

**WATERSHED STREET TREE INVENTORY:
Understanding our Trees as a Resource**

**Report to
Nine Mile Run Watershed Association
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INTRODUCTION

Street trees offer benefits beyond aesthetics. By providing shade in the summer and trapping heat in the winter, they help to stabilize temperature and reduce energy consumption. By intercepting precipitation, they reduce the flow of storm water runoff into the sewer system. This decreases the amount of sewage that overflows into our streams, improving the ecosystem. Until now, the communities within the Nine Mile Run watershed had no gauge to measure the benefits provided by street trees. Tree benefits have a dollar value. If a tree provides shade to a building, the energy costs to cool the building are lower. Similarly, all of the services that are provided by trees, such as stormwater retention, etc. have a quantifiable value.

The Nine Mile Run Watershed Association (NMRWA) recognizes that it is important for a community to understand the value of their street trees. They are often viewed as simply part of the natural landscape; however, trees are a resource that can be used strategically to provide gain for the whole community. If we learn about the variety of benefits of street trees and their value, we can look at them as an investment and feel comfortable devoting resources to maintain and protect them.

TREE INVENTORY

NMRWA organized events from Fall 2005 to Fall 2006 to document an inventory of all the street trees in the watershed (apart from those trees already inventoried by the City of Pittsburgh). First, residents gathered to inventory street trees in the watershed boroughs of Edgewood, Swissvale and Wilkinsburg. During each inventory, residents learned about the types of trees present in their communities and how to recognize them. The volunteers recorded the location of each tree by: a number assigned to each street, the address of the nearest building and the tree's number in the order of trees that were at that address. Tree size was determined by its diameter at breast height (DBH). Furthermore, the general condition of the tree was assessed by the conditions of the crown and the trunk.

These tree inventory events were of vital importance to the mission of the NMRWA. Not only did they collect valuable information that will provide a snapshot in time of the state of all street trees in the watershed, but residents learned about trees and their importance to the community. NMRWA invited tree experts to teach the volunteers about how to recognize common tree species in our area as well as ways to evaluate the health of the wood and crown of the tree.

Tree inventory data is used by special software to calculate the value of the street trees as a resource for the community. A cost-benefit analysis, facilitated by iTree STRATUM software from the USDA Forest Service, allows a community to understand the economic and ecological benefits that come from healthy street trees. It can also help the municipality to manage these resources, providing guidance in choosing the tree species and planting locations to achieve optimum benefit.

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Tree inventory data has been collected for all of the municipalities in the Nine Mile Run Watershed. The City of Pittsburgh contracted Davey Tree Services to perform a full street tree inventory which was completed in 2005. Additionally, volunteers collected street tree data for Edgewood, Swissvale and Wilkinsburg. Information about City of Pittsburgh trees within the watershed was provided by the Pittsburgh Shade Tree Commission and the City of Pittsburgh.

INVENTORY ANALYSIS

There are two primary tools in the iTree software suite; STRATUM (Street Tree Resource Analysis Tool for Urban forest Managers) and UFORE (Urban Forest Effects Model). UFORE is used to help quantify environmental effects, such as air quality, resulting from an urban forest. STRATUM, which is used to help quantify the benefits of street trees, is the program that is used for this inventory analysis. STRATUM generates reports based on tree inventory data and information specific to the borough. Using these inputs the program produces a report of the benefits and cost of street trees to the community. Energy, stormwater and air quality benefits are reported according to tree species, size and other characteristics. These benefits, which will be referred to further on, are defined in Table 1 (iTree Users Manual p37). Generally, healthier trees, larger leaves and larger tree crowns can provide more shade and more surface area to absorb rain, carbon dioxide and air pollutants, hence, more benefit. Other considerations include the diversity of the tree population. If all trees are the same, they are likely to react in a similar way to environmental stress. Therefore, in order to cultivate a stable and resilient tree population, it is important to have trees of various ages and species.

Table 1: Categories of benefits for which STRATUM calculates a dollar value.

Energy	The sum of energy savings due to reduced natural gas use in winter (measured in MBtu ¹ /tree/year) and reduced electricity use for air conditioning in summer (measured in kWh ² /tree/year).
Storm Water	A measure of reduced annual stormwater runoff due to trees (measured in hundred cubic feet [CCF]/tree/year).
Air Quality	The sum of air pollutants (O ₃ , NO ₂ ³ , SO ₂ ⁴ , PM10 ⁵) deposited on tree surfaces and reduced emissions from power plants (NO ₂ , PM10, VOCs ⁶ , SO ₂) due to reduced electricity use (measured in pounds/tree/year). The model accounts for potential negative effects of trees on air quality due to BVOC ⁷ emissions.
Carbon Dioxide	The sum of decreased atmospheric CO ₂ due to sequestration by trees and reduced emissions from power plants due to reduced energy use. The model accounts for CO ₂ released as trees die and decompose and CO ₂ released during the care and maintenance of trees.
Aesthetic/ Other	A measure of the tangible and intangible benefits of trees reflected in increases in property values due to trees.
Summary	The total of energy, stormwater, air quality, carbon dioxide, and aesthetic/other benefits. Reported as \$ per tree or Total \$.

Footnotes (iTree Users Manual glossary):

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1 - **MBtu** – Million British thermal units. A BTU (British Thermal Unit) is the amount of heat necessary to raise one pound of water by 1 degree Fahrenheit.

2 - **Watt-hour** – One watt-hour is equivalent to one watt of power used for one hour. For example, a forty-watt light bulb uses 40 watt-hours of energy per hour. A kilo-watt-hour (KWh) is one thousand watt-hours, and a mega-watt-hour (MWh) is one million watt-hours.

3 - **Nitrogen Dioxide (NO₂)**– Nitrogen dioxide and other oxides of nitrogen (NO_x) are compounds typically created during the combustion process, and are major contributors to smog formation and acid deposition. As a result, NO₂ can have numerous adverse health effects.

4 - **Sulfur dioxide (SO₂)** – A strong-smelling, colorless gas that is formed by the combustion of fossil fuels. Power plants, which may use coal or oil high in sulfur content, can be major sources of SO₂. Sulfur oxides contribute to the problem of acid rain.

5 - **Particulate Matter** – A major class of air pollutants consisting of tiny solid or liquid particles of soot, dust, smoke, fumes, and mists. The EPA currently monitors fine particle pollution of PM_{2.5}, particulate matter that is less than or equal to 2.5 μm in diameter - 1/30th the diameter of a human hair. The size of the particles allows them to enter the air sacs (gas-exchange region) deep in the lungs where they can be deposited and result in adverse health effects. These pollutants are released from many sources including the production of energy to heat and cool buildings. Because research has not yet shown that trees affect PM_{2.5} levels, both STRATUM and UFORE calculate the benefit with respect to the former EPA standard of PM₁₀.

6 - **Volatile organic compounds (VOCs)** – Hydrocarbon compounds that exist in the ambient air and are by-products of energy used to heat and cool buildings. Volatile organic compounds contribute to the formation of smog and/or are toxic. Examples of VOCs are gasoline, alcohol, and solvents used in paints.

7 - **Biogenic Volatile Organic Compounds (BVOCs)** – Hydrocarbon compounds emitted from vegetation, (e.g., isoprene and monoterpenes) into the air that contribute to the formation of smog and/or may themselves be toxic.

The inventory data for each borough had to be formatted to interface with STRATUM. Each tree was assigned an identification number (“TreeID”), which was constructed from three pieces of inventory data: street segment, address and tree number (four, four and two digit numbers respectively). The ten-digit combination of these three numbers forms the TreeID, a unique number identifying each tree in its respective borough.

Information gathered from each borough is used to tailor the STRATUM results to better represent the borough. The average street and sidewalk widths will help determine the benefits provided by the shade of the tree canopy cover. Municipal budget figures give approximations of how much money is devoted annually to tree maintenance and other related costs. More specifically, tree maintenance is ‘the sum of all identifiable internal and external costs associated with the annual management of street trees citywide. Costs include, but are not limited to planting, pruning, tree and stump removal, pest and disease control, establishment and irrigation costs, repair and mitigation of infrastructure damage, litter and storm damage clean-up, program administration, and inspection and service requests.’ (iTree Users Manual p111)

STRATUM software reports statistical tree population information in several different terms and units for each of the three boroughs. For example, energy benefits are expressed in mega-watt-hours (MWh), Therms and dollars. These reports are used to evaluate the overall performance of the street trees and to compare them by species and by size. Certain tree species provide a larger measure of benefits. Also, mature trees that have reached full-size provide greater benefits than younger, smaller trees.

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RESULTS

One STRATUM output is the replacement value of the trees (cost of replacing the trees in their current condition). Replacement value is one way to gauge the value of the street tree population. The STRATUM analysis showed that the replacement values of the populations for each of the boroughs were in the millions; \$8 million in Edgewood, \$6.5 million in Wilkinsburg and \$5.3 million in Swissvale. The healthier a tree population is, the higher its value. In Figures 1-3, the potential value of a completely healthy tree population is shown beside the actual value for each of the three populations.



Figure 1: The bar on the left indicates the theoretical replacement value of the Edgewood street tree population if all the trees were in good health.

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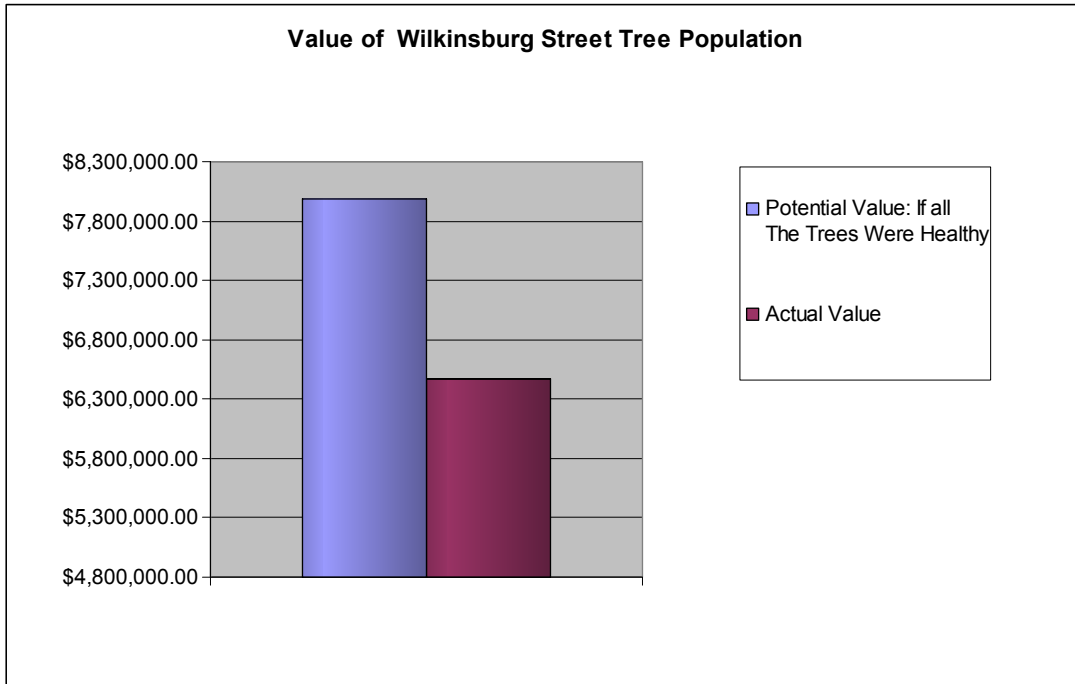


Figure 2: The bar on the left indicates the theoretical replacement value of the Wilkinsburg street tree population if all the trees were in good health.

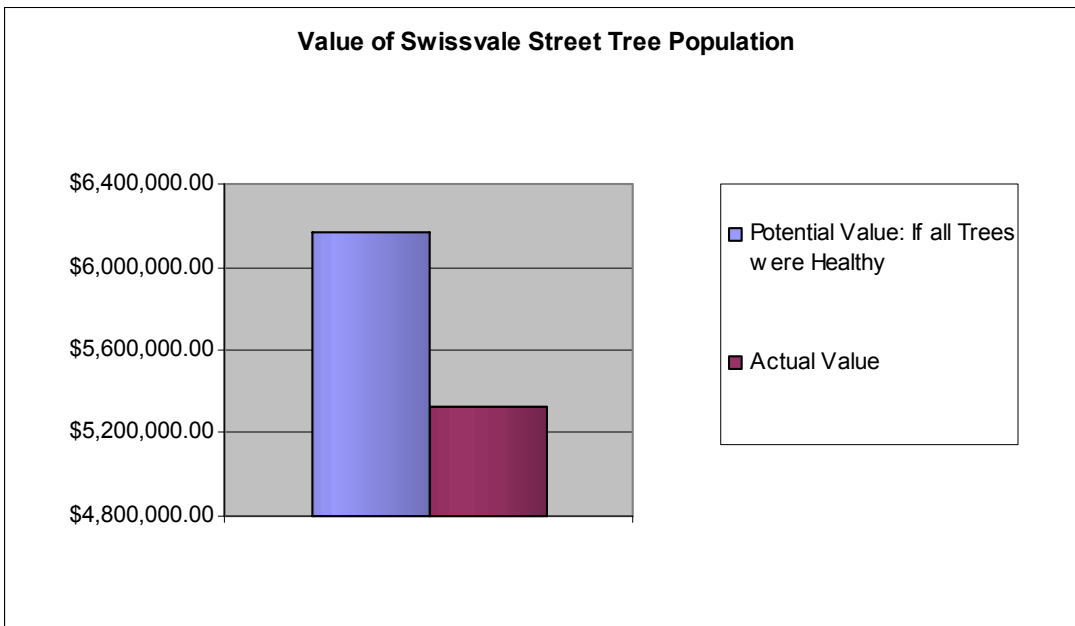


Figure 3: The bar on the left indicates the theoretical replacement value of the Swissvale street tree population if all the trees were in good health.

These replacement values, obtained from regional appraisal guides, are dependent on several factors. The value changes with species and trunk size, in addition overall health. Certain tree species are more highly rated than others. Even within a species,

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value changes because larger trees are worth more than younger, smaller ones. Figures 4-6, display how the replacement value varies both with species and trunk size (DBH).

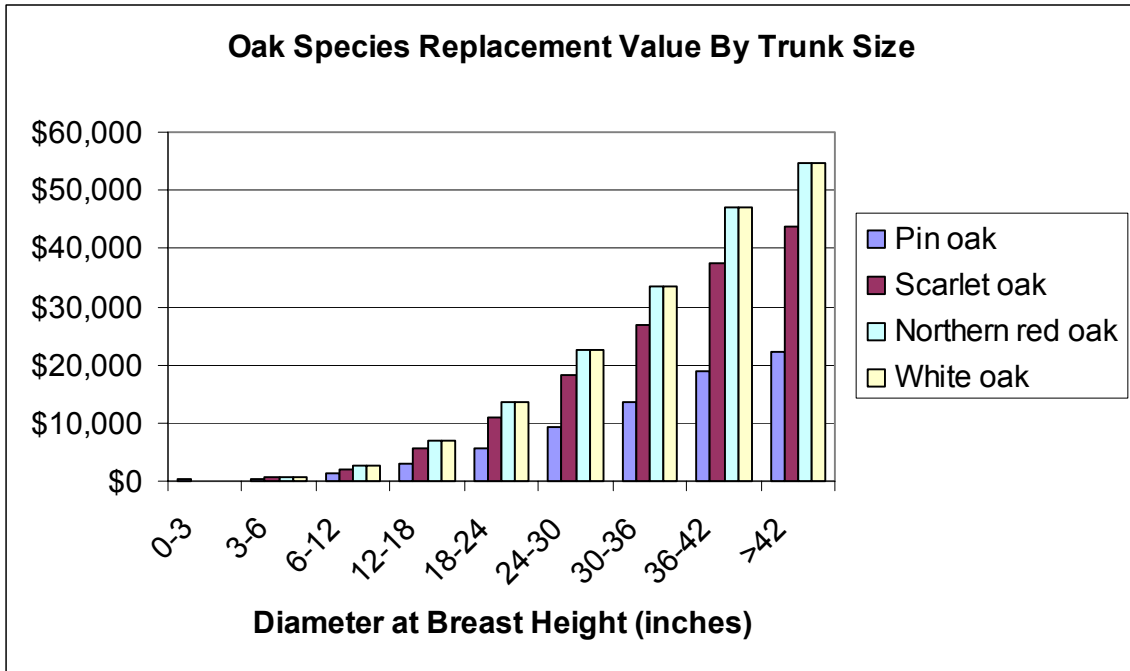


Figure 4: Replacement values of healthy Oak trees of various species and sizes.

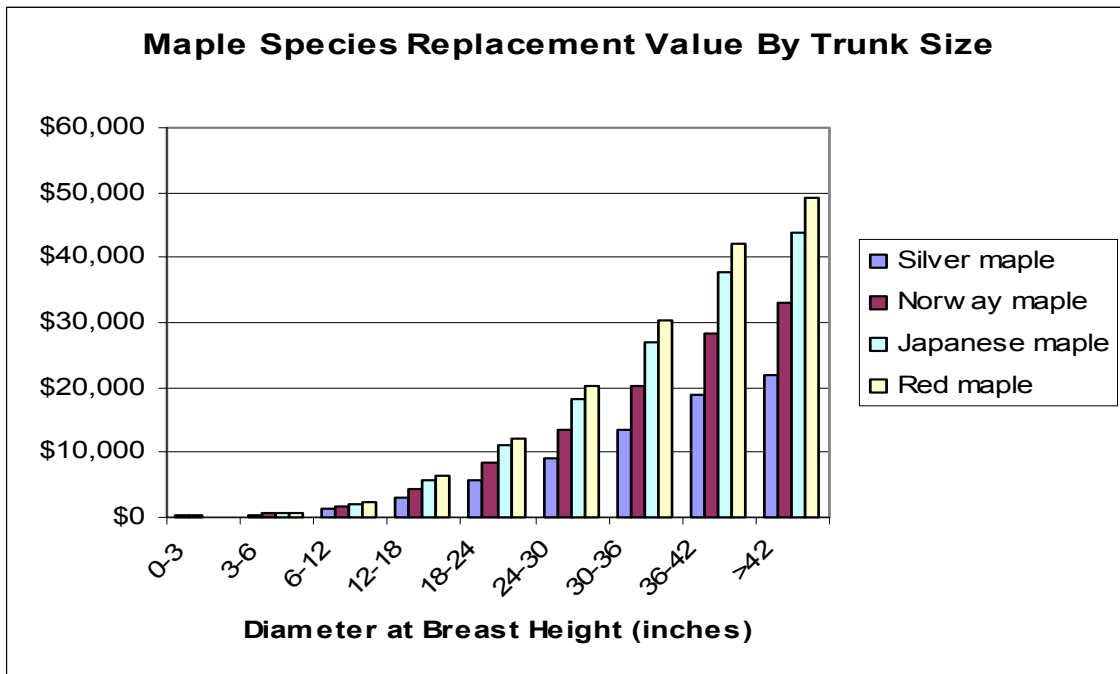


Figure 5: Replacement values of healthy Maple trees of various species and sizes.

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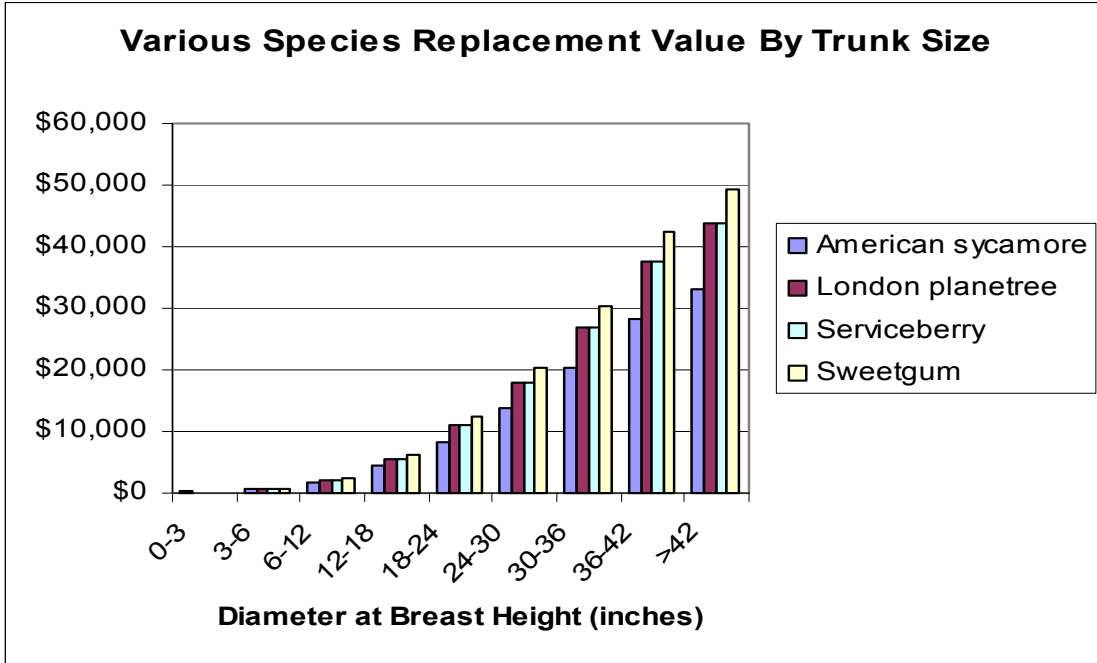


Figure 6: Replacement values of healthy trees of various species and sizes.

The three tables below display the value benefits provided for the categories shown in Table 1. Tables 2, 3 and 4 list the value of the benefits as the average dollar amount provided by a single tree in each of the most abundant tree species (\$/Tree). Table 2 illustrates the results of the Edgewood inventory; Table 3 the Swissvale inventory and Table 4 the Wilkinsburg inventory. The variety of trees in each inventory differs slightly and it is important to note the species that provide the greatest impacts in each borough

Table 2: Benefits per tree for the twelve most abundant species in Edgewood.

Edgewood

Annual Benefits of Public Trees by Species (\$/tree)

3/19/2007

Species	Energy	CO ₂	Air Quality	Stormwater	Aesthetic/Other	Total (\$) Standard
Pin oak	97.52	3.49	19.56	30.40	87.12	238.09 (N/A)
London planetree	114.08	2.90	20.43	32.65	76.45	246.52 (N/A)
Apple	9.21	0.16	1.43	1.23	10.38	22.42 (N/A)
Norway maple	52.37	1.56	9.40	10.38	49.23	122.94 (N/A)
Callery pear	12.83	0.43	2.34	2.80	51.51	69.91 (N/A)
Scarlet oak	99.94	3.61	20.36	31.95	88.80	244.66 (N/A)
Northern red oak	94.18	2.45	16.93	24.00	55.42	192.98 (N/A)
American	24.46	0.61	3.85	4.54	52.35	85.80 (N/A)
Sweetgum	92.63	1.74	11.04	21.92	58.83	186.16 (N/A)
Red maple	21.66	0.44	3.52	5.31	46.46	77.39 (N/A)
Littleleaf linden	25.12	0.54	3.89	4.92	35.47	69.94 (N/A)
American elm	114.88	3.35	24.38	34.53	116.08	293.22 (N/A)
Other street trees	36.27	0.88	6.56	9.24	34.70	87.65 (N/A)

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Table 3: Benefits per tree for the twelve most abundant species in Swissvale.

Swissvale

Annual Benefits of Public Trees by Species (\$/tree)

3/19/2007

Species	Energy	CO ₂	Air Quality	Stormwater	Aesthetic/Other	Total (\$) Standard
London planetree	113.31	2.86	20.20	31.89	75.59	243.85 (N/A)
Pin oak	73.34	2.34	13.77	20.42	73.22	183.10 (N/A)
Red maple	21.40	0.43	3.33	5.07	46.78	77.01 (N/A)
Littleleaf linden	58.18	1.09	9.67	11.38	28.80	109.11 (N/A)
Callery pear	18.78	0.63	3.74	4.59	58.71	86.45 (N/A)
Norway maple	37.01	1.00	6.39	6.68	34.45	85.52 (N/A)
Silver maple	77.21	1.74	14.34	21.23	44.98	159.49 (N/A)
Horsechestnut	60.44	2.16	10.29	14.40	62.38	149.67 (N/A)
Black locust	60.10	1.15	9.01	8.88	79.94	159.08 (N/A)
Sweetgum	46.83	0.84	5.61	8.33	45.47	107.08 (N/A)
Sugar maple	29.52	0.64	4.76	6.36	33.32	74.60 (N/A)
Pin cherry	12.85	0.25	1.94	1.56	9.76	26.36 (N/A)
Other street trees	42.95	0.92	7.16	8.19	37.95	97.17 (N/A)

Table 4: Benefits per tree for the eleven most abundant species in Wilkinsburg.

Wilkinsburg

Annual Benefits of Public Trees by Species (\$/tree)

3/19/2007

Species	Energy	CO ₂	Air Quality	Stormwater	Aesthetic/Other	Total (\$) Standard
Pin oak	85.38	2.75	16.25	24.31	79.95	208.64 (N/A)
Norway maple	56.70	1.59	10.07	10.53	50.25	129.14 (N/A)
London planetree	110.12	2.74	19.49	30.28	73.47	236.10 (N/A)
Honeylocust	59.84	1.16	10.31	11.91	61.04	144.26 (N/A)
Red maple	48.56	0.93	8.10	11.04	45.66	114.28 (N/A)
Silver maple	73.49	1.68	13.73	20.32	44.45	153.68 (N/A)
Callery pear	16.92	0.54	3.11	3.70	58.48	82.76 (N/A)
Ash	17.67	0.31	2.91	3.25	35.82	59.97 (N/A)
Black locust	53.19	1.07	8.84	10.19	75.14	148.43 (N/A)
Littleleaf linden	49.40	0.90	8.09	9.75	28.65	96.79 (N/A)
Northern red oak	90.89	2.33	16.15	22.68	54.17	186.22 (N/A)
Other street trees	30.46	0.74	5.09	6.51	40.91	83.70 (N/A)

Based on the three tables above, figures 7-9 provide a visual comparison of seven tree species. The seven species providing the highest dollar benefits on an individual tree basis are included in the pie charts. There are three different pie charts because the results are unique for each borough. For example, figure 7 shows that in Edgewood the average annual benefit provided by a Sweetgum tree is \$186, while figure 8 reports the average annual benefit from a Sweetgum tree in Swissvale is \$107. Several factors, from size to condition of the tree, can affect the benefits provided by the tree.

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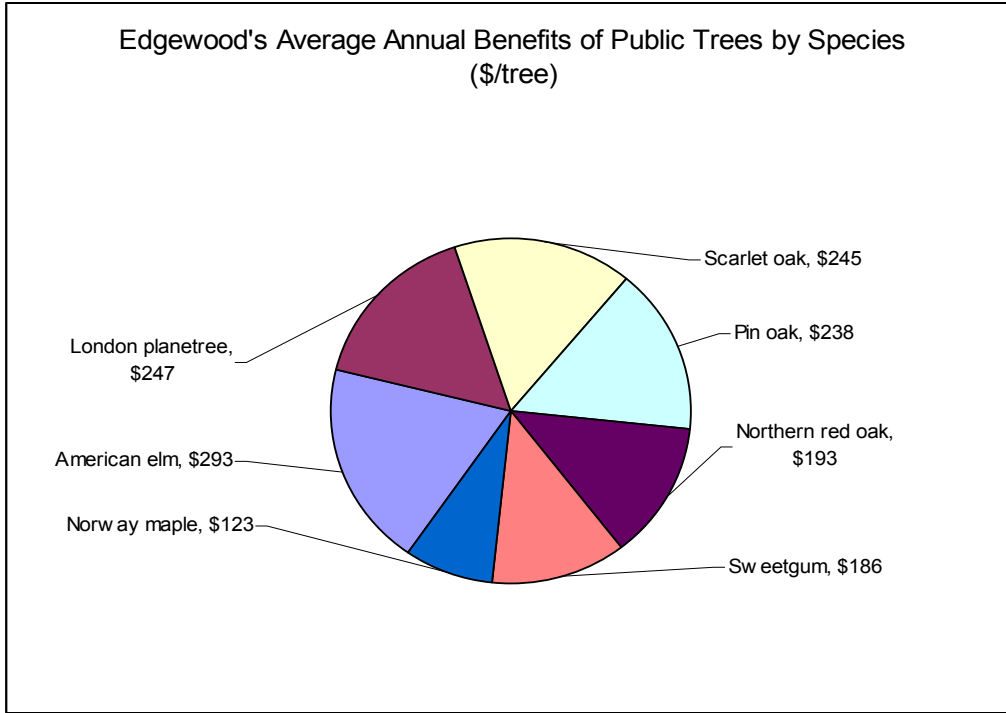


Figure 7: Average value of benefits provided to Edgewood by a single tree from each of seven species. Benefits include stormwater, energy, CO₂, air quality and aesthetic value.

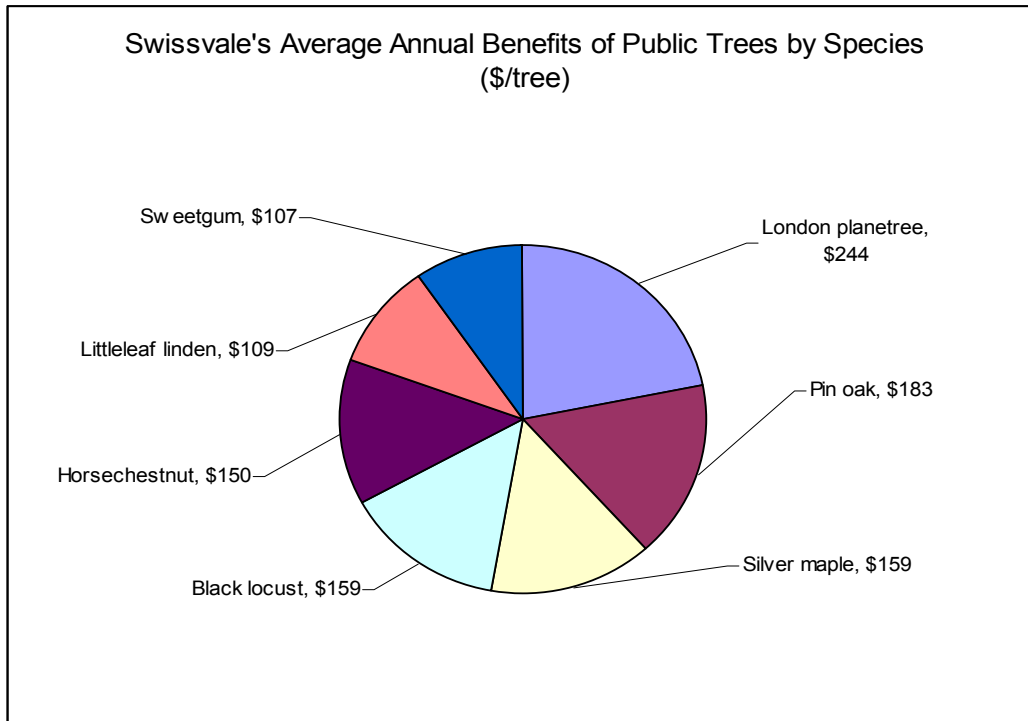


Figure 8: Average value of benefits provided to Swissvale by a single tree from each of seven species. Benefits include stormwater, energy, CO₂, air quality and aesthetic value.

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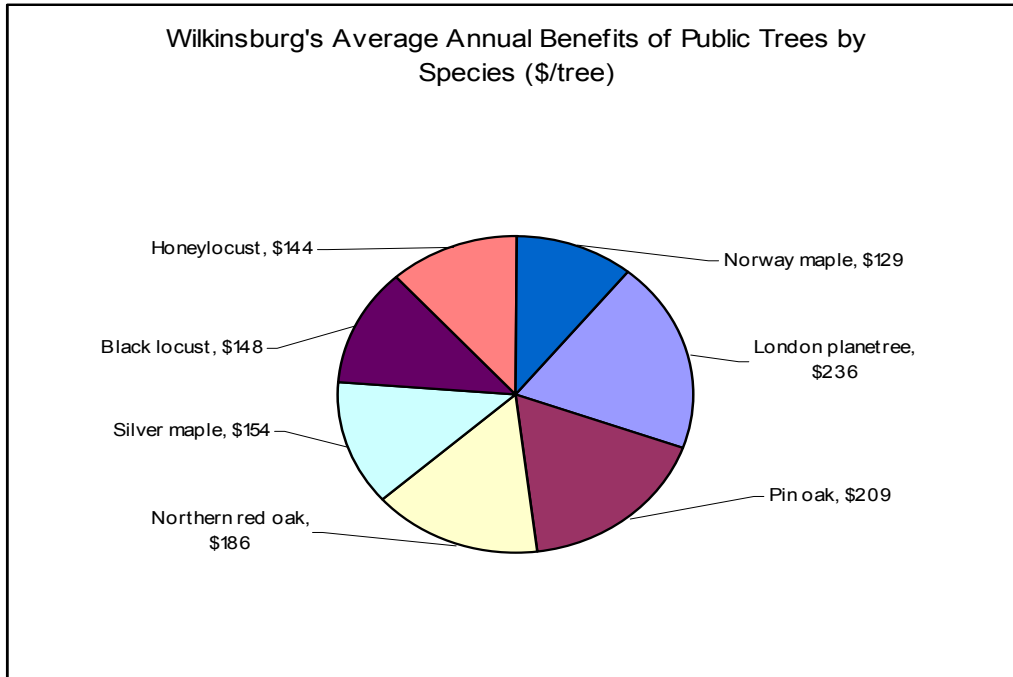


Figure 9: Average value of benefits provided to Wilkinsburg by a single tree from each of seven species. Benefits include stormwater, energy, CO₂, air quality and aesthetic value.

Clearly, there are certain species of trees that provide greater overall benefit. In fact, some of these species are consistently beneficial across the different boroughs. Two examples are the Pin Oak and the London Planetree. In Edgewood, other valuable trees are the Scarlet and Northern Red Oak, the Sweetgum and the American Elm; in Swissvale, the Sweetgum and the Silver Maple; in Wilkinsburg, the Northern Red Oak and the Silver Maple.

Since the NMRWA is primarily concerned with the role of the trees in reducing stormwater runoff, the figures below relate only to the benefits provided for reduction of stormwater. Figures 10-12 show a species comparison similar to that in figures 7-9. It is interesting to note that the species which are the best overall performers may not necessarily be the best in a particular benefit category. For Edgewood in figure 10, the best trees for stormwater reduction are the same as those for overall benefit in figure 7. In Swissvale, figure 11 shows the same tree species, though the rank among them changes from figure 8. For the Wilkinsburg trees, figure 12 shows a different species providing high stormwater benefits compared to overall benefits in figure 9. The Black Locust species in figure 9 is replaced by the Red Maple species in figure 12. This just illustrates that there are several species which provide important benefits and also that the most desirable species can change depending on what benefits are most important to the community.

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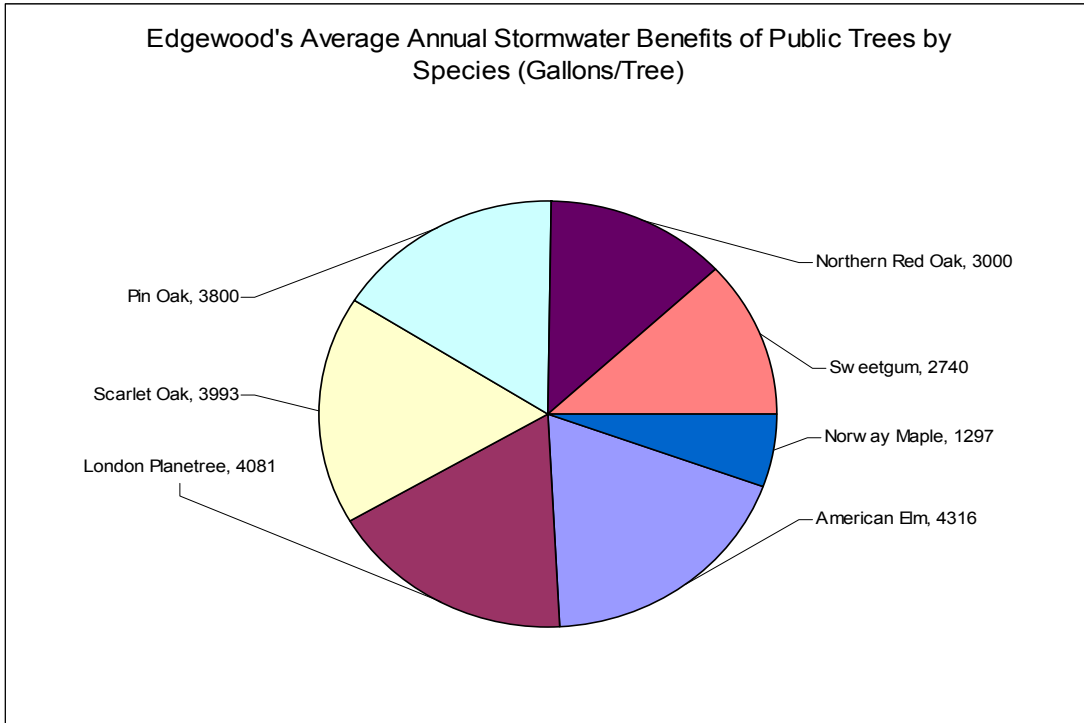


Figure 10: Average value of stormwater benefits provided to Edgewood annually by a single tree from each of seven species.

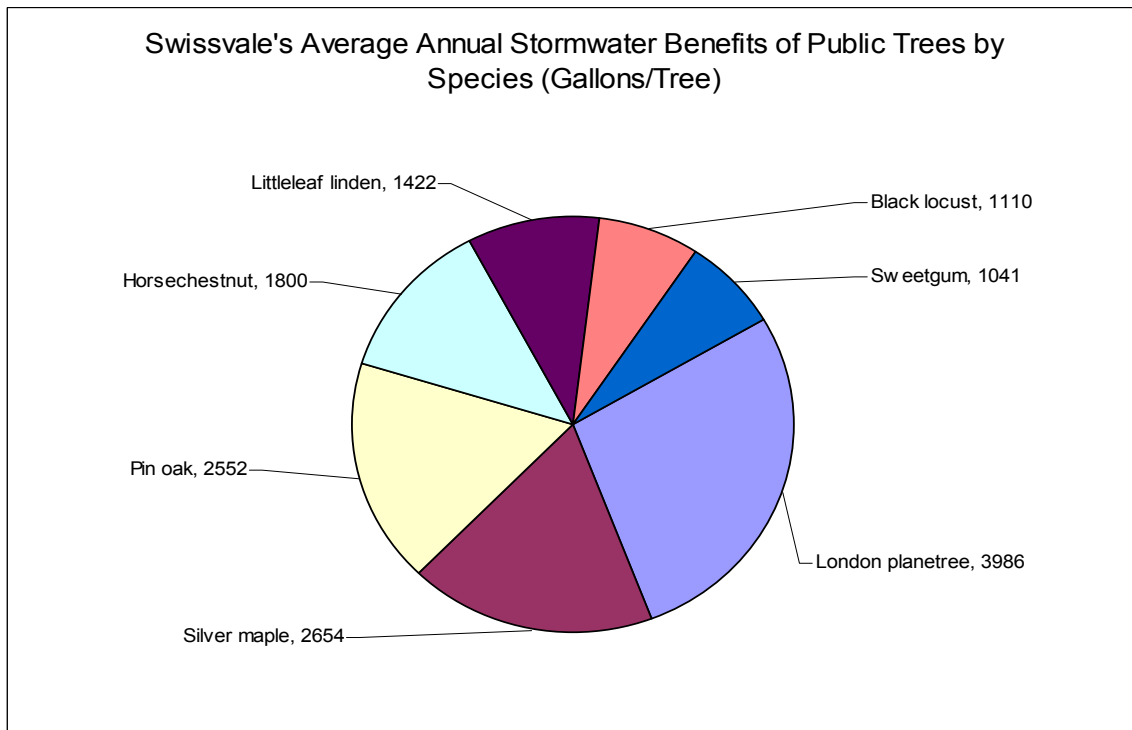


Figure 11: Average value of stormwater benefits provided to Swissvale annually by a single tree from each of seven species.

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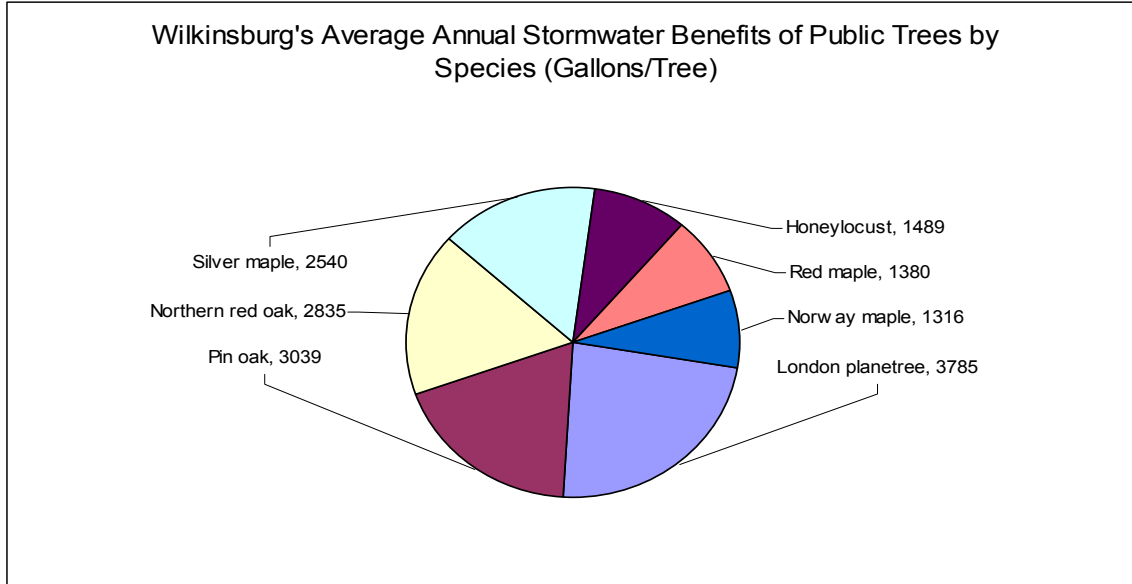


Figure 12: Average value of stormwater benefits provided to Wilkinsburg annually by a single tree from each of seven species.

All of the results that have been provided so far have been specific to particular tree species. A more general report is provided in Tables 5, 6 and 7. These tables illustrate the overall benefits for the entire borough rather than reporting by species. Each benefit category shows the average benefit per tree and per capita as well as the total value in each category. In addition to the benefits, the cost to the borough of tree maintenance is factored in to provide a cost-benefit ratio.

Table 5: Values of benefits provided by all the trees in Edgewood. The benefit-cost ratio is based on budget information collected from Edgewood.

Edgewood

Total Annual Benefits, Net Benefits, and Costs for Public Trees

3/19/2007

Benefits	Total (\$) Standard Error	\$/tree Standard Error	\$/capita Standard Error
Energy	68,322 (N/A)	76.59 (N/A)	20.63 (N/A)
CO2	2,036 (N/A)	2.28 (N/A)	0.61 (N/A)
Air Quality	12,786 (N/A)	14.33 (N/A)	3.86 (N/A)
Stormwater	19,659 (N/A)	22.04 (N/A)	5.94 (N/A)
Aesthetic/Other	56,755 (N/A)	63.63 (N/A)	17.14 (N/A)
Total Benefits	159,558 (±0)	178.88 (±0)	48.19 (±0)
Costs			
Planting	18,251	20.46	5.51
Contract Pruning	0	0.00	0.00
Pest	0	0.00	0.00
Irrigation	0	0.00	0.00
Removal	0	0.00	0.00
Administration	0	0.00	0.00
Inspection/Service	0	0.00	0.00
Infrastructure	0	0.00	0.00
Litter Clean-up	10,000	11.21	3.02
Liability/Claims	0	0.00	0.00
Other Costs	1,000	1.12	0.30
Total Costs	29,251	32.79	8.83
Net Benefits	130,307 (±0)	146.08 (±0)	39.36 (±0)
Benefit-cost ratio	5.45 (±0)		

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Table 6: Values of benefits provided by all the trees in Swissvale. The benefit-cost ratio is based on budget information collected from Swissvale.

Swissvale

Total Annual Benefits, Net Benefits, and Costs for Public Trees

3/19/2007

Benefits	Total (\$) Standard Error	\$/tree Standard Error	\$/capita Standard Error
Energy	46,763 (N/A)	67.67 (N/A)	4.84 (N/A)
CO2	1,197 (N/A)	1.73 (N/A)	0.12 (N/A)
Air Quality	8,236 (N/A)	11.92 (N/A)	0.85 (N/A)
Stormwater	12,116 (N/A)	17.53 (N/A)	1.26 (N/A)
Aesthetic/Other	40,320 (N/A)	58.35 (N/A)	4.18 (N/A)
Total Benefits	108,632 (±0)	157.21 (±0)	11.25 (±0)
Costs			
Planting	0	0.00	0.00
Contract Pruning	0	0.00	0.00
Pest	0	0.00	0.00
Irrigation	0	0.00	0.00
Removal	0	0.00	0.00
Administration	0	0.00	0.00
Inspection/Servic	0	0.00	0.00
Infrastructure	0	0.00	0.00
Litter Clean-up	0	0.00	0.00
Liability/Claims	0	0.00	0.00
Other Costs	12,000	17.37	1.24
Total Costs	12,000	17.37	1.24
Net Benefits	96,632 (±0)	139.84 (±0)	10.01 (±0)
Benefit-cost ratio	9.05 (±0)		

Table 7: Value of benefits provided by all the trees in Wilkinsburg. The benefit-cost ratio is based on budget information collected from Wilkinsburg.

Wilkinsburg

Total Annual Benefits, Net Benefits, and Costs for Public Trees

3/19/2007

Benefits	Total (\$) Standard Error	\$/tree Standard Error	\$/capita Standard Error
Energy	81,224 (N/A)	66.96 (N/A)	4.51 (N/A)
CO2	2,205 (N/A)	1.82 (N/A)	0.12 (N/A)
Air Quality	14,667 (N/A)	12.09 (N/A)	0.81 (N/A)
Stormwater	19,970 (N/A)	16.46 (N/A)	1.11 (N/A)
Aesthetic/Other	73,390 (N/A)	60.50 (N/A)	4.08 (N/A)
Total Benefits	191,456 (±0)	157.84 (±0)	10.63 (±0)
Costs			
Planting	3,000	2.47	0.17
Contract Pruning	0	0.00	0.00
Pest	0	0.00	0.00
Irrigation	0	0.00	0.00
Removal	0	0.00	0.00
Administration	0	0.00	0.00
Inspection/Servic	0	0.00	0.00
Infrastructure	0	0.00	0.00
Litter Clean-up	20,736	17.09	1.15
Liability/Claims	0	0.00	0.00
Other Costs	6,800	5.61	0.38
Total Costs	30,536	25.17	1.70
Net Benefits	160,920 (±0)	132.66 (±0)	8.94 (±0)
Benefit-cost ratio	6.27 (±0)		

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The six figures above present information about only a dozen tree species, however, these species represent over eighty percent of the species of street trees in the three boroughs. A more complete illustration is provided below. The annual stormwater benefits for all of the tree species that are in the communities of Wilkinsburg, Edgewood and Swissvale are shown in figure 13. Since the species number about fifty, they are clustered into groups A – M. The species that intercept a similar volume of rainfall are grouped together. The approximate volume of rainfall is indicated in figure 13. The species that are included in each group are listed in table 8.

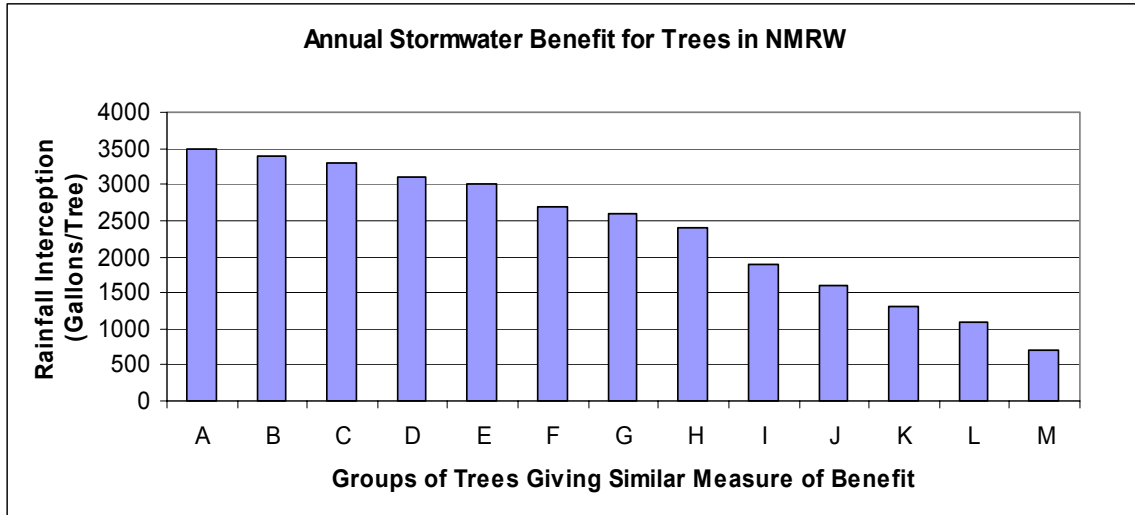


Figure 13: Species of trees, by group, and the stormwater reduction benefit provided.

Table 8: List of species included in each group.

GROUP	SPECIES
A	American elm
	Elm
	Siberian elm
B	Pin oak
	Scarlet oak
	White oak
	Northern red oak
C	Black locust
	Eastern cottonwood
	Northern hackberry
	Tree of heaven
D	Tulip tree
	American sycamore
	London planetree
E	Silver maple
	Sugar maple
	Ash
F	Green ash
	White ash
	Honeylocust
	Crimson king maple
	Japanese maple
G	Norway maple
	Striped maple
H	Sweetgum
	American basswood
	Basswood
I	Corkscrew willow
	Northern catalpa
	Red maple
	Red mulberry
	Ginkgo
J	Callery pear
	Horsechestnut
	Red horsechestnut
	Eastern hemlock
	Littleleaf linden
	Apple
	American plum
	Black cherry
	Cherry plum
	Downy serviceberry
Eastern redbud	
K	European mountain ash
	Flowering dogwood
	Goldenrain tree
	Hawthorn
	Kousa dogwood
	Kwanzan cherry
	Pin cherry
Serviceberry	

WATERSHED STREET TREE INVENTORY

Similarly, total annual benefits for all of the tree species that are in the communities of Wilkinsburg, Edgewood and Swissvale are shown in figure 14, they are clustered into groups A – L. The species that provide a similar dollar amount in total annual benefits are grouped together. The approximate value is indicated in figure 14. The species that are included in each group are listed in table 9.

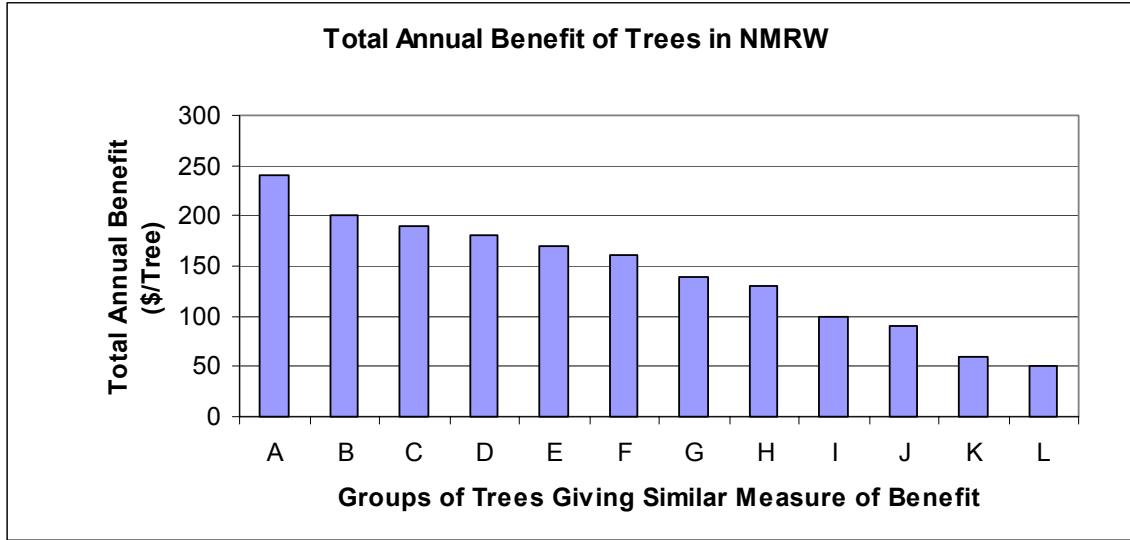


Figure 14: Species of trees, by group, and the total annual benefit provided.

Table 9: List of species included in each group.

GROUP	SPECIES	
A	American elm	
	Elm	
	Siberian elm	
B	Pin oak	
	Scarlet oak	
	White oak	
	Crimson king maple	
	Japanese maple	
	Norway maple	
	Striped maple	
C	Black locust	
	Eastern cottonwood	
	Northern hackberry	
	Tree of heaven	
	Tulip tree	
	Northern red oak	
D	Ash	
	Green ash	
	White ash	
	American sycamore	
	London planetree	
E	Sugar maple	
F	Honeylocust	
	Silver maple	
G	Ginkgo	
	Callery pear	
	American basswood	
	Basswood	
H	Sweetgum	
	Corkscrew willow	
	Northern catalpa	
	Red maple	
	Red mulberry	
	Horsechestnut	
I	Red horsechestnut	
	Eastern hemlock	
	J	Littleleaf linden
		K
	American plum	
	Black cherry	
	Cherry plum	
	Downy serviceberry	
	Eastern redbud	
	European mountain ash	
	Flowering dogwood	
Goldenrain tree		
Hawthorn		
L	Kousa dogwood	
	Kwanzan cherry	
	Pin cherry	
	Serviceberry	

WATERSHED STREET TREE INVENTORY

CONCLUSION

Many of the causes of erosion and pollution of our streams are directly related to urbanization. This can be seen in the asphalt and concrete covering much of the landscape. Currently, street trees play a more important role than ever in helping to restore natural storm water and pollution controls. Street trees provide a large surface area of leaves, which intercept rainfall, heat and air pollution. They have a direct effect on improving the health of the watershed ecosystem and all those who depend upon it, most significantly, its residents.

STRATUM provides an important service by helping the community to understand the value of their street tree resources. Results show a strong performance by Elms and Oaks, which provide the greatest benefits. However, many of the other species provide comparable benefits as well. Therefore, it is important to value street trees as an investment by promoting healthy trees and maintaining the population.

It is evident by looking at STRATUM results that there is a significant gain for the community on an investment in maintaining a healthy street tree population. The types of benefits are wide-ranging; from energy savings to reduced storm water runoff to increased property values. However, reduction of stormwater is particularly important because it helps to reverse the degradation of our surface water quality. The impervious surfaces that make up most of the developed land in our community block the natural processes that allow infiltration of rainfall into the ground. Instead, the runoff travels, picking up pollutants long the way, to our sewer systems. It is to the benefit of the community to understand and gain an appreciation for the role of street trees in protecting our resources.

RESOURCES AND FURTHER READING

McPherson, E. Gregory; Simpson, James R.; Peper, Paula J.; Gardner, Shelley L.; Vargas, Kelaine E.; Maco, Scott E.; Xiao Qingfu; 2005. Midwest Community Tree Guide.

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