

WV Project CommuniTree

2012-2015 Tree Purchase Statistics & i-Tree Streets Analysis

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Building communities from the roots up!

Prepared by Cacapon Institute

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Introduction

Cacapon Institute (CI) has prepared this report to inform future planning and tree purchases with the goal of increasing species diversity and providing greater short-term and long-term benefits of trees planted through WV Project CommuniTree. A summary of accomplishments 2012-2015 is displayed in the table below.¹ Records for each column are in bold.

Planting Season	Planting Events	Trees Planted	Acres Trees (100/acre)	Volunteers Engaged	Volunteer Hours
Spring 2012	10	444	4.4	570	1,286
Fall 2012	11	282	2.8	759	1,116
Spring 2013	16	710	7.1	1,319	1,877
Fall 2013	10	204	2.0	429	848
Spring 2014	19	528	5.3	1,554	3,141
Fall 2014	10	370	3.7	504	1,233
Spring 2015	18	596	6.0	1,408	2,687
Fall 2015	13	292	2.9	959	1,191
Total 2012-2015	107	3,426	34.3	7,502	13,379

¹ WV Project CommuniTree began in 2008 under the direction of WV Conservation Agency. Between 2008 and 2011, CTee had 9 planting events and planted 1,722 trees. In 2012, CTee was renewed under a broader partnership with WV Division of Forestry, WV DEP, and Cacapon Institute joining WV Conservation Agency.

Species Diversity (Charts on page 4-6)

The top three species planted through the WV Project CommuniTree program in 2012-2015 are Eastern Redbud (434, 15%), Serviceberry (292, 10%), and Flowering Dogwood (220, 8%).

Although these trees are beautiful and are frequently requested by CTree applicants, planting larger, shade trees (i.e., long-lived and large growing species) will have a greater benefit for reducing stormwater runoff pollution, increasing tree canopy, improving public health, reducing particulate and air pollution, and making communities more resilient to climate change.

Where flowering trees (i.e., shorter growing species) are required, such as under power lines, a greater diversity is necessary to provide greater benefits as described above. Despite the restraints that have limited purchase of larger or more diverse trees in the past, including low availability, high cost, or incompatible stock sizes, a wider range of species needs to be considered. The “cost benefit” of trees should weigh diversity and greater, long-term, ecological benefits and look beyond individual trees’ purchase price.

Based on the “10-20-30 Rule” (page 5) the CTree program exceeded the species rule on two counts, slightly exceeded the genus rule on one, but met the family rule. Eastern Redbud (15%) was planted at half again the 10% recommended species limit. Serviceberry (10.3%) narrowly exceeded the species rule. *Quercus* (20.6%) narrowly exceeded the 20% genus rule. Of the 3,426 trees planted, all groupings of trees by family were well below the 30% family rule (*Fagaceae* (20.6%) was planted most frequently).

Tree Cost by Species (Table on page 7)

Given that greater diversity is necessary, it is useful to review previous purchases’ cost per individual tree. Making more cost effective purchases may make it possible to purchase a wider range of species. Trees are a commodity so there is no certainty that costs will remain constant. This analysis did not factor in stock size. None the less, looking strictly at cost per species per tree is a beginning look at market costs while seeking a wider range of species in future purchases. Additional analysis of species cost is recommended including:

- cost per tree given survival rates,
- cost per tree that includes stock size information,
- cost per tree in relation to short term ecological benefits, and
- cost per tree in relation to long term ecological benefits.

Benefits by Species, i-Tree Analysis of Current and 20-year Growth (Chart on page 8)

i-Tree Streets can be used to assign quantitative values to the amount of pollution trees mitigate, remove, and/or store. i-Tree then assigns a dollar value to those benefits.² Trees must be classified based on species, size, health, and other inputs in order for i-Tree to assign a value. More inputs will provide more informative i-Tree outputs. In the short-term model, all 3,426 trees that were planted through WV Project CommuniTree (2012-2015) are assumed to fall into the smallest i-Tree DBH class classification (1-3" DBH). Based on this "stock size" (i.e., size when planted), eastern redbuds, serviceberry, and flowering dogwoods provide the most benefit. This is due, in large part, to the larger percentage planted. In the 20-year growth analysis we assume shade and evergreen trees reach the DBH class of 6-9", flowering trees reach the DBH class 3-6", and shrubs remain in the DBH class 1-3". In the long-term model, pin oaks, white oaks, and red maples will provide the greatest benefits after a 20-year grow-out period. Over time, the benefits of flowering trees (that dominate early) is surpassed by the shade trees that have a higher per-tree benefit due to greater canopy cover, carbon sequestration, and mitigation of air pollution.

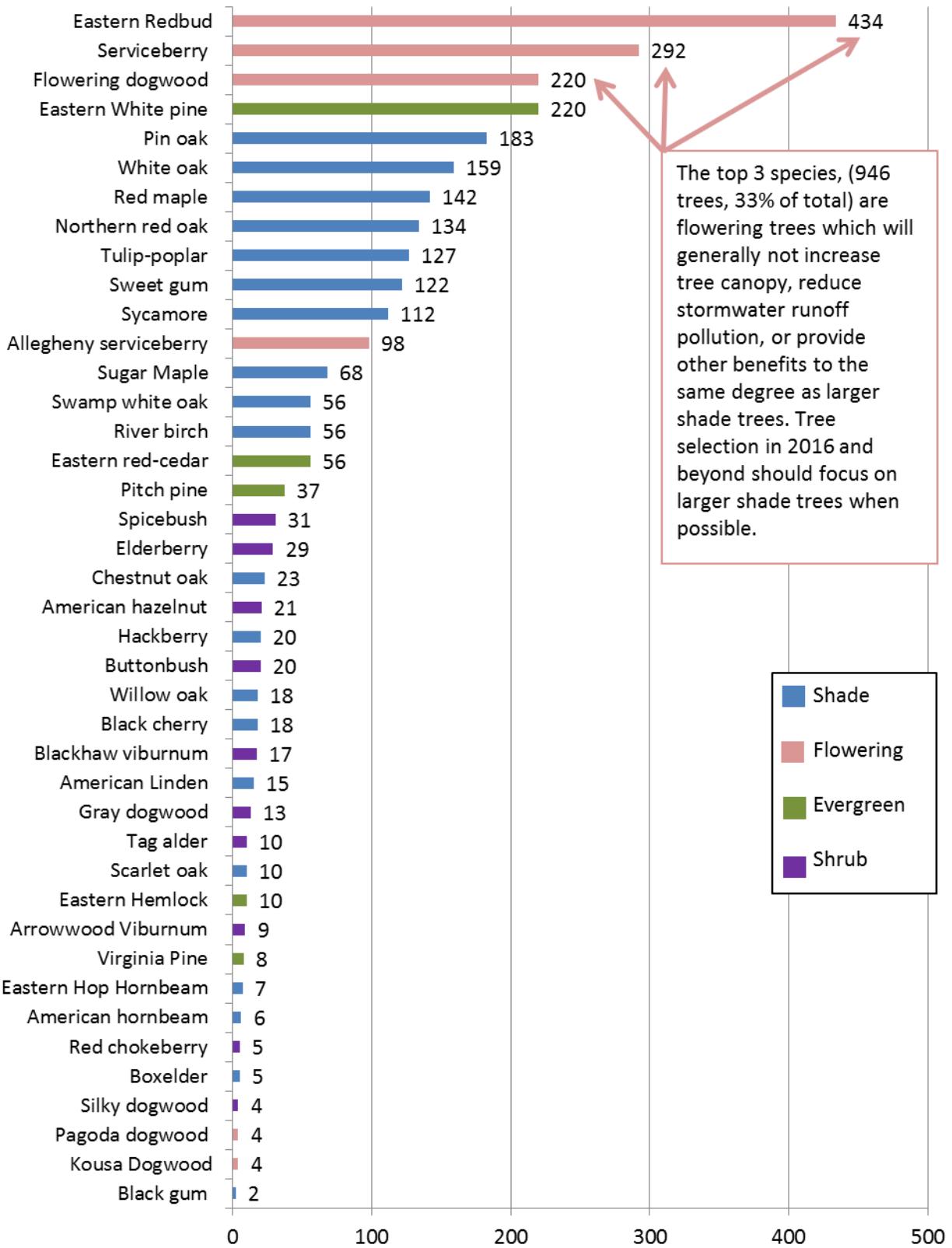
Recommendation

More investigation is needed but, in order to increase diversity and foster greater benefits (both short-term and long-term), two recommendations can be made.

1. Expand the planting of "shade trees" (i.e., large growing, long-lived species). While "flowering trees" (smaller species often used as ornamentals) are popular, an effort should be made to improve the public understanding of, and desire for, species that produce the greatest long-term benefit. Sycamores, for example, appear to be popular (112 have been planted), their cost is unexceptional, and their ecological benefit expands greatly over time.
2. Continue applying the "10-10-30% rule." Over-planted species and genus (eastern redbud, serviceberry, and *Quercus* (oaks) particularly) should be brought into balance. This can be achieved by limiting their planting number and/or by increasing the relative number of *other* types of trees planted. Educating the public on the benefits of "shade trees" such as *Liquidambar* and *Tilia*, species with a reasonable cost, good long-term benefits, and that are also highly sought after for their landscape value, may increase applicants' request for them.

² Cacapon Institute recognizes that trees have intrinsic value beyond our ability to quantitatively measure. In addition, fixing a monetary value creates a somewhat arbitrary dollar value (markets vary and the value of energy saving, for example, will fluctuate). The USDA Forest Service i-Tree Streets tool, used for this report, is not specifically intended for the purpose of evaluating trees planted across time and projects but, broadly speaking, use of i-Tree Streets presents not unlikely, potential, short-term and long-term benefits for the trees.

CTree 2012-2015 - Species Planted



CTree 2012-2015 - "10-20-30" Rule								
Family (19)(30% MAX)	Count	%	Genus (25)(20% MAX)	Count	%	Species (41)(10% MAX)	Count	%
Fagaceae	583	20.6%	<i>Quercus</i>	583	20.6%	<i>Cercis canadensis</i>	434	15.4%
Fabaceae	434	15.4%	<i>Cercis</i>	434	15.4%	<i>Amelanchier canadensis</i>	292	10.3%
Rosaceae	408	14.4%	<i>Amelanchier</i>	390	13.8%	<i>Pinus strobus</i>	220	7.8%
Pinaceae	275	9.7%	<i>Pinus</i>	265	9.4%	<i>Cornus florida</i>	220	7.8%
Cornaceae	247	8.7%	<i>Cornus</i>	245	8.7%	<i>Quercus palustris</i>	183	6.5%
Sapindaceae	215	7.6%	<i>Acer</i>	215	7.6%	<i>Quercus alba</i>	159	5.6%
Altingiaceae	127	4.5%	<i>Liriodendron</i>	127	4.5%	<i>Acer rubrum</i>	142	5.0%
Magnoliaceae	122	4.3%	<i>Liquidambar</i>	122	4.3%	<i>Quercus rubra</i>	134	4.7%
Betulaceae	122	4.3%	<i>Platanus</i>	112	4.0%	<i>Liriodendron tulipifera</i>	127	4.5%
Platanaceae	112	4.0%	<i>Juniperus</i>	56	2.0%	<i>Liquidambar styraciflua</i>	122	4.3%
Cypress	56	2.0%	<i>Betula</i>	56	2.0%	<i>Platanus occidentalis</i>	112	4.0%
Lauraceae	31	1.1%	<i>Lindera</i>	31	1.1%	<i>Amelanchier laevis</i>	98	3.5%
Rubiaceae	20	0.7%	<i>Sambucus</i>	29	1.0%	<i>Acer saccharum</i>	68	2.4%
Cannabaceae	20	0.7%	<i>Viburnum</i>	26	0.9%	<i>Juniperus virginiana</i>	56	2.0%
Caprifoliaceae	17	0.6%	<i>Corylus</i>	21	0.7%	<i>Betula nigra</i>	56	2.0%
Tiliaceae	15	0.5%	<i>Cephalanthus</i>	20	0.7%	<i>Quercus bicolor</i>	56	2.0%
Caprifoliaceae	9	0.3%	<i>Celtis</i>	20	0.7%	<i>Pinus rigida</i>	37	1.3%
Betulaceae	7	0.2%	<i>Prunus</i>	18	0.6%	<i>Lindera benzoin</i>	31	1.1%
Rosaceae	5	0.2%	<i>Tilia</i>	15	0.5%	<i>Sambucus canadensis</i>	29	1.0%
	2825	100%	<i>Tsuga</i>	10	0.4%	<i>Quercus prinus</i>	23	0.8%
			<i>Alnus</i>	10	0.4%	<i>Corylus americana</i>	21	0.7%
			<i>Ostrya</i>	7	0.2%	<i>Cephalanthus occidentalis</i>	20	0.7%
			<i>Carpinus</i>	6	0.2%	<i>Celtis occidentalis</i>	20	0.7%
			<i>Aronia</i>	5	0.2%	<i>Prunus serotina</i>	18	0.6%
			<i>Nyssa</i>	2	0.1%	<i>Quercus phellos</i>	18	0.6%
				2825	100%	<i>Viburnum prunifolium</i>	17	0.6%
						<i>Tilia americana</i>	15	0.5%
						<i>Cornus racemosa</i>	13	0.5%
						<i>Tsuga canadensis</i>	10	0.4%
						<i>Quercus coccinea</i>	10	0.4%
						<i>Alnus serrulata</i>	10	0.4%
						<i>Viburnum dentatum</i>	9	0.3%
						<i>Pinus virginiana</i>	8	0.3%
						<i>Ostrya virginiana</i>	7	0.2%
						<i>Carpinus caroliniana</i>	6	0.2%
						<i>Acer negundo</i>	5	0.2%
						<i>Aronia arbutifolia</i>	5	0.2%
						<i>Cornus kousa 'Green Sleeves'</i>	4	0.1%
						<i>Cornus alternifolia</i>	4	0.1%
						<i>Cornus amomum</i>	4	0.1%
						<i>Nyssa sylvatica</i>	2	0.1%
							2825	100%

The “10-20-30” rule of biodiversity states that a tree population should be comprised of no more than 10% of any species, 20% of any genera, or 30% of any family. In Urban Forestry, following this rule will help ensure that the tree population is biodiverse and therefore less susceptible to major decline in tree canopy from exotic pests or diseases.

For WV Project CommuniTree 2012-2015, only 2 tree species exceeded the 10% rule (*Cercis canadensis* and *Amelanchier canadensis*), 1 genera of trees exceeded the 20% rule (*Quercus*), and no families of trees exceeded the 30% rule.

More about the “10-20-30” rule can be found in this publication – [“Trees for Urban Planting – Diversity, Uniformity, and Common Sense”](#).

WV Project CommuniTree 2012-2015 - Family, Genus, & Species

