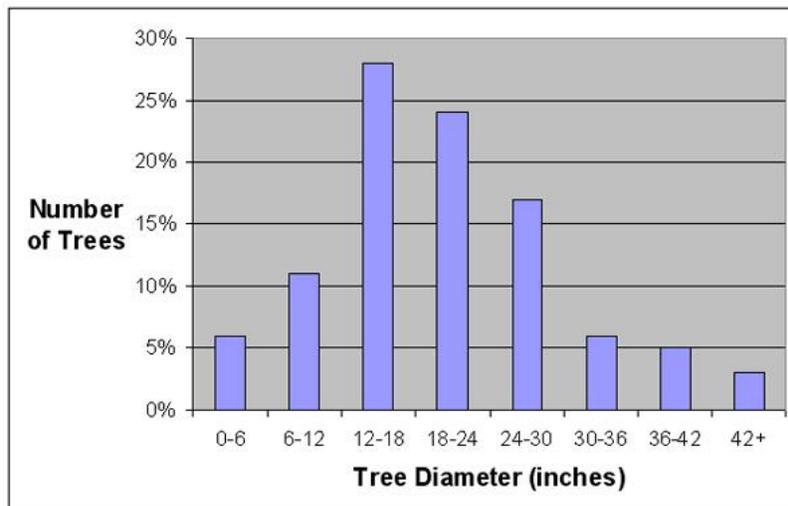
Diameter Distribution

DBH (tree trunk diameter at breast height) is not only a measure of tree age and size, but also a valuable indicator of the benefits provided by street trees. In general, the older and larger the tree, the more the benefits provided. At the same time, there must be a sufficient number of younger, smaller trees in the street tree population to account for the loss of trees over time and thereby maintain a sustainable community forest.

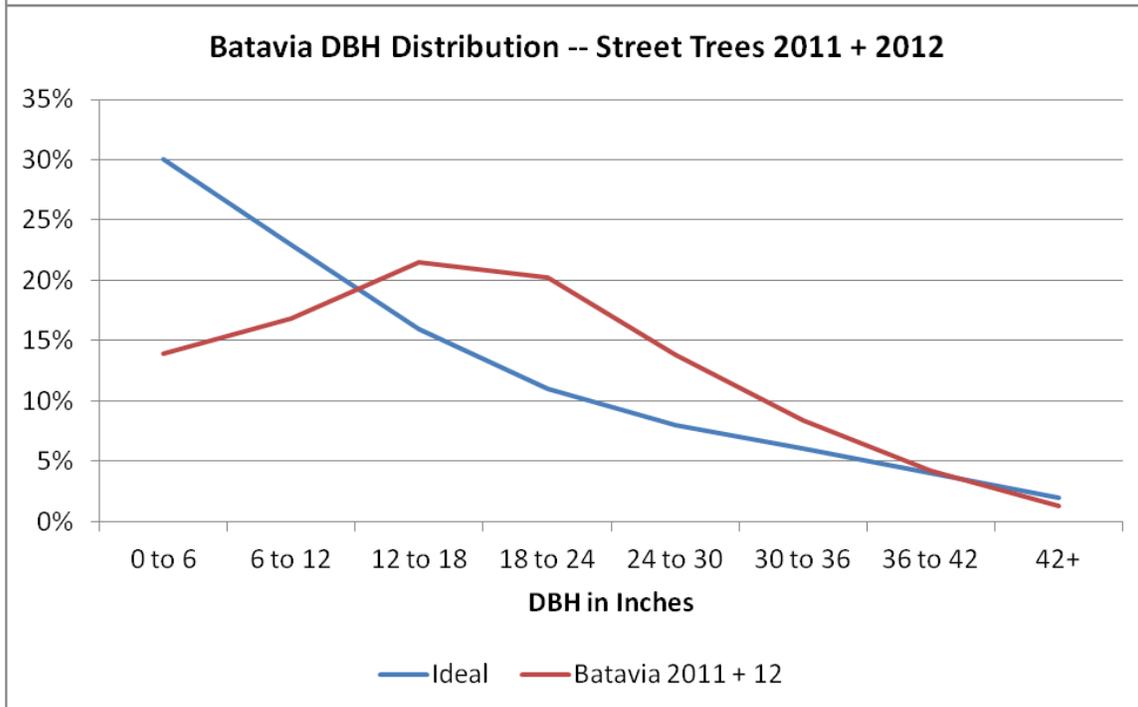
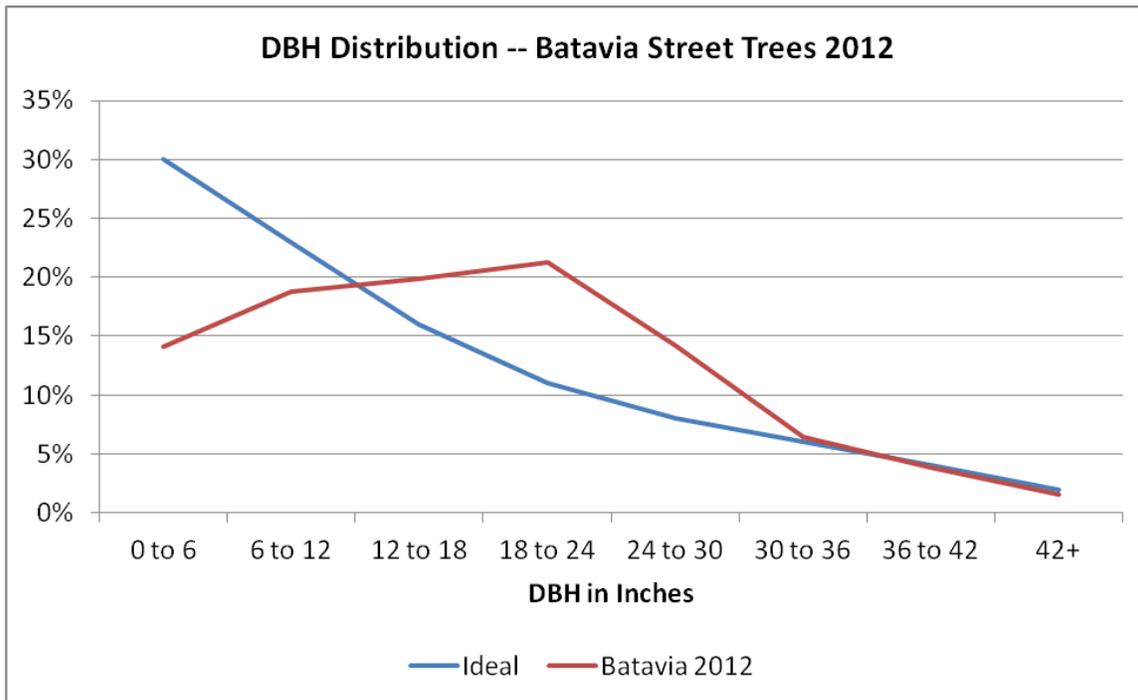
If a community is planting trees regularly, the following J-shaped trend line should be observed for its trees, tapering off at the larger (older) sizes (see graph below).



If, however, a community is not planting trees regularly, the following trend line may be observed for its trees, where a disproportionate share of its trees are in the larger (older) sizes (see graph below).

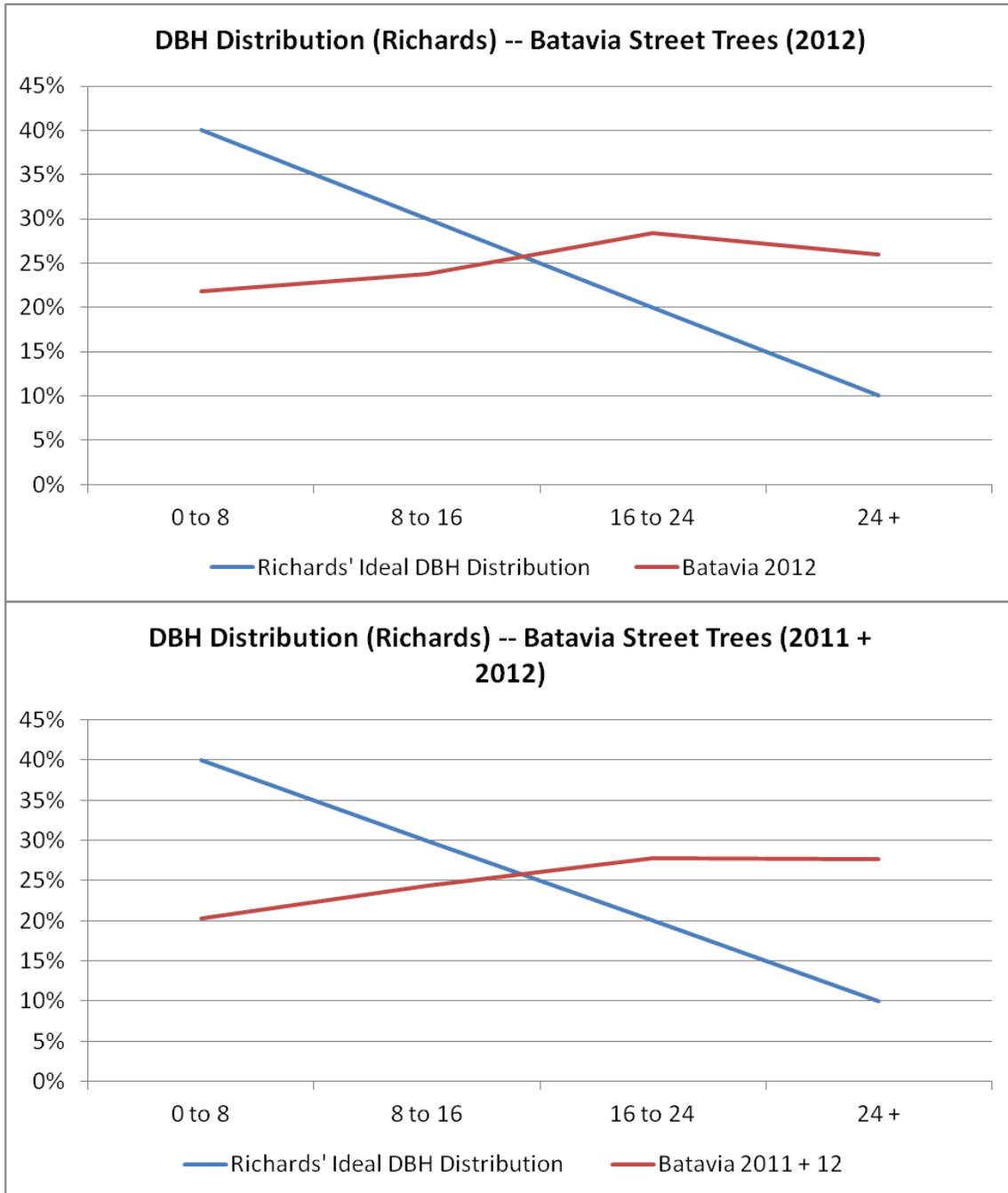


The graphs below plot the DBH distribution for inventoried street trees in Batavia against an ideal, J-shaped distribution for community trees.



Both graphs suggest an insufficient number of young trees are currently being planted in the city’s right-of-way to compensate for the future loss of older trees.

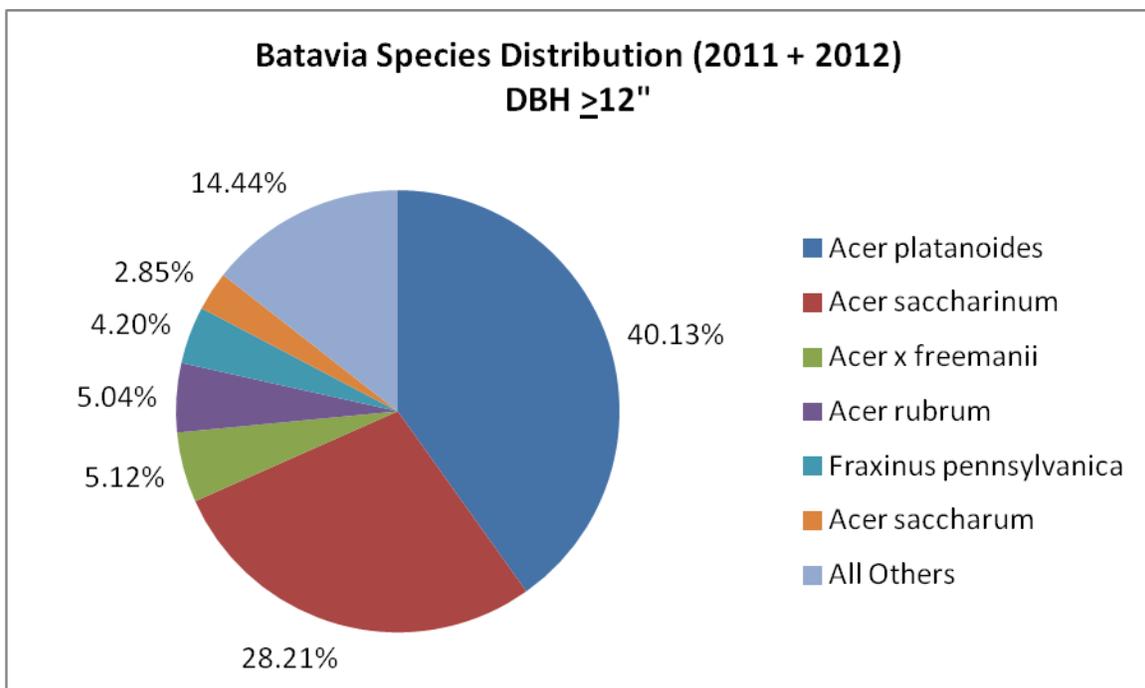
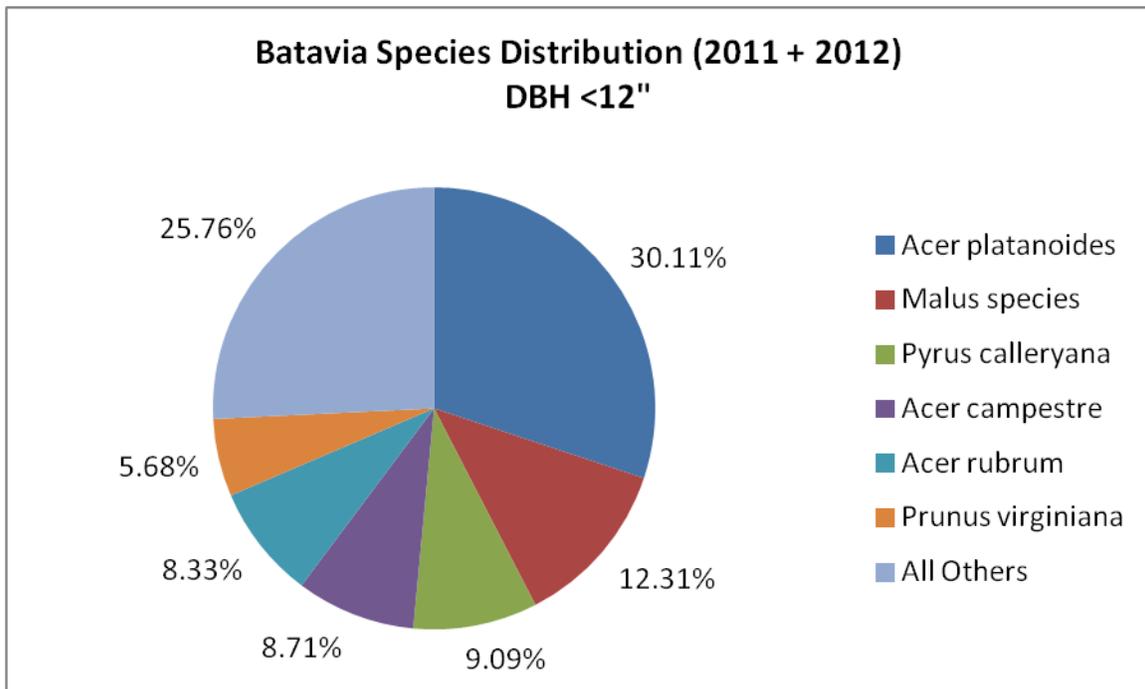
Another metric of diameter distribution has been postulated by Richards (1983).¹ According to Richards, an ideal distribution of street trees would find 40% of trees with a DBH less than 8 inches, 30% 8 to 16 inches, 20% 16 to 24 inches, and 10% greater than 24 inches. The graphs below plot the DBH distributions for inventoried Batavia street trees in relation to Richards' ideal DBH distribution.



¹ Richards, N.A. (1983) Diversity and stability in a street tree population. *Urban Ecology*, 7:159-171.

These graphs confirm the finding of the previous graphs and further suggest that additional younger, smaller trees need to be planted along the city's streets to account for the future loss of older trees.

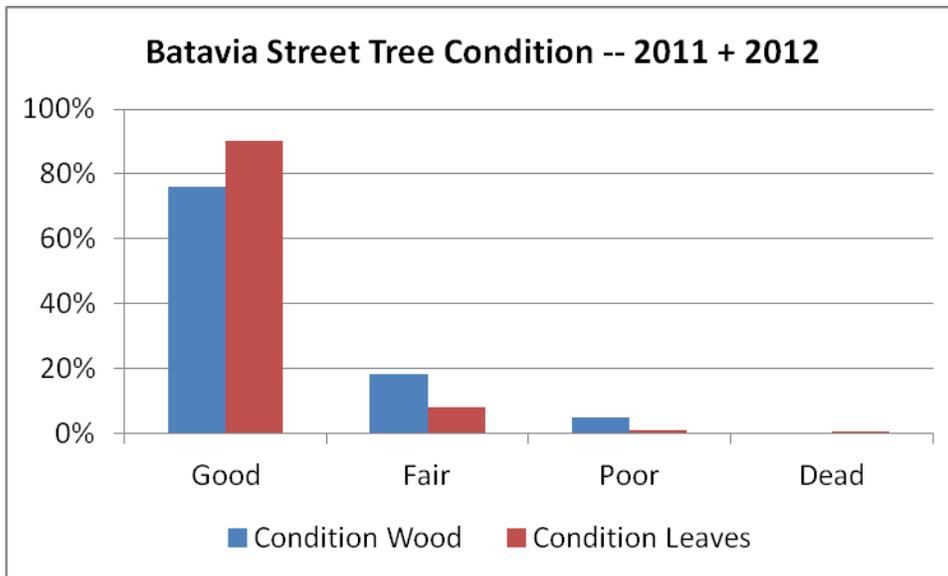
The two graphs below depict the DBH distribution of inventoried trees by species for trees with a DBH less than 12 inches and trees with a DBH of 12 inches and greater.



30.72% of inventoried trees have trunk diameters less than 12 inches while 69.28% of inventoried trees have diameters greater than or equal to 12 inches. Norway Maple (*Acer platanoides*) and Silver Maple (*Acer saccharinum*) dominate the larger DBH classes, and Norway Maple (*Acer platanoides*), Crabapple (*Malus species*), Callery Pear (*Pyrus calleryana*), and Hedge Maple (*Acer campestre*) are the most prevalent species in the smaller DBH classes.

Tree Condition and Maintenance

Most Batavia street trees inventoried in 2011 and 2012 are in good condition and a great majority is in at least fair condition (see graph below).



A majority of inventoried trees (88.82%) is in need of a Routine Prune at most, but 11.18% of inventoried trees were rated a High Priority Prune and 23.80% were rated "Consult Needed" and should be inspected by a licensed arborist (see table below).

Maintenance Recommendation	Percentage
None	61.55%
Train	3.53%
Routine Prune	23.68%
High Priority Prune	11.18%
Consult Needed	
No	76.14%
Yes	23.80%

69.59% of trees given a "Consult Needed" designation are Silver Maples (*Acer saccharinum*). Mature Silver Maples are typically given a "Consult Needed" designation due to their (1) age and large size and (2) V shaped branching structure which renders them vulnerable to sudden catastrophic failure. Accordingly, these Silver Maples warrant an inspection by a certified arborist even when in apparent good condition.

Additional Comments

The inventories in 2011 and 2012 located 87Ash (*Fraxinus*) trees or 5.04% of all trees inventoried. The Emerald Ash Borer is an invasive beetle that has devastated Ash trees in the Midwest and has now spread to New York State. New plantings of Ash trees should be avoided and consideration should be given to the likely need to remove established Ash trees in the future.

Associated Files

The following files are included as attachments accompanying this report:

An Excel file (*Data_2011_2012.xls*) which contains all data from the 2011 and 2012 inventories including trees and planting spaces.

A zipped *Batavia_2011_2012* file containing a "Shapefiles" folder in which can be found in GIS file format (UTM 18N NAD 83) the data contained in the "Data_2011_2012.xls" Excel file.

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