Hayward, California

Urban Forest Resource Analysis

February 2012

DAVEY RESOURCE GROUP

A Division of The Davey Tree Expert Company

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Urban Forest Resource Analysis

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Executive Summary

Recognized by the National Arbor Day Foundation as a Tree City, USA for more than 25 years, Hayward, California acknowledges that trees are important for the environmental and quality of life benefits they provide. The community has an active urban forest program along with a comprehensive ordinance that protects trees on streets and public right-of-ways.

As further evidence of their long-standing, proactive stance to managing the urban forest, the City contracted with Davey Resource Group (DRG) in 2011 to inventory publicly owned trees on streets and right-of-ways, in parks, and at City facilities. The inventory, conducted by a team of arborists, included a brief inspection of each tree. In addition to the geographic location, the arborist also recorded the species, size, condition, and current maintenance needs of each tree. The inventory identified 29,248 trees and 8,276 available planting sites. Using the collected information in conjunction with i-Tree benefit-cost modeling software, DRG developed a detailed and quantified analysis of the current structure, function, and value of Hayward's public tree resource.

The analysis determined that Hayward's public trees are a cost-effective resource that provides annual benefits of $1,483,016 ($50.70 per tree). These benefits include energy savings, air quality improvements, stormwater interception, atmospheric CO_2 reduction, and aesthetic contributions to the social and economic health of the community. Considering the annual investment of $1,164,542 ($7.99 per capita) to provide care for this resource, the community realizes an overall net benefit of $318,474. **The bottom line is that for every $1 spent on public trees, the community receives $1.27 in benefits.**

Each year, public trees reduce electrical energy consumption by 2,692 megawatt hours (MWh) and annual natural gas consumption by 55,712 therms, for a combined value of $464,981. In addition, canopy from this population annually reduces stormwater runoff by 32.3 million gallons, protecting local water resources, including the San Francisco Bay, by preventing the introduction of sediment and pollutants. Due to the prevalence of some species that naturally emit higher amounts of biogenic volatile organic compounds (BVOCs), the air quality impact from the overall population is negative (-$227,112). However, the population, as a whole, is removing, through deposition and interception, 4.5 tons of nitrogen dioxide (NO_2), sulfur dioxide (SO_2), ozone (O_3), and small particulate matter (PM_{10}) from the atmosphere each year.

While Hayward is already realizing a positive return on its urban forest investment, there is plenty of room to grow. With a current stocking rate of 78%, there are a good number of sites available for planting additional trees. Furthermore, the age distribution of existing trees is young to intermediate. As these trees continue to mature and new trees are planted, the benefits from the street tree resource will continue to increase. Of course, it will be necessary to continue to dedicate sufficient resources for the management and care of this vital and dynamic resource. With a strong urban forest program as a solid foundation, Hayward's public trees are poised to deliver an increasing and sustainable benefit stream for many generations to come.

Introduction

The City Hayward, California is located in Alameda County on the east side of the San Francisco Bay and 25 miles southeast of San Francisco. Chartered in 1876, Hayward encompasses an area of 62.55 square miles and has a current population estimated at 145,839. The City, known as the "Heart of the Bay", enjoys a Mediterranean climate and a growing business community. Taking pride in a history of ethnic diversity, Hayward fosters an accepting and caring environment where "people from many cultures live and work together to build a community reflective of its residents[1]". Planning for the future, the community is focused on balancing the needs of a growing population with the preservation of open space, and the need for economic development.

With a tradition of beautiful tree-lined streets, Hayward is a community determined to preserve, build, and nurture its urban forest. The City has an active urban forest program (Hayward Street Tree Program) along with a Certified Arborist and three tree crews that ensure street trees are maintained in a healthy and safe condition. Municipal Code (Section 7-2.50 – 7-2.65) governs the care and preservation of street trees and requires residents to obtain permission to plant, trim, or remove trees in public street right-of-ways. Focused on building the urban forest, the Keep Hayward Green Program offers to plant a free street tree for residents who agree to nurture the tree with water, care, and regular inspection.

Individual trees and a healthy urban forest play important roles in the quality of life and the sustainability of Hayward. Research has demonstrated that healthy urban trees can improve the local environment and lessen the impact resulting from urbanization and industry (CUFR). Trees improve air quality by manufacturing oxygen and absorbing carbon dioxide (CO_2), as well as filtering and reducing airborne particulate matter such as smoke and dust. Urban trees reduce energy consumption by shading structures from solar energy and reducing the overall rise in temperature created through urban heat island effects (EPA). Urban trees slow and reduce stormwater runoff, helping to protect critical waterways, including the Bay, from excess pollutants and particulates and urban trees provide critical habitat for wildlife and promote a connection to the natural world.

In addition to these direct improvements, healthy urban trees increase the overall attractiveness of a community and have been proven to increase the value of local real estate by 7 to 10%, as well as promoting shopping, retail sales, and tourism (Wolf, 2007). Trees support a more livable community, fostering psychological health and providing residents with a greater sense of place (Ulrich, 1986; Kaplan, 1989). Community trees, both public and private, soften the urban hardscape by providing a green sanctuary and making Hayward a more enjoyable place to live, work, and play. The City's 29,248 public trees play a prominent role in the urban forest benefits afforded to the community and the citizens rely on the City to protect and maintain this vital resource.

Acknowledged by the National Arbor Day Foundation as a Tree City USA for more than 25 years, there is ample evidence that the Hayward community values its trees. Continuing with a proactive stance on the management of the community's urban forest resource, the City contracted with Davey Resource Group (DRG) in 2011 to conduct an inventory of public trees on streets and right-of-ways, in parks, and at city facilities. A team of ISA Certified Arborists

[1] City of Hayward, *Hayward's History*. *hayward-ca.gov*. http://user.govoutreach.com/hayward/faq.php?cid=10775

mapped and geo-coded the location of publicly owned trees using global positioning system (GPS) technology. The inventory data is maintained by city staff using TreeKeeper® 7.7, a software management system developed by Davey to provide accurate and dependable inventory data specific to tree characteristics, health, and performed maintenance.

In addition to geo-coding the location, DRG arborists collected information about the species, size, condition, and current maintenance needs of each tree. The data collected on street trees was used in conjunction with *i-Tree's Streets*, a STRATUM Analysis Tool (*Streets* v4.0.3; i-Tree v4.1.3), to develop a resource analysis and report of the current condition of the street tree resource. This report, unique to Hayward, effectively quantifies the value of the community's public street trees in regards to actual benefits derived from the resource. In addition, the report provides baseline values that can be used when developing and updating an urban forest management plan. This helps in determining where to focus available resources and setting benchmarks for measuring progress.

The purpose of the urban forest resource analysis and report is to provide information on the structure, function, and value of the public street tree resource. From this information, managers and citizens alike can make informed decisions about budgetary support and management priorities. This report provides the following information:

- A description of the current structure of Hayward's public tree resource.
- Current, detailed management expenditures for Hayward's publicly managed trees and critical baseline information for evaluating program efficiency.
- A quantified value of the environmental benefits provided by Hayward's public trees. This also illustrates the relevance and relationship of the resource to local quality of life issues such as air quality, environmental health, economic development, and psychological health.
- Data that may be used by resource managers in the pursuit of alternative funding sources and collaborative relationships with utility purveyors, non-governmental organizations, air quality districts, federal and state agencies, legislative initiatives, or local assessment fees.
- Benchmark data, useful in the development of urban forest management goals and for measuring the success of long-term strategies.

Chapter 1: Urban Forest Resource Summary

Summary of Urban Forest Resource Structure

Hayward's urban forest resource currently includes 29,248 publicly managed trees and 8,276 available planting sites. A structural analysis is the first step towards understanding the benefits provided by these trees as well as their management needs. Upon examination of species composition, diversity, age distribution, condition, canopy coverage, and replacement value, DRG determined that the following information characterizes Hayward's public tree resource:

- The inventory includes more than 260 distinct tree species. The predominant tree species are crapemyrtle (*Lagerstroemia indica*, 7.5%), coast redwood (*Sequoia sempervirens*, 6.7%), and purple-leaf plum (*Prunus cerasifera*, 4.9%).
- The age structure of Hayward's public tree population is young to intermediate, with 49.8% of trees measuring less than 8 inches DBH (diameter at breast height, measured at 4'6" above the ground).
- Hayward's public tree resource is in overall good condition, with 60% of trees rated good or better and 33% rated fair. Maintaining the condition of existing trees for as long as possible will increase their useful lifespan and promote a steady flow of benefits to the community.
- Hayward's urban forest canopy cover is estimated at 383 acres, or nearly 1% of the total land area and 23.5% of the total street and sidewalk area within the City.
- Hayward's urban forest has sequestered 38,015 tons of carbon (CO_2) to date, valued at $570,229.
- Replacement of Hayward's 29,248 public trees with trees of similar size, species, and condition would cost $57.8 million.
- Hayward's current stocking level for public trees is estimated to be 78%, based on a total of 37,524 inventoried planting sites, including 29,248 trees, 7,765 vacant sites, and 511 sites requiring stump removal prior to replanting.

Replacement of Hayward's 29,248 public trees with trees of similar size, species, and condition would cost $57.8 million

Summary of Urban Forest Benefits

Annually, Hayward's urban forest provides cumulative benefits to the community at an average value of $50.70 per tree, for a total gross value of $1,483,016 per year. The City's public trees are providing the following substantial annual benefits:

- Public trees reduce electricity and natural gas use in Hayward through shading and climate effects valued at $464,981, an average of $15.90 per tree.

- Public trees in Hayward currently sequester 2,330 tons of atmospheric CO_2 per year. An additional 1,132 tons is avoided through decreased energy use, resulting in a net value of $46,424 and an average of $1.59 per tree.
- Hayward's urban forest intercepts an estimated 32.3 million gallons of stormwater annually for a total value of $129,354 per year, an average of $4.42 per tree.
- The total annual benefits contributed by Hayward's urban forest to property value increases, aesthetics, and socioeconomic value are nearly $1.1 million, an average of $36.56 per tree.

For every $1 invested in the urban forest, Hayward receives $1.27 in benefits

- While many species in the inventory are providing positive air quality benefits, the prevalence of some species that emit high levels of biogenic volatile organic compound (BVOCs) is resulting in an air quality deficit of -$227,112.
- When the City's annual investment of $1,164,542 for maintenance of this urban forest resource is considered, the annual net benefit (benefits minus investment) to the City is $318,474. The average net benefit for an individual public tree in Hayward is $10.89 per year. **Hayward receives $1.27 in benefits for every $1 spent on the public tree population.**

Urban Forest Resource Management

Hayward's public urban forest is a dynamic resource that is worth continued investment to maintain and grow its full benefit potential. **The community forest is one of the few assets that has the potential to increase in value with time and proper management.** Appropriate and timely tree care can substantially increase lifespan, preserving the higher benefit stream that results from a mature community forest. As individual trees continue to mature, aging trees are replaced, and stocking levels increase, the overall value of the community forest and the amount of benefits provided also increases. This vital, living resource is, however, vulnerable to a host of stressors, requiring ecologically sound and sustainable best management practices to ensure a continued flow of benefits for future generations.

Hayward's urban forest has a young to intermediate relative age distribution, with a good portion of young trees establishing to provide replacement for older trees as their senescence necessitates removal. While the overall population is in relatively good condition, the inventory identified 857 trees that are recommended for removal. In conjunction with priority tree removals, Hayward should focus resources on maximizing the overall flow of benefits by continuing to plant additional trees to replace removals and increase the overall stocking level (currently 78%). Based on the resource analysis, Davey Resource Group recommends the following:

- *Continue tree planting efforts with the goal of achieving a 100% stocking rate, utilizing available planting sites identified by the inventory. Where possible, establish replacement trees for the City's most mature trees (and top benefit producers) with trees of similar stature before they must be removed, thereby ensuring a consistent*

flow of benefits. Focus on planting large-stature trees, where space allows, to maximize benefits.

- *Increase reliance on species that provide positive air quality benefits.*
- *Promote the health and longevity of the existing tree resource through comprehensive tree maintenance and a cyclical pruning schedule.*
- *Dedicate resources towards a structural (training) pruning program for young and establishing trees to promote healthy structure, extend life expectancy, and reduce future costs and liability.*

Planning and funding for tree care and tree management must complement planting efforts in order to ensure the long-term success and health of Hayward's urban forest. Existing mature trees should be maintained and protected whenever possible, since the greatest benefits accrue from the continued growth and longevity of the existing canopy. Hayward can take pride in knowing that public trees improve the quality of life in the city and that trees are well worth the investment.

This urban forest resource analysis and report, based on the current inventory status, defines the population and structure of Hayward's public trees and quantifies the benefits of that resource. The analysis focuses solely on publicly owned, city-managed trees. The analysis utilizes *i-Tree Streets*, a STRATUM Analysis Tool (*Streets* v4.0.3; i-Tree v4.1.3), in order to establish baseline information on the value to the community. This report and the included analysis, which is unique to Hayward, effectively estimates and quantifies the value of the public tree asset in regards to actual benefits derived from this resource. In addition, the report provides a baseline analysis that can be used when creating, implementing, and updating an urban forest management plan, determining where best to focus available resources, and setting benchmarks for measuring progress. An urban forest resource analysis provides information on the structure, function, and value of the urban forest and its assets so that forest managers and citizens alike can make informed decisions about budgetary support and management priorities.

Chapter 2: Hayward's Public Tree Resource

Population Composition

Broadleaf hardwood species dominate Hayward's public tree population, comprising 85% of the total inventory. Broadleaf trees typically have larger canopies than coniferous trees of the same size. Since many of the measurable benefits derived from trees are directly related to leaf surface area, broadleaf trees generally provide the highest level of benefits to a community. Larger-statured broadleaf tree species provide greater benefits than smaller-statured trees, independent of diameter (DBH). Deciduous broadleaf species make up 49.5% of Hayward's public tree population, including 12% large-stature, 19% medium-stature, and 19% small-stature trees. Evergreen broadleaf trees comprise 35.6% of the population, including 14% large-stature, 14% medium-stature, and 8% small-stature evergreen broadleaf trees. Large-stature conifers represent 13% of the overall population, while small and medium-stature conifers each represent less than 1%. Palms represent less than 1% of the population (Figure 1).

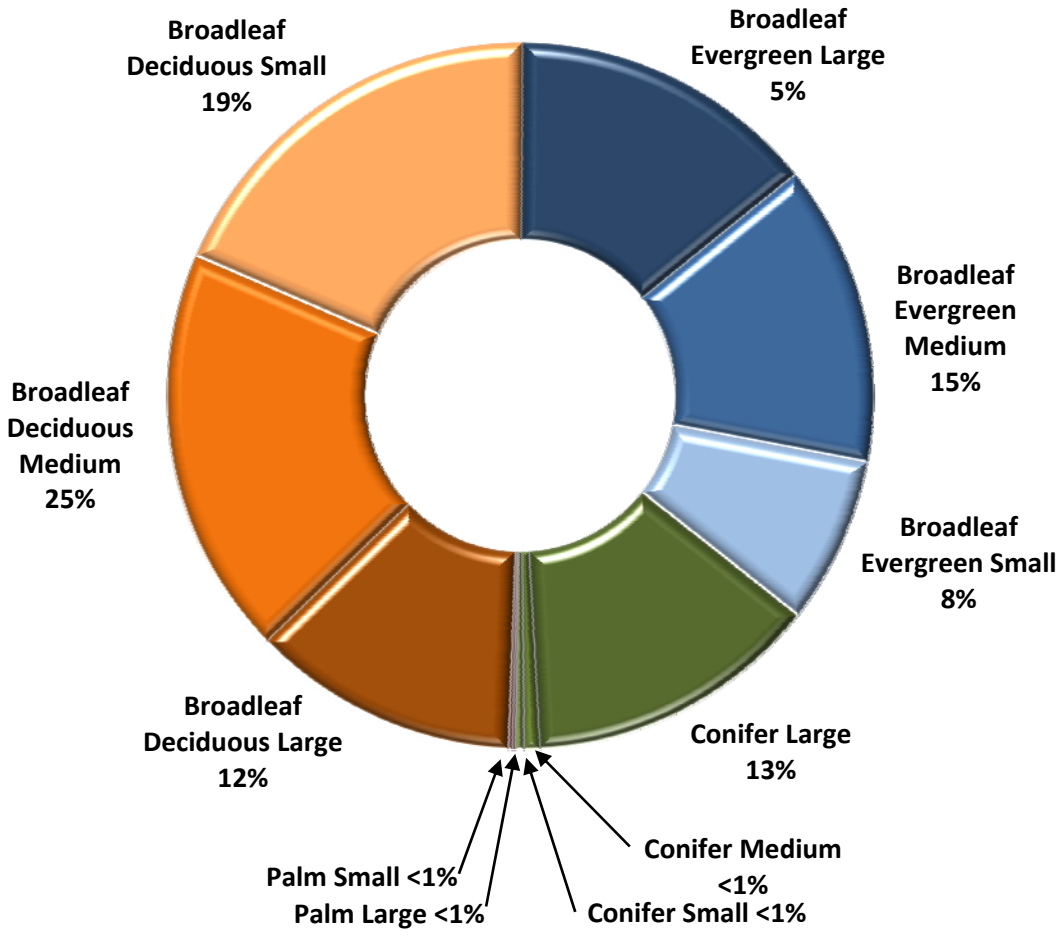


Figure 1. Composition of Hayward's Public Tree Population

Species Richness and Composition

Hayward's public tree population includes a mix of more than 260 unique species, significantly more than that of the mean of 53 species reported by McPherson and Rowntree (1989) in their nationwide survey of street tree populations in 22 U. S. cities.

The top ten species represent 46% of the total population (Figure 2 and Table 1). The predominant tree species are crapemyrtle (*Lagerstroemia indica*, 7.5%), Coast redwood (*Sequoia sempervirens*, 6.7%), and purple-leaf plum (*Prunus cerasifera*, 4.9%). Six genera represent 42.5% of the population, comprised of eucalyptus (*Eucalyptus spp.,* 8%), crapemyrtle (*Lagerstroemia spp.,* 7.5%), stonefruit species (*Prunus spp.,* 7.4%), pear (*Pyrus spp.,* 7.3%), redwood (*Sequoia spp.,* 6.7%), and oak (*Quercus spp.,* 5.7%).

There is a widely accepted rule that no single species should represent greater than 10% of the total population while no single genus more than 20% (Clark Et al, 1997). No genus or species in Hayward's public tree population have reached these thresholds, suggesting adequate diversification within the inventory. A complete population summary can be found in Appendix C.

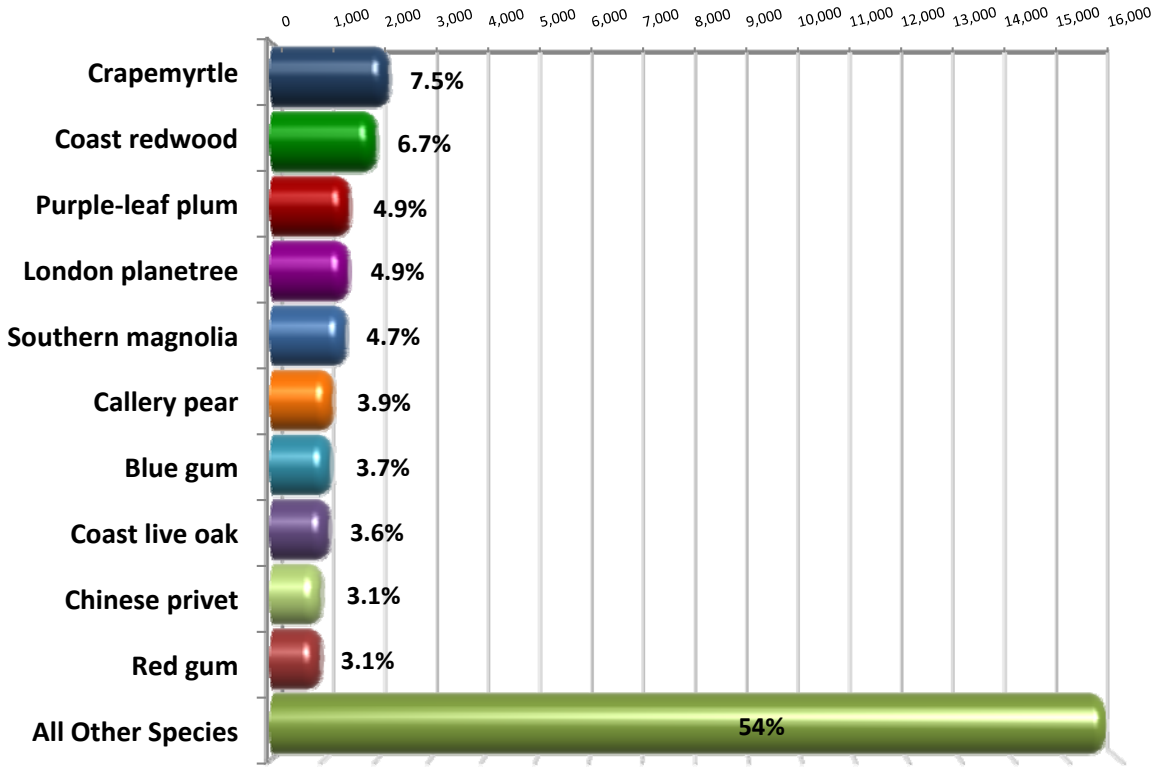


Figure 2. Species Frequency in Hayward's Public Tree Population

Maintaining a diverse population within an urban forest is important. Dominance of any single species or genus can have detrimental consequences in the event of storms, drought, disease, pests, or other stressors, which can severely affect an urban forest and the flow of benefits and costs over time. Catastrophic pathogens, such as Dutch Elm Disease (*Ophiostoma ulmi)*, Emerald Ash Borer (*Agrilus planipennis*), Asian Long-horned Beetle (*Anoplophora glabripennis*), and Sudden Oak Death (SOD) (*Phytophthora ramorum*) are

some examples of unexpected, devastating, and costly pests and pathogens that highlight the importance of diversity and the balanced distribution of species and genera.

Table 1. Population Summary of Hayward's Public Tree Inventory

Species	DBH Class (in) 0-3	3-6	6-12	12-18	18-24	24-30	30-36	36-42	>42	Total	% of Pop.
Broadleaf Deciduous Large (BDL)											
London planetree	90	487	329	191	129	107	59	26	2	1,420	4.86%
Chinese elm	8	21	29	164	240	9	1	0	0	472	1.61%
BDL OTHER	108	384	318	299	269	187	68	36	14	1,683	5.75%
BDL Total	**206**	**892**	**676**	**654**	**638**	**303**	**128**	**62**	**16**	**3,575**	**12.22%**
Broadleaf Deciduous Medium (BDM)											
Callery pear	99	391	499	121	19	0	0	1	0	1,130	3.86%
Chinese pistache	224	293	290	44	4	0	0	0	0	855	2.92%
Sweetgum	61	160	199	244	78	13	4	0	0	759	2.60%
White mulberry	3	3	32	136	134	89	15	0	0	412	1.41%
BDM OTHER	346	524	851	301	159	72	33	19	10	2,315	7.92%
BDM Total	**733**	**1,371**	**1,871**	**846**	**394**	**174**	**52**	**20**	**10**	**5,471**	**18.71%**
Broadleaf Deciduous Small (BDS)											
Crapemyrtle	720	1,036	433	4	1	0	0	0	0	2,194	7.50%
Purple-leaf plum	275	468	651	44	0	1	0	0	0	1,439	4.92%
Trident maple	213	162	24	0	0	0	0	0	0	399	1.36%
BDS OTHER	501	499	344	54	9	3	1	0	0	1,411	4.82%
BDS Total	**1,709**	**2,165**	**1,452**	**102**	**10**	**4**	**1**	**0**	**0**	**5,443**	**18.61%**
Broadleaf Evergreen Large (BEL)											
Blue gum	5	39	141	152	116	133	115	122	266	1,089	3.72%
Coast live oak	201	302	303	136	61	33	13	10	2	1,061	3.63%
Red gum	4	15	139	321	222	138	40	11	5	895	3.06%
Holly oak	7	53	116	95	37	10	2	1	1	322	1.10%
BEL OTHER	119	170	108	121	110	76	32	17	8	761	2.60%
BEL Total	**336**	**579**	**807**	**825**	**546**	**390**	**202**	**161**	**282**	**4,128**	**14.11%**
Broadleaf Evergreen Medium (BEM)											
Southern magnolia	284	274	508	247	60	6	1	1	1	1,382	4.73%
Chinese privet	35	163	365	262	73	10	0	0	0	908	3.10%
Black acacia	9	71	95	38	38	28	14	0	0	293	1.00%
BEM OTHER	70	253	485	328	163	105	30	14	4	1,452	4.96%
BEM Total	**398**	**761**	**1,453**	**875**	**334**	**149**	**45**	**15**	**5**	**4,035**	**13.80%**
Broadleaf Evergreen Small (BES)											
Evergreen pear	82	182	461	131	31	6	1	0	0	894	3.06%
BES OTHER	355	385	421	126	28	16	11	6	1	1,349	4.61%
BES Total	**437**	**567**	**882**	**257**	**59**	**22**	**12**	**6**	**1**	**2,243**	**7.67%**
Conifer Evergreen Large (CEL)											
Coast redwood	150	341	597	408	186	142	79	28	21	1,952	6.67%
Canary island pine	35	94	172	122	191	70	30	2	1	717	2.45%
Italian stone pine	11	16	131	105	55	38	14	9	10	389	1.33%
CEL OTHER	49	74	166	199	164	116	56	30	21	875	2.99%
CEL Total	**245**	**525**	**1,066**	**834**	**596**	**366**	**179**	**69**	**53**	**3,933**	**13.45%**

Species	DBH Class (in) 0-3	3-6	6-12	12-18	18-24	24-30	30-36	36-42	>42	Total	% of Pop.
Conifer Evergreen Medium (CEM)											
CEM OTHER	79	48	55	19	9	2	1	0	0	213	0.73%
CEM Total	**79**	**48**	**55**	**19**	**9**	**2**	**1**	**0**	**0**	**213**	**0.73%**
Conifer Evergreen Small (CES)											
CES OTHER	2	30	59	15	3	2	1	1	1	114	0.39%
CES Total	**2**	**30**	**59**	**15**	**3**	**2**	**1**	**1**	**1**	**114**	**0.39%**
Palm Evergreen Large (PEL)											
PEL OTHER	0	0	1	8	10	5	9	1	2	36	0.12%
PEL Total	**0**	**0**	**1**	**8**	**10**	**5**	**9**	**1**	**2**	**36**	**0.12%**
Palm Evergreen Small (PES)											
PES OTHER	3	8	7	15	14	8	2	0	0	57	0.19%
PES Total	**3**	**8**	**7**	**15**	**14**	**8**	**2**	**0**	**0**	**57**	**0.19%**
All Trees	**4,148**	**6,946**	**8,329**	**4,450**	**2,613**	**1,425**	**632**	**335**	**370**	**29,248**	**100%**

Species Importance

To quantify the significance of any one particular species found in Hayward's public tree population, an *importance value* (IV) is derived for each of the most common species in the inventory. Importance values are particularly meaningful to urban forest managers because they indicate a community's reliance on the functional capacity of particular species. **i-Tree *Streets* calculates importance value based on the mean of three values: percentage of total population, percentage of total leaf area, and percentage of total canopy cover.** Importance value goes beyond tree numbers alone to suggest reliance on specific species based on the benefits they provide. The importance value can range from zero (which implies no reliance) to 100 (suggesting total reliance). No single species should dominate the composition in the City's urban forest population. Because importance value goes beyond population numbers alone, it can help managers to better comprehend the resulting loss of benefits from a catastrophic loss of any one species. When importance values are comparatively equal among the ten to 15 most abundant species, the risk of major reductions to benefits is significantly reduced. Of course, suitability of the dominant species is another important consideration. Planting short-lived or poorly adapted species can result in short rotations and increased long-term management costs.

The 20 most abundant species identified in Hayward's public tree inventory represent 64.9% of the total population, 67.6% of the total leaf area, and 65.1% of the total canopy cover for a combined importance value of 65.85 (Table 2). Of these species, Hayward relies most on the blue gum (*Eucalyptus globulus,* IV=9.14), followed by coast redwood (*Sequoia sempervirens*, IV=6.51) and London planetree (*Platanus acerifolia*, IV=6.27).

Hayward's blue gum, accounting for 3.7% of the overall population, have an importance value of 9.14 and are providing the greatest per tree functional capacity to provide benefits compared to their representation in the population. Blue gum are among the largest diameter trees in the tree inventory, with a significant percentage of individuals (58%, in relation to their specific population) in the mature size classes (≥24 inches DBH). Chinese elm (*Ulmus parvifolia*, population 1.6%; IV= 3.07) and white

mulberry (*Morus alba*, population 1.4%; IV=2.48) are also performing at a higher functional capacity comparatively.

Table 2. Importance Value (IV) of Hayward's Most Abundant Public Tree Species

Species	Number of Trees	% of Total Trees	Leaf Area (ft2)	% of Total Leaf Area	Canopy Cover (ft2)	% of Total Canopy Cover	Importance Value
Crapemyrtle	2,194	7.50	822,084.92	1.54	319,675.76	1.92	**3.65**
Coast redwood	1,952	6.67	4,793,846.65	8.97	650,661.57	3.90	**6.51**
Purple-leaf plum	1,439	4.92	846,400.45	1.58	312,849.67	1.87	**2.79**
London planetree	1,420	4.86	3,291,734.33	6.16	1,302,933.24	7.81	**6.27**
Southern magnolia	1,382	4.73	1,474,876.65	2.76	526,204.82	3.15	**3.55**
Callery pear	1,130	3.86	1,399,503.17	2.62	459,712.14	2.75	**3.08**
Blue gum	1,089	3.72	6,760,645.51	12.65	1,844,524.18	11.05	**9.14**
Coast live oak	1,061	3.63	1,651,563.49	3.09	447,396.06	2.68	**3.13**
Chinese privet	908	3.10	810,756.48	1.52	437,849.54	2.62	**2.42**
Red gum	895	3.06	3,230,220.17	6.05	1,008,882.90	6.05	**5.05**
Evergreen pear	894	3.06	1,052,545.13	1.97	391,664.73	2.35	**2.46**
Chinese pistache	855	2.92	731,076.55	1.37	286,951.53	1.72	**2.00**
Sweetgum	759	2.60	1,951,153.02	3.65	428,620.19	2.57	**2.94**
Canary island pine	717	2.45	1,848,665.85	3.46	454,134.94	2.72	**2.88**
Chinese elm	472	1.61	1,445,359.43	2.71	814,873.02	4.88	**3.07**
White mulberry	412	1.41	1,575,893.38	2.95	512,399.81	3.07	**2.48**
Trident maple	399	1.36	93,913.88	0.18	38,478.98	0.23	**0.59**
Italian stone pine	389	1.33	1,066,805.21	2.00	268,353.81	1.61	**1.64**
Holly oak	322	1.10	717,395.84	1.34	192,110.93	1.15	**1.20**
Black acacia	293	1.00	528,572.94	0.99	165,034.22	0.99	**0.99**
Other species	10,266	35.10	17,337,997.82	32.45	5,824,901.12	34.90	**34.15**
All Trees	**29,248**	**100%**	**53,431,010**	**100.00**	**16,688,213**	**100%**	**100%**

Due to their relatively small leaf area and canopy coverage, immature and small-stature trees tend to have lower importance values than their population numbers might suggest. Therefore, consideration of tree type along with age distribution can provide additional significance to the importance value. For instance, Hayward's Chinese pistache (*Pistacia chinensis*) represents 2.9% of the total population yet has an importance value of only 2.00. However, an analysis of the age distribution of this species (Table 1) reveals that 60% of this medium-statured broadleaf are young trees (0-6" DBH). As this population matures, its importance in the inventory will increase. Conversely, crapemyrtle (population 7.5%; IV=3.65), with 80% of the population less than 6 inches DBH, is a small-statured species and unlikely to increase much in importance over time.

Stocking Level

The inventory included the collection of vacant planting sites, identified on the basis of a maximum of one (1) vacant site per property, regardless of the number of sides or quantity of available sites, and within the following guidelines:

- Shortest linear dimension:
  - Less than 5 feet = Small vacant site
  - 5 - 8 feet = Medium vacant site
  - Greater than 8 feet = Large vacant site

- Spacing between trees
  - Trees spaced 20 feet on center = Small vacant site
  - Trees spaced 30 feet on center = Medium vacant site
  - Trees spaced 50 feet on center = Large vacant site

A total of 8,276 vacant planting sites were identified in Hayward's public tree inventory, including:

- 456 Large vacant sites
- 3,201 Medium vacant sites
- 4,098 Small vacant sites
- 10 Vacant sites (other)
- 511 sites requiring stump removal prior to replanting

Considering an overall total of 37,524 sites, including 29,248 existing trees, the public tree resource has a current stocking level of 78%.

Increasing the stocking rate to 100%, by using all available planting sites, will increase the benefits to the community provided by this vital urban forest resource.

Canopy Cover

The amount and distribution of leaf surface area is the driving force behind the urban forest's ability to produce benefits for the community (Clark, 1997). As canopy cover increases, so do the benefits afforded by leaf area. It is important to remember that publicly managed urban trees throughout the United States, including Hayward's trees, likely represent less than 10% of the entire urban forest (Moll and Kollin, 1993).

In Hayward, it is estimated that public trees are currently providing 383 acres of tree canopy cover, shading just less than 1% of the total land area (40,032 acres) and 23.5% of streets and sidewalks (1,631 acres) within the City.

Relative Age Distribution

The distribution of individual tree ages within a tree population influences present and future costs as well as the flow of benefits. An unevenly aged population allows managers to allocate annual maintenance costs uniformly over many years and assures continuity in overall tree canopy coverage and associated benefits. A desirable distribution has a high proportion of young trees to offset establishment and age related mortality as the percentage of older trees declines over time (Richards, 1982/83). This ideal, albeit uneven, distribution suggests a large fraction of trees (+/-40% of the total) should be young, with diameters at breast height (DBH) less than eight inches, while only 10% should be in the large diameter classes (>24 inches).

Hayward's public tree inventory is young to intermediate, with 49.8% of all trees less than 8 inches DBH, and 66.4% less than 12 inches DBH. As the stocking rate is increased through new tree plantings, the percentage of younger trees will continue to increase in the short term. However, as these young and intermediate trees mature, along with proper management, the benefits derived from this resource will continue to increase substantially. Regular inspection and proactive pruning cycles can ensure that Hayward's young and intermediate stage trees mature into well-structured, healthy specimens, thereby maximizing

benefits to the community, reducing risk, and promoting a consistent flow of benefits for many generations to come.

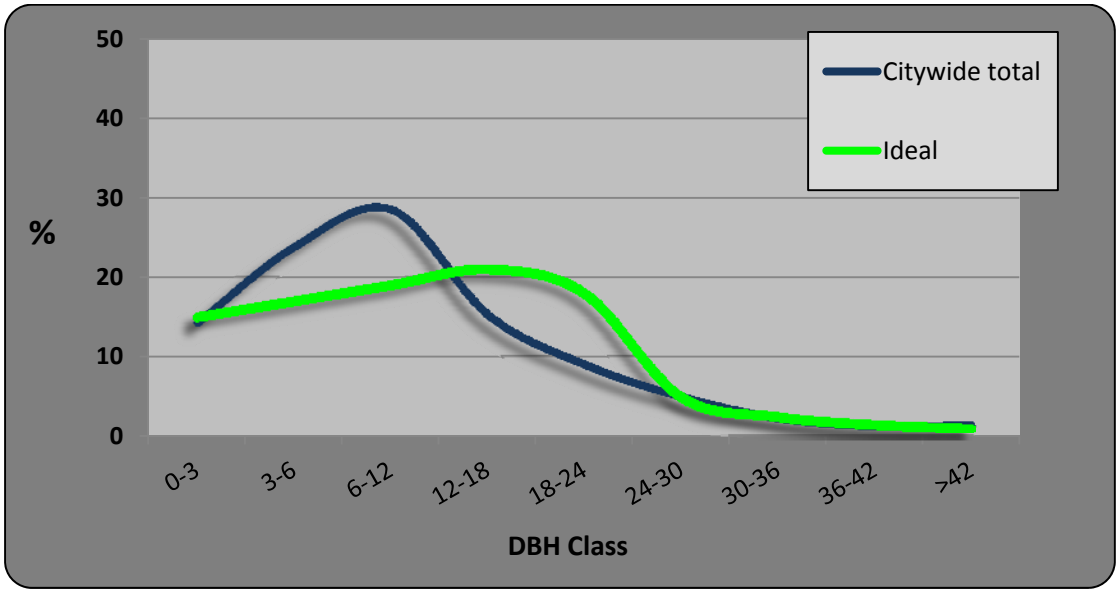


Figure 3. Overall Relative Age Distribution of Hayward's Public Tree Population

Four of Hayward's top ten most common tree species have significant representation in the smallest size class (< 3 inches DBH) (Figure 4), including crapemyrtle (*Lagerstroemia indica*) with 32.8% of trees less than 3 inches in diameter, southern magnolia (*Magnolia grandiflora,* 20.6%), purple-leaf plum (*Prunus cerasifera*, 19.1%), and coast live oak (*Quercus agrifolia, 18.9%*). This indicates that these species have been more heavily planted in recent years.

As tree populations mature and begin to senesce, their maintenance needs may become more frequent and costly. When a species is desirable, it is important to include that species in new planting plans to ensure that sufficient replacement exists as over-mature trees are removed. This also ensures a continuation of the benefit stream from these populations. Four of the top ten species have significant representation in the large/mature class range (> 24" DBH): blue gum (*Eucalyptus globulus,* 58.4%), red gum (*Eucalyptus camaldulensis*, 21.7%), coast redwood (*Sequoia sempervirens*, 13.85%), and London planetree (*Platanus acerifolia*, 13.7%). Both coast redwood and London planetree also have adequate representation in the younger class range (< 6 inches DBH), 25.2% and 40.6% respectively. However, blue gum (4% of the population < 6 inches DBH), and red gum (2.1% < 6 inches DBH) have not played a significant role in recent plantings, possibly indicating a choice to reduce reliance on these species.

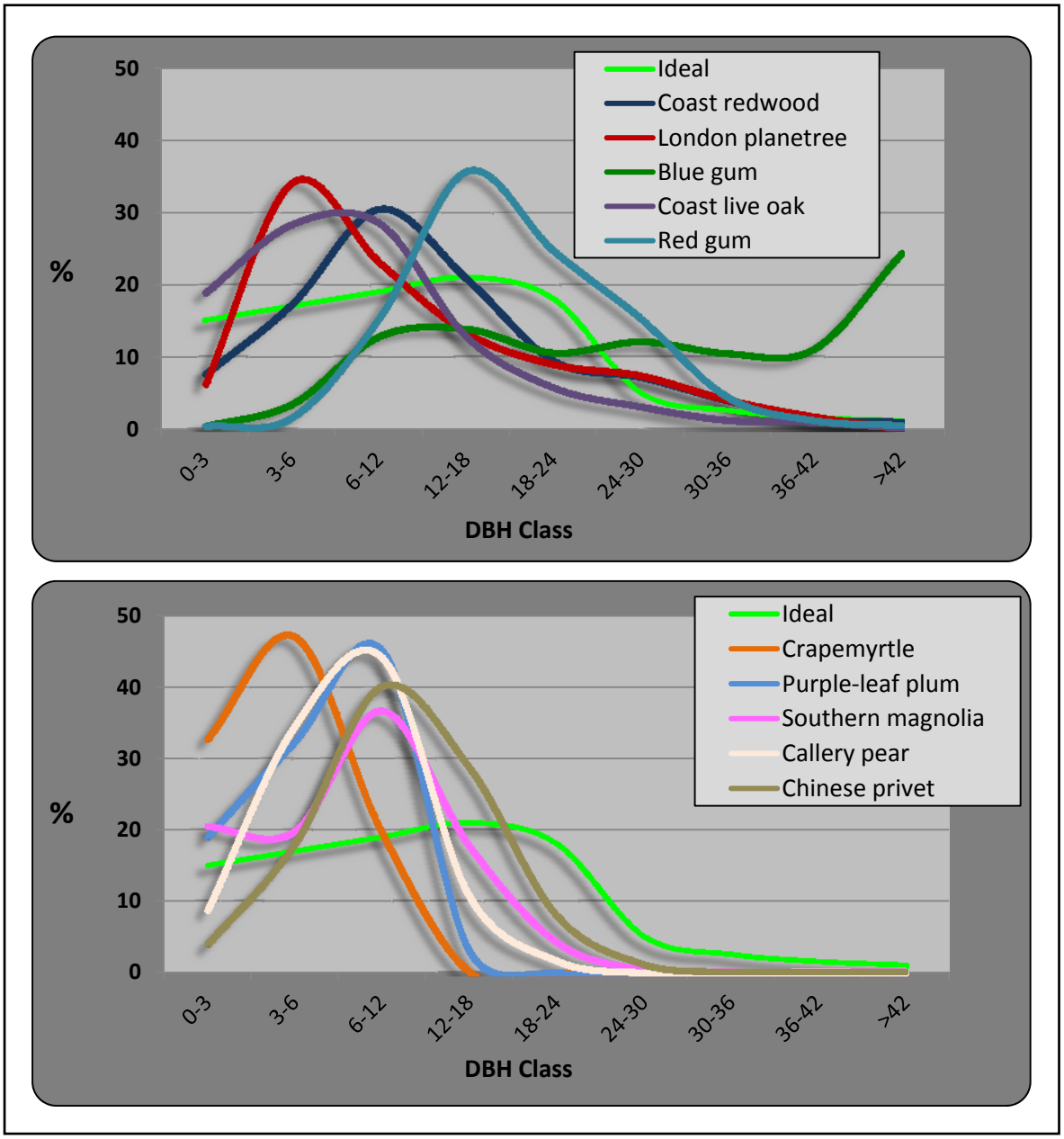


Figure 4. Relative Age Distribution of Hayward's Top Ten Public Tree Species

Condition and Relative Performance of Species

Tree condition is an indication of how well trees are managed and how well they are performing in a given site-specific environment (e.g., street median, parking lot, etc.). Each tree inventoried was rated for overall condition, with consideration to the structure and soundness of the stem, roots, and branches, as well as shoot growth and density, color, and appearance of the leaves and canopy. When trees are performing at their peak, as are 60.1% of Hayward's trees classified as good or better, the benefits they provide are maximized.

The inventory found 32.7% of Hayward's trees in fair condition, which may be an indication of age and/or a combination of multiple factors, including inadequate resources or maintenance, pest or diseases organisms, or a poorly sited species.

While 1.6% of the population was found to be dead, 5.7% was determined to be in poor or critical condition. Removal or mitigation of dead and failing trees is recommended as soon as possible to reduce exposure to liability.

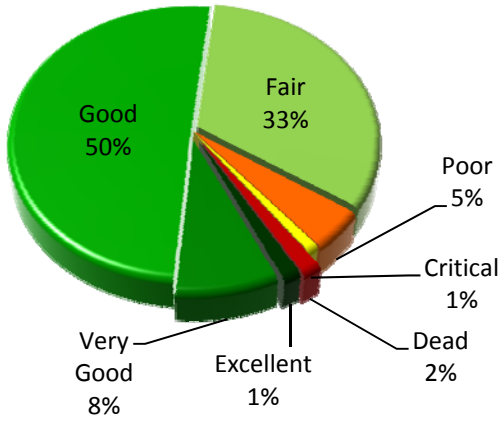


Figure 5. Overall Condition of Hayward's Public Trees

The *relative performance index* (RPI) is one way to further analyze the condition and suitability of specific urban tree species. The RPI provides an urban forest manager with a detailed perspective on how one species' performance compares to that of another. The index compares the condition ratings (wood and foliage) of each tree species with the condition ratings of every other tree species within a given urban forest population. An RPI value of 1.0 or better indicates that the species is performing as well or better than average when compared to other species. An RPI value below 1.0 indicates that the species is not performing as well in comparison to the rest of the population.

Among the 20 most common species (>1% of the total population) identified by the inventory, 13 have an RPI of 1.0 or greater (Table 3). Of these, Canary Island pine (*Pinus canariensis*) has the highest RPI of 1.11, followed by coast redwood (*Sequoia sempervirens, RPI* = 1.10), and crapemyrtle (*Lagerstroemia indica, RPI = 1.09*).

Red gum (*Eucalyptus camaldulensis)* has the lowest RPI rating of 0.69, likely, in part, to the advanced age distribution of this population.

Hayward's most important species, blue gum (*Eucalyptus globulus*) is also performing below average with an RPI of 0.86. Also likely to be a reflection of the overall age of this population, with 58.4% of individual trees greater than 24 inches (DBH) and 24.4% greater than 42 inches (DBH)

Coast redwood (*Sequoia sempervirens*, RPI=1.10) and London planetree (*Platanus acerifolia*, RPI=1.07 are populations with a close to ideal age distribution, an indicator that their RPI values are an honest measure of performance.

Table 3. Relative Performance Index (RPI) for Hayward's Most Abundant Public Tree Species

Species	Excellent	Very Good	Good	Fair	Poor	Critical	Dead	RPI	# of Trees	% of All Trees
Crapemyrtle	2.10	12.67	67.96	14.95	1.46	0.32	0.55	**1.09**	2194	7.50
Coast redwood	1.43	26.08	54.56	13.68	2.92	0.92	0.41	**1.10**	1952	6.67
Purple-leaf plum	0.07	11.12	57.12	27.87	2.36	0.42	1.04	**1.04**	1439	4.92
London planetree	3.94	19.23	45.99	29.23	1.20	0.21	0.21	**1.07**	1420	4.86
Southern magnolia	1.52	9.91	57.24	27.79	2.89	0.29	0.36	**1.05**	1382	4.73
Callery pear	5.13	11.15	55.22	25.04	2.12	0.27	1.06	**1.06**	1130	3.86
Blue gum	0.00	0.00	31.31	53.99	8.26	1.74	4.68	**0.86**	1089	3.72
Coast live oak	0.09	0.66	64.84	30.63	2.73	0.66	0.38	**1.02**	1061	3.63
Chinese privet	0.00	0.00	40.31	48.13	8.70	2.42	0.44	**0.92**	908	3.10
Red gum	0.00	0.00	27.82	32.29	14.30	6.26	19.33	**0.69**	895	3.06
Evergreen pear	0.00	9.28	46.42	41.39	2.46	0.11	0.34	**1.01**	894	3.06
Chinese pistache	5.50	6.32	58.48	25.96	2.81	0.58	0.35	**1.06**	855	2.92
Sweetgum	0.00	3.56	50.46	43.21	2.50	0.13	0.13	**1.00**	759	2.60
Canary island pine	1.26	14.64	68.48	14.78	0.70	0.14	0.00	**1.11**	717	2.45
Chinese elm	0.00	0.00	36.44	60.17	2.54	0.42	0.42	**0.94**	472	1.61
White mulberry	0.00	0.00	4.85	69.90	24.51	0.73	0.00	**0.79**	412	1.41
Trident maple	0.50	18.05	58.15	18.05	2.76	1.25	1.25	**1.06**	399	1.36
Italian stone pine	0.00	2.31	60.15	36.50	1.03	0.00	0.00	**1.02**	389	1.33
Holly oak	0.00	2.80	51.24	40.06	4.66	1.24	0.00	**0.98**	322	1.10
Black acacia	0.34	6.14	40.96	43.34	7.17	1.37	0.68	**0.96**	293	1.00
All Trees	**1.48**	**8.28**	**50.35**	**32.66**	**4.66**	**0.98**	**1.59**	**1.00**	**29248**	**100%**

The RPI can be a useful tool for urban forestry managers. For example, if a city has been planting two or more new species in their urban forest, the RPI can be used to compare their relative performance. If the RPI indicates that one is performing relatively poorly, a municipality may decide to reduce or even stop planting that species and subsequently save money on both planting stock and replacement costs. The RPI enables managers to look at the performance of long-standing species as well. Species planted for many years that have an RPI of 1.00 or greater have performed well when compared to the population as a whole. These top performers should be retained as a significant portion of the urban forest population. It is important to keep in mind that because RPI is based on condition only, it may not reflect cosmetic or nuisance issues, especially seasonal issues that are not threatening the health or structure of the trees.

An RPI value less than 1.00 may be indicative of a species that is not well adapted to local conditions. Poorly adapted species are more likely to present increased safety and maintenance issues. Species with an RPI less than 1.00 should receive careful consideration before being selected for future planting choices. Prior to selecting or deselecting trees on the basis of RPI alone, managers are encouraged to take into account the age distribution of the species, among other factors. A species that has a RPI of less than 1.00, but has a significant number of trees in larger DBH classes, may just be exhibiting signs of population senescence. The individuals of this species may have produced substantial benefits over the years and should continue to be considered when making species selection determinations for future planting.

The RPI value can also be used to identify underutilized species that are demonstrating good performance. Trees with an RPI value greater than 1.00 and representing a sizeable portion of

the total population may be indicating their suitability in the local environment and should receive consideration for additional planting. Based on RPI, relative age distribution, and percentage in the population, the analysis suggests that tulip tree (*Liriodendron tulipifera*) and seven other species may be underused in Hayward's public tree inventory (Table 4).

Table 4. Tree species which may be underutilized, based on RPI and Relative Age Distribution

Species	# in Pop.	% of Pop.	RPI
Broadleaf Deciduous Large (BDL)			
Tulip tree (*Liriodendron tulipifera*)	49	0.17	1.01
Evergreen ash (Fraxinus uhdei)	24	0.11	1.03
Broadleaf Deciduous Medium (BDM)			
Tallowtree (*Sapium sebiferum*)	87	0.30	1.14
Broadleaf Evergreen Small (BES)			
Lemon bottlebrush (*Callistemon citrinus*)	82	0.28	1.05
Conifer Evergreen Large (CEL)			
Deodar cedar (*Cedrus deodara*)	219	0.75	1.05
Giant Sequoia (*Sequoiadendron giganteum*)	26	0.09	1.04
Conifer Evergreen Large (CEL)			
Hollywood juniper (*Juniperus torulosa*)	66	0.23	1.09
Palm Evergreen Large (PEL)			
Canary Island date palm (*Phoenix canariensis*)	25	0.09	1.11

Other species with high RPIs and a high percentage of young trees (<6 inches DBH) were not identified; because they are currently being planted (i.e., increased in the inventory) and because the RPI in populations with a large percentage of young trees is typically higher and cannot be considered as a true representation of performance.

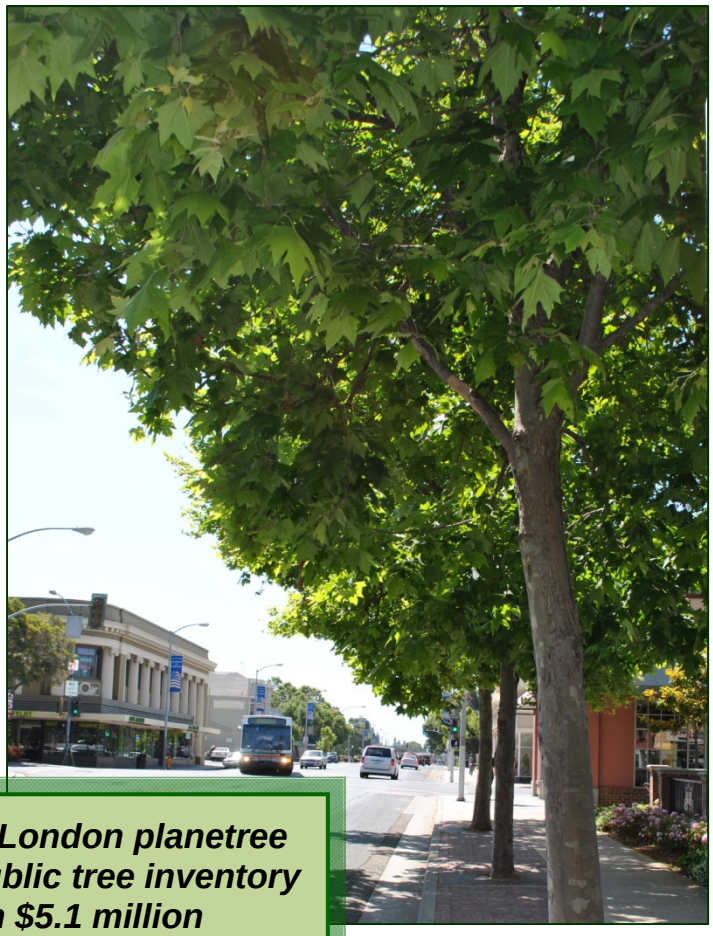
Replacement Value

The current value of Hayward's public tree resource is nearly $58 million. The community forest is a public asset which, when properly cared for, has the potential to appreciate in value as the trees mature over time. Replacement value accounts for the historical investment in trees over their lifetime and is a way of describing the value of a tree population (and/or average value per tree) at a given time. Replacement value is a reflection of current population numbers, stature, placement, and condition. There are several methods available for obtaining a fair and reasonable perception of a tree's value (CTLA, 1992, Watson, 2002). The cost approach, trunk formula method used in this analysis assumes the value of a tree is equal to the cost of replacing the tree in its current state (Cullen, 2002). To replace Hayward's current public tree population of 29,248 trees with trees of similar size, species, and condition would cost nearly $58 million (Table 5 and Appendix C). The average replacement value per tree is $1,978.

Coast redwood (*Sequoia sempervirens*) account for 12.4% ($7.2 million) of the total estimated replacement value, followed by London planetree (*Platanus acerifolia*, 8.9%, $5.2 million), and Canary Island pine (*Pinus canariensis*, 6.6%, $3.8 million). The high value of each of these populations reinforces their importance to the City. Many of the highest valued species are large and medium-stature trees with large canopies and are therefore likely to have high importance values (IV) as well.

Species with lower replacement values are generally smaller-stature trees with a lower IV, as evidenced by crapemyrtle (*Lagerstroemia indica*) with a replacement value of $1.4 million (2.4%), despite its relative prevalence in the population (7.5 %).

Hayward's public trees are a vital component of the City's infrastructure and a public asset valued at nearly $58 million—an asset that, with proper care and maintenance, will increase in value over time. Distinguishing replacement value from the value of annual benefits produced by Hayward's public trees is very important. Annual benefits are discussed in Chapter 3.



Replacement of the entire London planetree population in Hayward's public tree inventory would cost more than $5.1 million

Table 5. Replacement Value of Hayward's Most Common Public Tree Species

Species	DBH Class (in)									Total	% of Total
	0-3	3-6	6-12	12-18	18-24	24-30	30-36	36-42	>42		
Crapemyrtle	126,748	519,333	691,932	16,963	8,173	0	0	0	0	**1,363,150**	2.36
Coast redwood	17,781	128,115	762,027	1,369,853	1,157,848	1,492,348	1,202,114	568,019	472,494	**7,170,599**	12.40
Purple-leaf plum	49,829	165,482	568,265	82,091	0	3,786	0	0	0	**869,453**	1.50
London planetree	13,750	236,303	463,892	732,520	932,423	1,232,582	932,849	566,277	56,886	**5,167,482**	8.93
Southern magnolia	39,102	124,063	744,299	895,533	411,954	62,786	19,240	25,451	21,332	**2,343,759**	4.05
Callery pear	16,180	146,139	461,006	244,435	68,514	0	0	10,861	0	**947,135**	1.64
Blue gum	703	6,160	31,091	56,516	78,425	135,913	172,563	239,957	587,696	**1,309,025**	2.26
Coast live oak	25,095	132,240	433,409	500,460	438,078	406,455	223,749	222,693	56,886	**2,439,065**	4.22
Chinese privet	4,848	38,660	198,266	311,754	161,480	35,146	0	0	0	**750,155**	1.30
Red gum	766	2,208	24,738	163,150	253,275	286,490	125,938	40,887	23,458	**920,910**	1.59
Evergreen pear	14,806	87,187	664,401	459,072	194,106	63,724	14,633	0	0	**1,497,929**	2.59
Chinese pistache	37,353	170,477	551,157	200,649	34,387	0	0	0	0	**994,022**	1.72
Sweetgum	10,261	71,559	271,307	825,143	494,830	131,141	63,556	0	0	**1,867,797**	3.23
Canary island pine	5,103	44,590	265,165	494,230	1,503,130	892,217	532,888	38,176	28,443	**3,803,943**	6.58
Chinese elm	941	11,057	51,663	732,982	2,116,097	130,560	25,345	0	0	**3,068,645**	5.31
White mulberry	489	858	15,439	139,608	259,772	283,436	69,751	0	0	**769,353**	1.33
Trident maple	35,024	95,879	46,036	0	0	0	0	0	0	**176,939**	0.31
Italian stone pine	1,585	5,109	121,265	244,497	263,751	296,093	153,854	131,109	155,344	**1,372,607**	2.37
Holly oak	1,053	28,627	204,606	458,626	330,640	147,968	44,354	33,532	28,107	**1,277,512**	2.21
Black acacia	1,535	18,615	55,254	44,266	82,144	92,967	69,033	0	0	**363,815**	0.63
Other trees	462,847	1,996,931	5,073,601	5,046,792	4,933,256	5,237,257	3,163,978	1,729,196	1,125,712	**28,769,569**	49.74
All Trees	**671,440**	**3,216,662**	**9,676,593**	**11,550,234**	**12,556,263**	**9,434,735**	**5,611,731**	**3,038,140**	**2,083,866**	**57,839,664**	**100%**

Chapter 3: Public Tree Resource Benefits

Trees are important to Hayward. Environmentally, they help conserve and reduce energy use, reduce local and global carbon dioxide (CO_2) levels, improve air quality, and mitigate stormwater runoff. Additionally, trees provide a wealth of well-documented psychological, social, and economic benefits related primarily to their aesthetic effects. Environmentally, trees make good sense, working ceaselessly to provide benefits back to the community. However, the question remains, are the collective benefits worth the costs of management? In other words, are trees a good investment for Hayward? To answer this question, the benefits must be quantified in financial terms. This analysis provides a snapshot of the annual benefits, along with the value of those benefits, produced by Hayward's public trees. While the annual benefits produced by the urban forest can be substantial, it's important to recognize that the greatest benefits from the urban forest are derived from the benefit stream that results over a greater period of time from a mature forest where trees are well managed, healthy, and long-lived.

This analysis utilized Hayward's current public tree inventory and i-Tree's *Streets* model to assess and quantify the beneficial functions of this public tree resource and to place a dollar value on the annual environmental benefits these trees provide. These estimates provide first-order approximations of tree value. While *i-Tree Streets* only generally accounts for the benefits produced by Hayward's public tree population, it is an accounting based on the best available and current scientific research with an accepted degree of uncertainty. The data returned from *i-Tree Streets* can provide a platform from which management decisions can be made (Maco and McPherson, 2003). A discussion on the methods used to quantify and put a monetary value on these benefits can be found in Appendix A.

Energy Savings

Trees modify climate and conserve energy in three principal ways:

- **Shading reduces the amount of radiant energy absorbed and stored by hardscape surfaces, thereby reducing the heat island effect.**
- **Transpiration converts moisture to water vapor, thereby cooling the air by using solar energy that would otherwise result in heating of the air.**
- **Reduction of wind speed and the movement of outside air into interior spaces and conductive heat loss where thermal conductivity is relatively high (e.g., glass windows [Simpson, 1998]).**

Heat island effect describes the increase in urban temperatures in relation to surrounding locations and is related to increased hardscape and impervious surfaces. Trees and other vegetation within an urbanized environment help reduce the heat island effect by lowering air temperatures 5°F (3°C) compared with outside the green space (Chandler, 1965). On a larger, citywide scale, temperature differences of more than 9°F (5°C) have been observed between city centers without adequate canopy coverage and more vegetated suburban areas (Akbari and others, 1992). The relative importance of these effects depends upon the size and configuration of trees and other landscape elements (McPherson, 1993). Tree spacing, crown spread, and vertical distribution of leaf area each influence the transport of warm air and pollutants along streets and out of urban canyons. By reducing air movement into buildings and against conductive surfaces (e.g., glass, metal siding), trees reduce conductive

heat loss from buildings. Trees can reduce wind speed and the resulting air infiltration by up to 50%, translating into potential annual heating savings of 25% (Heisler, 1986).

Electricity and Natural Gas Reduction

Electricity and natural gas saved annually in Hayward from the shading and climate effects of public trees is equal to 2,692 MWh ($406,500) and 55,712 therms ($58,481), for a total retail savings of approximately $464,981 and an average of $15.90 per tree (Table 6). Coast redwood (*Sequoia sempervirens*), which represents 6.7% of the population with an importance value of 6.51, accounts for 10.1% of the total energy savings. Blue gum (*Eucalyptus globulus*, 9.7%) and London planetree (*Platanus acerifolia*, 5.7%) provide the next greatest contribution towards total energy savings, due in large part to their canopy size and prevalence.

Chinese pistache (*Pistacia chinensis*), which represents 2.9% of the total population, is contributing only 1.6% of the total energy savings due to the relatively young age distribution of this population (60% of trees <6" DBH). As this population of medium-stature trees matures, the benefits can also be expected to increase. Conversely, crapemyrtle (*Lagerstroemia indica*), also a relatively young population (80% <6" DBH), comprising 7.5% of the overall population and contributing only 2% of the energy benefits, will not realize a substantial increase in benefit contribution due to its small stature at maturity.

Examining average energy savings on a per tree basis (Figure 6), blue gum ($41.55), white mulberry (*Morus alba,* $31.80), and red gum (*Eucalyptus camaldulensis*, $29.28) are currently the greatest contributors, primarily due to their large stature and relatively mature age distribution as compared to the rest of the tree population.

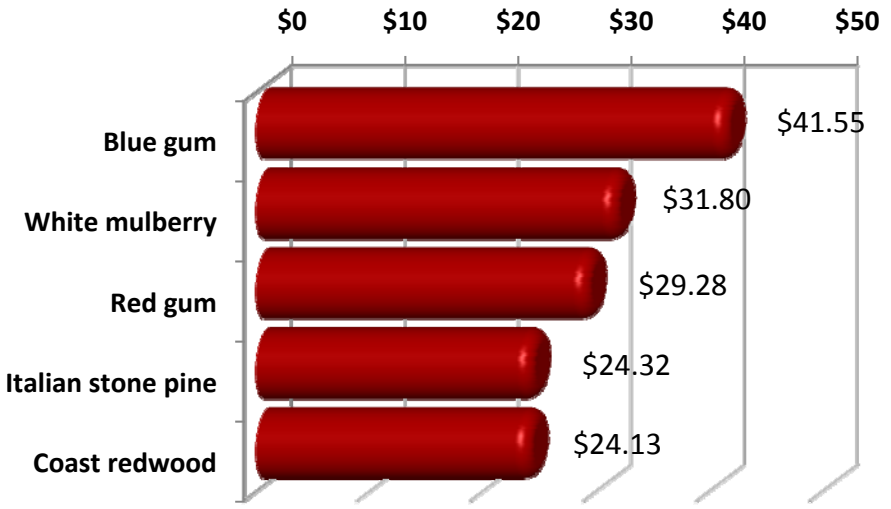


Figure 6. Annual Electricity and Natural Gas Benefits - Top 5 Species

Table 6. Annual Electric and Natural Gas Benefits from Hayward's Public Tree Resource

Species	Total Electricity (MWh)	Electricity ($)	Total Natural Gas (Therms)	Natural Gas ($)	Total ($)	% of Total Tree Numbers	% of Total $	Avg. $/tree
Crapemyrtle	53.62	8,097.25	1,089.04	1,143.17	**9,240.42**	7.50	1.99	4.21
Coast redwood	264.70	39,970.09	6,786.32	7,123.60	**47,093.69**	6.67	10.13	24.13
Purple-leaf plum	53.56	8,087.78	1,086.08	1,140.05	**9,227.83**	4.92	1.98	6.41
London planetree	154.48	23,326.47	2,894.41	3,038.26	**26,364.73**	4.86	5.67	18.57
Southern magnolia	84.16	12,707.41	1,596.33	1,675.67	**14,383.09**	4.73	3.09	10.41
Callery pear	81.31	12,278.40	1,885.90	1,979.63	**14,258.03**	3.86	3.07	12.62
Blue gum	263.75	39,826.18	5,170.15	5,427.10	**45,253.28**	3.72	9.73	41.55
Coast live oak	84.12	12,701.56	1,811.73	1,901.77	**14,603.32**	3.63	3.14	13.76
Chinese privet	47.79	7,215.89	705.15	740.19	**7,956.08**	3.10	1.71	8.76
Red gum	153.99	23,251.92	2,812.07	2,951.83	**26,203.76**	3.06	5.64	29.28
Evergreen pear	61.51	9,288.04	1,247.68	1,309.69	**10,597.73**	3.06	2.28	11.85
Chinese pistache	42.04	6,347.89	920.92	966.69	**7,314.58**	2.92	1.57	8.56
Sweetgum	102.34	15,453.09	2,445.09	2,566.61	**18,019.70**	2.60	3.88	23.74
Canary island pine	96.58	14,584.10	2,103.77	2,208.33	**16,792.43**	2.45	3.61	23.42
Chinese elm	66.11	9,982.05	1,016.43	1,066.95	**11,049.00**	1.61	2.38	23.41
White mulberry	75.55	11,408.80	1,610.77	1,690.82	**13,099.62**	1.41	2.82	31.80
Trident maple	6.27	946.58	130.78	137.27	**1,083.85**	1.36	0.23	2.72
Italian stone pine	54.60	8,243.86	1,159.77	1,217.41	**9,461.26**	1.33	2.03	24.32
Holly oak	37.50	5,662.79	812.00	852.36	**6,515.15**	1.10	1.40	20.23
Black acacia	27.83	4,202.35	539.21	566.01	**4,768.36**	1.00	1.03	16.27
Other trees	880.25	132,917.08	17,888.83	18,777.91	**151,694.99**	35.10	32.62	14.78
All Trees	**2,692**	**$406,500**	**55,712**	**58,481**	**$464,981**	**100%**	**100%**	**$15.90**

Atmospheric Carbon Dioxide Reduction

As environmental awareness continues to increase, governments are paying particular attention to global warming and the effects of greenhouse gas emissions. Two national policy options are currently under debate, the establishment of a carbon tax and a greenhouse gas cap-and-trade system, aimed at the reduction of atmospheric carbon dioxide (CO_2) and other greenhouse gases. A carbon tax would place a tax burden on each unit of greenhouse gas emission and would require regulated entities to pay for their level of emissions. Alternatively, in a cap-and-trade system, an upper limit (or cap) is placed on global (federal, regional, or other jurisdiction) levels of greenhouse gas emissions and the regulated entities would be required to either reduce emissions to required limits or purchase emissions allowances in order to meet the cap (Williams and others, 2007). The concept of purchasing emission allowances (offsets) has led to the acceptance of carbon credits as a commodity that can be exchanged for financial gain. The Center for Urban Forest Research (CUFR, Pacific Southwest Research Station, and USDA Forest Service) recently led the development of Urban Forest Project Reporting Protocol. The protocol, which incorporates methods of the Kyoto Protocol and Voluntary Carbon Standard (VCS), establishes methods for calculating reductions, provides guidance for accounting and reporting, and guides urban forest managers in developing tree planting and stewardship projects that could be registered for greenhouse gas (GHG) reduction credits (offsets). The protocol can be applied to urban tree planting projects within municipalities, campuses, and utility service areas anywhere in the U.S.

While Hayward's urban forest resource may, or may not, qualify for carbon offset credits or be traded in the open market, the City's public trees are nonetheless providing a significant reduction in atmospheric carbon dioxide (CO_2) for a positive environmental and financial benefit to the community.

Urban trees reduce atmospheric carbon dioxide (CO_2) in two ways:

- **<u>Directly</u>, through growth and the sequestration of CO_2 as wood and foliar biomass.**
- **<u>Indirectly</u>, by lowering the demand for heating and air conditioning, thereby reducing the emissions associated with electric power generation and natural gas consumption.**

Conversely, CO_2 is released by vehicles and other combustible engines used to plant and care for trees. Additionally, when a tree dies, most of the CO_2 that accumulated as woody biomass is released back into the atmosphere during decomposition, except in cases where the wood is recycled. Each of these factors must be considered when calculating the CO_2 reduction benefits of trees.

Sequestered Carbon Dioxide

To date, Hayward's public trees have sequestered a total of 38,015 tons of carbon dioxide (CO_2) valued at $570,229[2]. Annually, this resource directly sequesters 2,330.2 tons of CO_2, valued at $34,953, into woody and foliar biomass. Accounting for estimated CO_2 emissions from tree decomposition (-365 tons), tree related maintenance activity (-1.7 tons), and avoided CO_2 (1,131.5 tons), Hayward's trees provide an annual net reduction in atmospheric CO_2 of 3,095 tons, valued at $46,424 with an average of $1.59 per tree (Table 7).

Blue gum (*Eucalyptus globulus,* $8.19), red gum (*Eucalyptus camaldulensis,* $3.35), and white mulberry (*Morus alba,* $2.60) are currently providing the highest per tree benefit (Figure 7). In addition to providing the greatest per tree benefits, blue gum (as a population) are providing the greatest percentage of overall benefits at 19.2% due to their large stature, fast growth, and prevalence in the overall population.

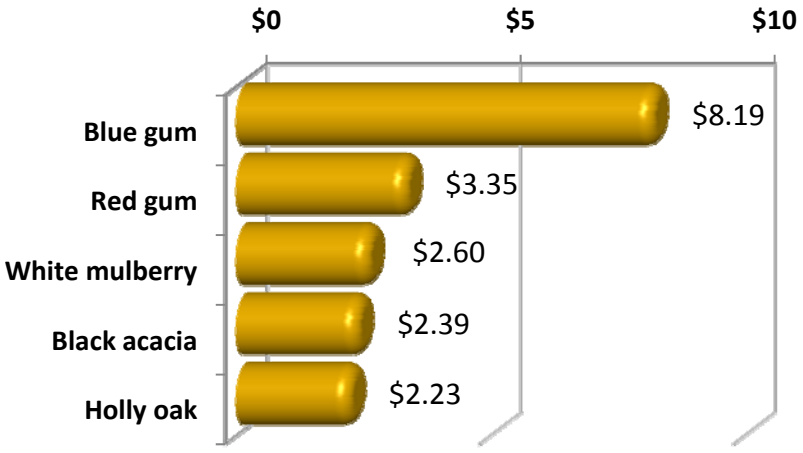


Figure 7. Annual Reduction of CO_2 - Top 5 species

[2] Based on i-Tree Streets default value of $15 per ton. Market value may vary.

Table 7. Annual CO_2 Reduction Benefits Provided by Hayward's Public Tree Resource

Species	Sequestered (lb)	Sequestered ($)	Decomposition Release(lb)	Maintenance Release (lb)	Total Release ($)	Avoided (lb)	Avoided ($)	Net Total (lb)	Total ($)	% of Total Tree Numbers	% of Total $	Avg. $/tree
Crapemyrtle	97,307.24	**729.80**	- 6,511.84	- 258.00	**- 50.77**	45,075.72	**338.07**	135,613.11	**1,017.10**	7.50	2.19	**0.46**
Coast redwood	358,768.16	**2,690.76**	- 37,300.88	- 229.54	**- 281.48**	222,505.28	**1,668.79**	543,743.02	**4,078.07**	6.67	8.78	**2.09**
Purple-leaf plum	110,840.28	**831.30**	- 9,327.66	- 169.22	**- 71.23**	45,022.99	**337.67**	146,366.39	**1,097.75**	4.92	2.36	**0.76**
London planetree	176,797.70	**1,325.98**	- 34,776.11	- 166.98	**- 262.07**	129,853.67	**973.90**	271,708.27	**2,037.81**	4.86	4.39	**1.44**
Southern magnolia	67,657.59	**507.43**	- 8,556.96	- 162.52	**- 65.40**	70,739.56	**530.55**	129,677.68	**972.58**	4.73	2.09	**0.70**
Callery pear	46,603.03	**349.52**	- 3,856.04	- 132.88	**- 29.92**	68,351.33	**512.63**	110,965.44	**832.24**	3.86	1.79	**0.74**
Blue gum	1,217,441.60	**9,130.81**	- 249,611.35	- 128.06	**- 1,873.05**	221,704.13	**1,662.78**	1,189,406.32	**8,920.55**	3.72	19.22	**8.19**
Coast live oak	170,726.07	**1,280.45**	- 21,482.64	- 124.77	**- 162.06**	70,706.95	**530.30**	219,825.62	**1,648.69**	3.63	3.55	**1.55**
Chinese privet	66,332.92	**497.50**	- 11,020.64	- 106.78	**- 83.46**	40,169.38	**301.27**	95,374.89	**715.31**	3.10	1.54	**0.79**
Red gum	324,532.24	**2,433.99**	- 54,156.66	- 105.25	**- 406.96**	129,438.68	**970.79**	399,709.01	**2,997.82**	3.06	6.46	**3.35**
Evergreen pear	46,122.18	**345.92**	- 4,359.87	- 105.13	**- 33.49**	51,704.63	**387.78**	93,361.81	**700.21**	3.06	1.51	**0.78**
Chinese pistache	10,691.07	**80.18**	- 1,250.57	- 100.54	**- 10.13**	35,337.38	**265.03**	44,677.34	**335.08**	2.92	0.72	**0.39**
Sweetgum	66,031.88	**495.24**	- 9,197.42	- 89.25	**- 69.65**	86,024.18	**645.18**	142,769.39	**1,070.77**	2.60	2.31	**1.41**
Canary island pine	108,729.89	**815.47**	- 13,300.22	- 84.32	**- 100.38**	81,186.71	**608.90**	176,532.06	**1,323.99**	2.45	2.85	**1.85**
Chinese elm	50,607.68	**379.56**	- 15,270.74	- 55.50	**- 114.95**	55,568.01	**416.76**	90,849.44	**681.37**	1.61	1.47	**1.44**
White mulberry	95,149.53	**713.62**	- 15,579.55	- 48.45	**- 117.21**	63,510.42	**476.33**	143,031.95	**1,072.74**	1.41	2.31	**2.60**
Trident maple	10,274.98	**77.06**	- 538.73	- 46.92	**- 4.39**	5,269.41	**39.52**	14,958.74	**112.19**	1.36	0.24	**0.28**
Italian stone pine	63,877.87	**479.08**	- 8,755.03	- 45.74	**- 66.01**	45,891.86	**344.19**	100,968.95	**757.27**	1.33	1.63	**1.95**
Holly oak	73,044.04	**547.83**	- 8,877.32	- 37.87	**- 66.86**	31,523.61	**236.43**	95,652.46	**717.39**	1.10	1.55	**2.23**
Black acacia	80,149.30	**601.12**	- 10,238.52	- 34.46	**- 77.05**	23,393.63	**175.45**	93,269.95	**699.52**	1.00	1.51	**2.39**
Other trees	1,418,678.21	**10,640.09**	- 205,923.94	- 1,207.22	**- 1,553.48**	739,922.06	**5,549.42**	1,951,469.10	**14,636.02**	35.10	31.53	**1.43**
All Trees	**4,660,363**	**$34,952**	**-729,893**	**-3,439**	**-$5,499**	**2,262,900**	**$16,971**	**6,189,931**	**$46,424**	**100%**	**100%**	**$1.59**

Air Quality

Urban trees improve air quality in five fundamental ways:

- **Absorption of gaseous pollutants such as ozone (O_3) and nitrogen dioxide (NO_2) through leaf surfaces**
- **Interception of particulate matter (PM_{10}), such as dust, ash, dirt, pollen, and smoke**
- **Reduction of emissions from power generation by reducing energy consumption**
- **Increase of oxygen levels through photosynthesis**
- **Transpiration of water and shade provision, resulting in lower local air temperatures, thereby reducing ozone (0_3) levels**

In the absence of cooling effects provided by trees, higher temperatures contribute to ozone (O3) formation. Additionally, short-term increases in ozone concentrations have been statistically associated with increased tree mortality for 95 large U. S. cities (Bell and others, 2004). However, it should be noted that while trees do a great deal to absorb air pollutants (especially ozone and particulate matter); they also negatively contribute to air pollution. Trees emit various biogenic volatile organic compounds (BVOCs), such as isoprenes and monoterpenes, which can also contribute to ozone formation. These BVOC emissions are accounted for by *i-Tree Streets* in the air quality net benefit.

Deposition and Interception

Each year, Hayward's public trees intercept or absorb approximately 4.5 tons of nitrogen dioxide (NO_2), small particulate matter (PM_{10}), sulfur dioxide (SO_2), and ozone (O_3), for a value of $93,274 (Table 8).

Avoided Pollutants

By reducing energy needs, the energy savings provided by trees have the additional indirect benefit of reducing air pollutant emissions (NO_2, PM_{10}, SO_2, and VOCs) that result from energy production. Altogether, 1.4 tons of pollutants, valued at $24,105, are avoided annually through the shading effects of Hayward's public trees.

BVOC Emissions

Biogenic volatile organic compound (BVOC) emissions from trees, which negatively affect air quality, must also be considered. Approximately 23.9 tons of BVOCs are emitted annually from Hayward's public trees, offsetting the total air quality benefits by -$344,491. Blue gum (*Eucalyptus globulus)* are the heaviest per tree emitters of BVOCs (21.9 lbs), accounting for 50.1% (23,880 pounds) of total BVOC emissions, while representing only 3.7% of the total population. Red gum (*Eucalyptus camaldulensis*, 4.3 lbs), coast redwood (*Sequoia sempervirens*, 3.5 lbs), holly oak (*Quercus ilex*, 2.7 lbs.), sweetgum (*Liquidambar styraciflua*, 2.3 lbs), coast live oak (*Quercus agrifolia*, 1.7 lbs.), black acacia (*Acacia melanoxylon*, 0.6 lbs), and southern magnolia (*Magnolia grandiflora*, 0.0.4 lbs) are also high per tree emitters of BVOCs that result in net negative air quality benefits from each of their respective populations.

London planetree (*Platanus acerifolia*), however, which is also a high per tree emitter of BVOCs (0.6 lbs), intercepts, deposits, and avoids air pollutants (NO_2, PM_{10}, SO_2, and VOCs) valued in excess of its BVOC emissions for a net positive air quality benefit of $1.37 per tree.

Net Air Quality Loss

Trees vary dramatically in their ability to produce net air quality benefits. While all tree species emit some BVOCs, most species contribute benefits to overall air quality that far outweigh these emissions. Many species in Hayward's street tree inventory produce positive air quality benefits. However, eight out of the top 20 most prevalent tree species (each >1% of the population) in the inventory emit BVOCs that exceed their positive benefits and result in net negative air quality for the overall tree resource (Table 8). As a population, blue gum results in the greatest overall loss to air quality, producing a net of 11 tons of BVOCs, followed by coast redwood (3.1 tons), and red gum (1.6 tons). Overall, the inventory is producing a net of 18 tons of BVOCs, at a cost (net loss) of $227,112 and an average loss of $7.77 per tree.

Top Contributors to Air Quality

Typically, large-canopied trees with large leaf surface areas that are not high emitters of BVOCs produce the greatest benefits. On a per tree basis, Chinese elm (*Ulmus parvifolia*, $10.98), white mulberry (*Morus alba*, $6.78), and evergreen pear (*Pyrus kawakamii,* $3.43) currently produce the greatest net air quality improvements (Figure 8).

Some species that produce positive air quality benefits are representing at least 1% of the overall inventory, but have immature populations, including Callery pear (*Pyrus calleryana*) and Chinese pistache (*Pistacia chinensis)*. As these medium-statured trees mature, their contribution to overall air quality will increase as well. Increased reliance on these and other species that produce positive air quality benefits in the inventory would help to balance the effects of species that emit higher BVOCs.

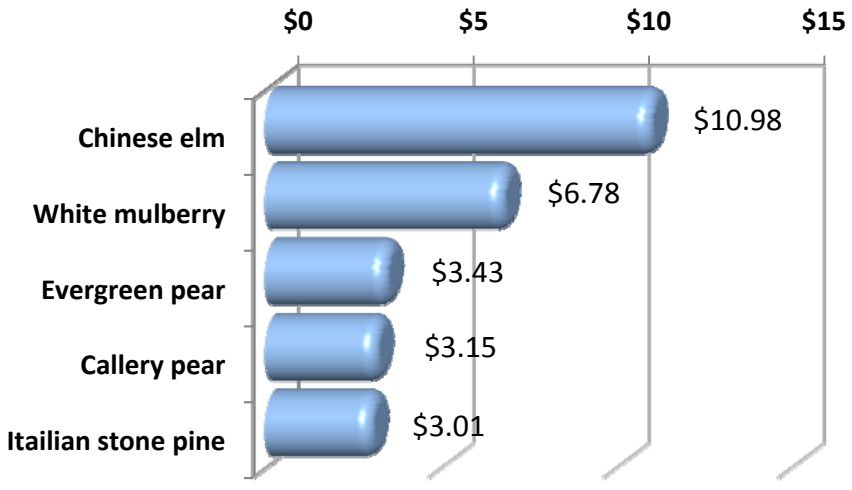


Figure 8. Annual Improvement to Air Quality - Top 5 Species

Table 8. Annual Air Quality Improvements Provided by Hayward's Public Tree Resource

Species	Deposition O3 (lb)	Deposition NO2 (lb)	Deposition PM10 (lb)	Deposition SO2 (lb)	Total Deposition ($)	Avoided NO2 (lb)	Avoided PM10 (lb)	Avoided VOC (lb)	Avoided SO2 (lb)	Total Avoided ($)	BVOC Emissions (lb)	BVOC Emissions ($)	Total (lb)	Total ($)	% of Total Tree Numbers	Avg. $/tree
Crapemyrtle	48.15	17.30	25.65	3.26	**989.17**	29.99	7.68	3.94	16.21	**487.58**	- 1.42	**- 10.27**	150.74	**1,466.49**	7.50	**0.67**
Coast redwood	164.23	72.31	104.32	14.09	**3,720.38**	154.86	37.38	19.35	77.08	**2,459.88**	- 6,877.05	**- 49,652.28**	- 6,233.43	**- 43,472.02**	6.67	**- 22.27**
Purple-leaf plum	62.33	22.39	31.21	4.22	**1,256.96**	29.58	7.55	3.87	15.93	**480.44**	- 1.46	**- 10.57**	175.62	**1,726.83**	4.92	**1.20**
London planetree	306.02	123.86	182.62	24.60	**6,675.48**	84.69	21.43	11.01	45.05	**1,370.70**	- 845.17	**- 6,102.11**	- 45.88	**1,944.08**	4.86	**1.37**
Southern magnolia	81.87	36.05	58.26	7.02	**1,928.39**	45.32	11.65	5.97	24.64	**738.11**	- 613.98	**- 4,432.95**	- 343.21	**- 1,766.45**	4.73	**- 1.28**
Callery pear	139.86	51.86	67.89	9.96	**2,813.73**	46.88	11.57	5.97	24.08	**751.27**	0.00	**0.00**	358.09	**3,565.00**	3.86	**3.15**
Blue gum	806.04	354.87	470.88	69.20	**17,774.83**	143.36	35.48	18.29	73.93	**2,299.79**	- 23,879.85	**- 172,412.48**	- 21,907.78	**- 152,337.86**	3.72	**- 139.89**
Coast live oak	85.12	37.47	57.00	7.29	**1,962.81**	47.23	11.85	6.09	24.82	**761.70**	- 1,970.77	**- 14,228.98**	- 1,693.89	**- 11,504.47**	3.63	**- 10.84**
Chinese privet	70.64	31.11	49.86	6.06	**1,659.24**	24.91	6.69	3.40	14.37	**412.98**	0.00	**0.00**	207.05	**2,072.23**	3.10	**2.28**
Red gum	235.13	103.54	152.15	20.19	**5,359.70**	82.10	20.99	10.77	44.31	**1,334.29**	- 3,854.55	**- 27,829.84**	- 3,185.37	**- 21,135.85**	3.06	**- 23.62**
Evergreen pear	111.83	49.25	69.65	9.59	**2,517.10**	34.09	8.64	4.44	18.19	**552.23**	0.00	**0.00**	305.68	**3,069.33**	3.06	**3.43**
Chinese pistache	117.95	43.71	55.37	8.41	**2,350.38**	24.12	6.06	3.12	12.71	**389.28**	- 232.77	**- 1,680.61**	38.68	**1,059.05**	2.92	**1.24**
Sweetgum	81.28	32.52	50.89	6.51	**1,797.23**	59.01	14.35	7.42	29.69	**940.10**	- 1,768.81	**- 12,770.82**	- 1,487.14	**- 10,033.50**	2.60	**- 13.22**
Canary island pine	92.90	40.91	61.80	7.97	**2,137.38**	53.73	13.37	6.89	27.91	**863.72**	- 195.59	**- 1,412.14**	109.88	**1,588.97**	2.45	**2.22**
Chinese elm	229.04	91.69	133.03	18.38	**4,942.59**	34.86	9.06	4.63	19.25	**570.38**	- 45.60	**- 329.21**	494.34	**5,183.76**	1.61	**10.98**
White mulberry	105.85	37.19	52.15	7.06	**2,115.53**	42.28	10.41	5.37	21.65	**676.91**	0.00	**0.00**	281.97	**2,792.44**	1.41	**6.78**
Trident maple	4.31	1.55	2.48	0.29	**90.64**	3.54	0.90	0.46	1.91	**57.53**	- 0.16	**- 1.17**	15.28	**146.99**	1.36	**0.37**
Italian stone pine	66.15	29.13	42.22	5.68	**1,501.00**	30.21	7.55	3.89	15.79	**486.46**	- 112.87	**- 814.90**	87.75	**1,172.57**	1.33	**3.01**
Holly oak	30.50	13.43	21.50	2.62	**715.96**	20.99	5.24	2.70	10.97	**337.98**	- 856.05	**- 6,180.70**	- 748.11	**- 5,126.77**	1.10	**- 15.92**
Black acacia	39.95	17.59	25.50	3.43	**906.51**	15.19	3.88	1.99	8.19	**246.87**	- 165.33	**- 1,193.66**	- 49.59	**- 40.27**	1.00	**- 0.14**
Other trees	1,391.78	563.36	805.37	110.49	**30,058.66**	488.92	122.71	63.12	257.13	**7,887.07**	- 6,292.02	**- 45,428.38**	- 2,489.12	**- 7,482.66**	35.10	**- 0.73**
All Trees	**4,270.94**	**1,771.07**	**2,519.82**	**346.33**	**$93,274**	**1,495.86**	**374.46**	**192.70**	**783.83**	**$24,105**	**- 47,713.44**	**-$344,491**	**- 35,958.44**	**-$227,112**	**100%**	**-$7.77**

Stormwater Runoff Reductions

According to Federal Clean Water Act regulations, municipalities must obtain a permit for managing their stormwater discharges into water bodies. Each city's program must identify the *best management practices* (BMPs) it will implement to reduce its pollutant discharge.

Rainfall interception by trees can reduce the amount of stormwater that enters collection and treatment facilities during large storm events. Trees intercept rainfall in their canopy, acting as mini-reservoirs, controlling runoff at the source. This is especially important in an urban setting with a significant quantity of impervious surfaces near a major waterway. Healthy urban trees can reduce the amount of runoff and pollutant loading in receiving waters in three primary ways:

- **Leaves and branch surfaces intercept and store rainfall, thereby reducing runoff volumes and delaying the onset of peak flows.**
- **Root growth and decomposition increase the capacity and rate of soil infiltration by rainfall and reduce overland flow.**
- **Tree canopies reduce soil erosion and surface flows by diminishing the impact of raindrops on barren surfaces.**

Hayward's public trees intercept 32.3 million gallons of stormwater annually for an average of 1,105 gallons per tree (Table 9). The total value of this benefit to the City is $129,354, an average of $4.42 per tree. Both as a population, and individually, blue gum (*Eucalyptus globulus*) currently provide the greatest stormwater benefits, representing 14.4% of the overall benefits (Figure 9) and averaging $4.42 per tree.

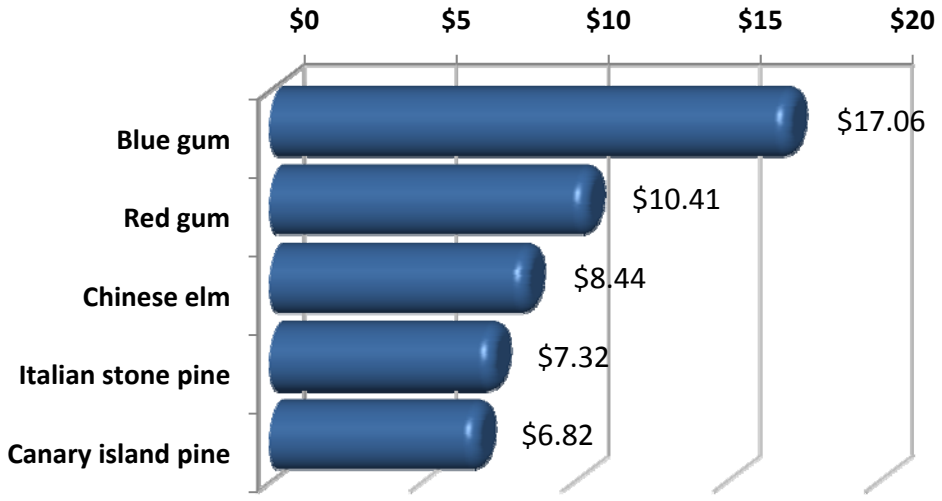


Figure 9. Annual Reduction in Stormwater Runoff - Top 5 Species

Table 9. Annual Stormwater Runoff Reduction Benefits Provided by Hayward's Public Tree Resource

Species	Total Rainfall Interception (Gal)	Total ($)	% of Total Tree Numbers	% of Total $	Avg. $/tree
Crapemyrtle	386,470.67	**1,545.99**	7.50	1.20	**0.70**
Coast redwood	2,563,647.69	**10,255.30**	6.67	7.93	**5.25**
Purple-leaf plum	385,390.20	**1,541.67**	4.92	1.19	**1.07**
London planetree	1,827,811.92	**7,311.76**	4.86	5.65	**5.15**
Southern magnolia	1,121,693.17	**4,487.08**	4.73	3.47	**3.25**
Callery pear	592,439.13	**2,369.92**	3.86	1.83	**2.10**
Blue gum	4,644,962.87	**18,581.14**	3.72	14.36	**17.06**
Coast live oak	1,121,323.75	**4,485.61**	3.63	3.47	**4.23**
Chinese privet	743,562.58	**2,974.46**	3.10	2.30	**3.28**
Red gum	2,329,160.39	**9,317.29**	3.06	7.20	**10.41**
Evergreen pear	825,829.86	**3,303.55**	3.06	2.55	**3.70**
Chinese pistache	347,168.94	**1,388.77**	2.92	1.07	**1.62**
Sweetgum	795,262.49	**3,181.27**	2.60	2.46	**4.19**
Canary island pine	1,223,024.22	**4,892.44**	2.45	3.78	**6.82**
Chinese elm	995,573.23	**3,982.57**	1.61	3.08	**8.44**
White mulberry	657,801.61	**2,631.39**	1.41	2.03	**6.39**
Trident maple	45,652.07	**182.62**	1.36	0.14	**0.46**
Italian stone pine	712,020.59	**2,848.28**	1.33	2.20	**7.32**
Holly oak	485,415.89	**1,941.80**	1.10	1.50	**6.03**
Black acacia	380,871.58	**1,523.59**	1.00	1.18	**5.20**
Other trees	10,151,266.24	**40,607.89**	35.10	31.39	**3.96**
All trees	**32,336,349**	**$129,354**	**100%**	**100%**	**$4.42**

Aesthetic, Property Value and Socioeconomic Benefits

Trees provide beauty in the urban landscape, privacy to homeowners, improved human health, a sense of comfort and place, and habitat for urban wildlife. There is documented evidence that trees promote better business by stimulating more frequent and extended shopping, and a willingness to pay more for goods and parking (Wolf, 1999). Some of these benefits may be captured as a percentage of the value of the property on which a tree stands. To determine the value of these less tangible benefits, *i-Tree Streets* uses research that compares differences in sales prices of homes to estimate the contribution associated with trees. Differences in housing prices in relation to the presence (or lack) of a street tree help define the aesthetic value of street trees in the urban environment. Consideration is given to the location of the street tree in relation to the land use. Street trees located in front of multi-family homes will not increase the property value at the same rate as single-family homes.

Furthermore, street trees located adjacent to commercial and nonresidential properties do not have the same resale potential as residential areas. These factors are taken into consideration and the value of those trees is adjusted accordingly. **The calculation of annual aesthetic and other benefits corresponds with a tree's annual increase in leaf area. When a tree is actively growing, leaf area may increase dramatically. Once a tree is mature, there may be little or no net increase in leaf area from one year to the next; thus, there is little or no incremental annual aesthetic benefit for that year, although the cumulative benefit over the course of the entire life of the tree may be large.** Since this report represents a

one-year sample snapshot of the public tree population, **aesthetic benefits reflect the increase in leaf area for each species population over the course of a single year.** As a result, a very young population of 100 sweetgum (*Liquidambar styraciflua)* will have a greater annual aesthetic benefit than an equal number of mature white mulberry (*Morus alba*). However, the cumulative lifetime aesthetic value of the mulberry would be much greater than that of the sweetgum.

The total annual benefit associated with property value increases and other less tangible benefits is $1.1 million, an average of $36.56 per tree (Table 10). Tree species that produced the highest average per tree aesthetic benefits include blue gum (*Eucalyptus globulus*, $79.01), coast redwood (*Sequoia sempervirens*, $69.07), and sweetgum (*Liquidambar styraciflua*, $57.20) (Figure 10).

It is important to recognize that aesthetic value alone is not an indication of the appropriateness of any one tree species.

Urban trees promote retail shopping by stimulating more frequent visits and a willingness to pay more for goods and services (Wolf 1999)

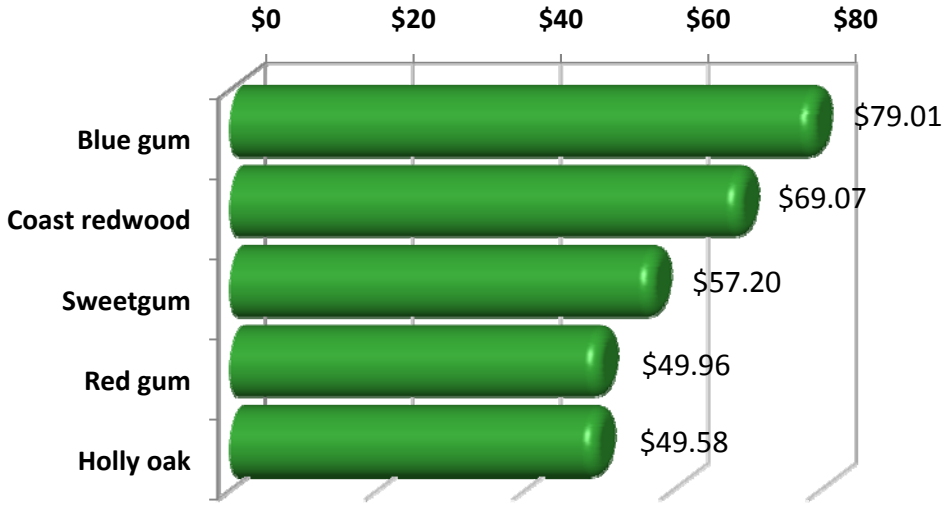


Figure 10. Annual Increase in Property and Socioeconomic Values - Top 5 Species

Table 10. Annual Property Value, Aesthetic, and Socioeconomic Benefits of Hayward's Public Tree Resource

Species	Total ($)	% of Total Tree Numbers	% of Total $	Avg. $/tree
Crapemyrtle	31,807.33	7.50	2.97	14.50
Coast redwood	134,818.26	6.67	12.61	69.07
Purple-leaf plum	22,699.28	4.92	2.12	15.77
London planetree	65,024.57	4.86	6.08	45.79
Southern magnolia	30,997.99	4.73	2.90	22.43
Callery pear	36,667.11	3.86	3.43	32.45
Blue gum	86,044.60	3.72	8.05	79.01
Coast live oak	46,322.97	3.63	4.33	43.66
Chinese privet	14,118.16	3.10	1.32	15.55
Red gum	44,715.99	3.06	4.18	49.96
Evergreen pear	25,694.05	3.06	2.40	28.74
Chinese pistache	19,062.66	2.92	1.78	22.30
Sweetgum	43,418.15	2.60	4.06	57.20
Canary island pine	34,442.57	2.45	3.22	48.04
Chinese elm	8,674.29	1.61	0.81	18.38
White mulberry	19,871.28	1.41	1.86	48.23
Trident maple	5,200.17	1.36	0.49	13.03
Italian stone pine	19,041.96	1.33	1.78	48.95
Holly oak	15,963.71	1.10	1.49	49.58
Black acacia	9,763.10	1.00	0.91	33.32
Other trees	355,020.72	35.10	33.20	34.58
All Trees	**$1,069,369**	**100%**	**100%**	**$36.56**

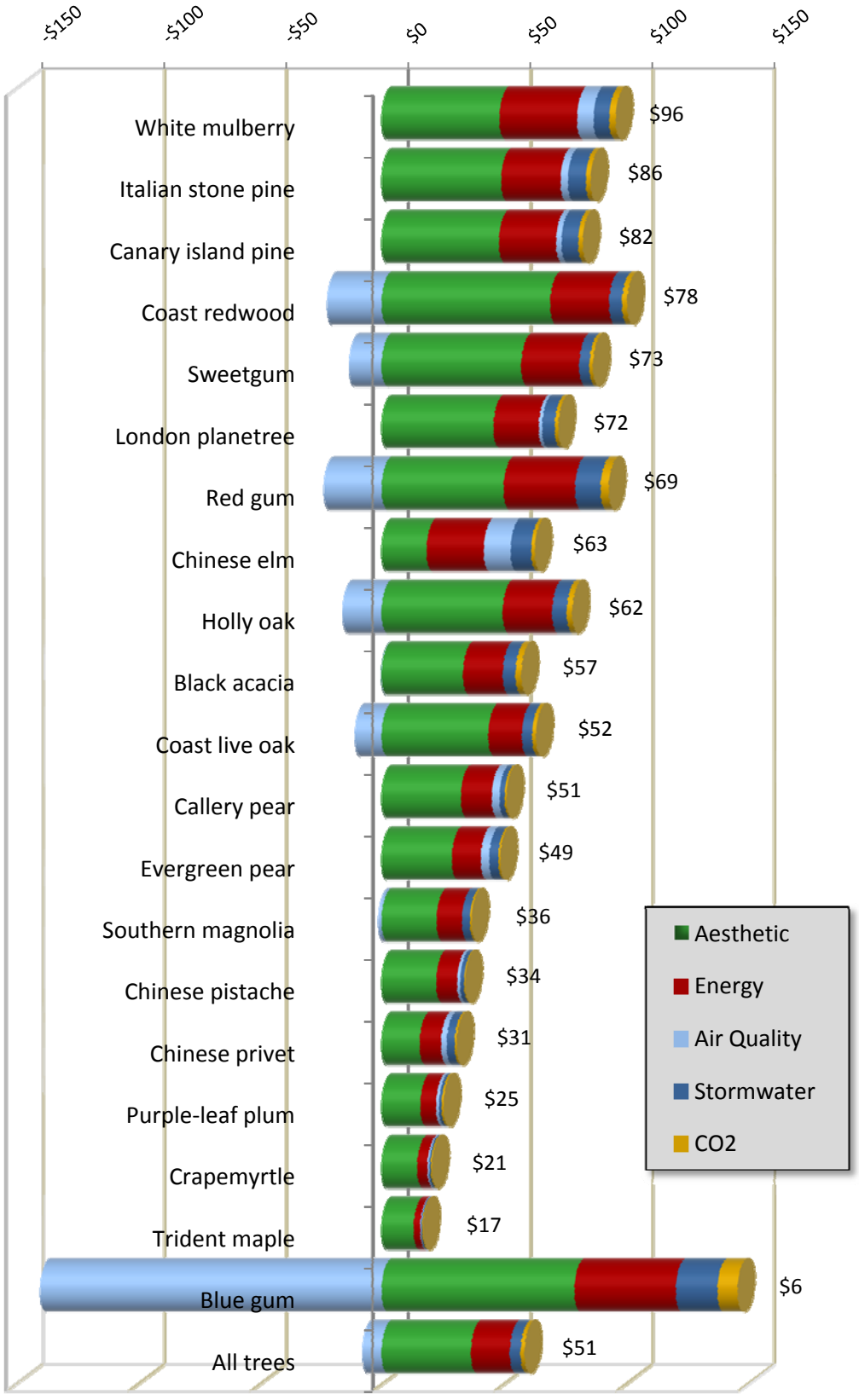


Figure 11.Summary of Annual per Tree Benefits from Hayward's Most Prevalent Public Tree Species

Table 11. Summary of Average Current Annual Per Tree Related Benefits from Hayward's Public Tree Resource

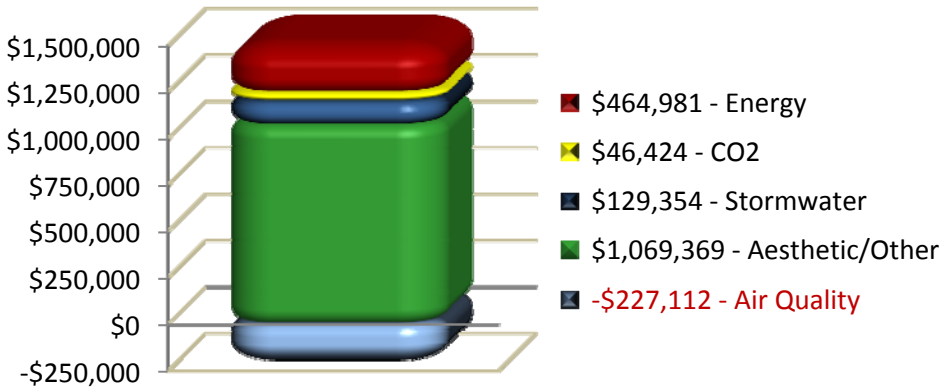
Species	Energy $	CO_2 $	Air Quality $	Stormwater $	Aesthetic & Other $	Total $
Crapemyrtle	4.21	0.46	0.67	0.70	14.50	**20.54**
Coast redwood	24.13	2.09	- 22.27	5.25	69.07	**78.27**
Purple-leaf plum	6.41	0.76	1.20	1.07	15.77	**25.21**
London planetree	18.57	1.44	1.37	5.15	45.79	**72.32**
Southern magnolia	10.41	0.70	- 1.28	3.25	22.43	**35.51**
Callery pear	12.62	0.74	3.15	2.10	32.45	**51.06**
Blue gum	41.55	8.19	- 139.89	17.06	79.01	**5.92**
Coast live oak	13.76	1.55	- 10.84	4.23	43.66	**52.36**
Chinese privet	8.76	0.79	2.28	3.28	15.55	**30.66**
Red gum	29.28	3.35	- 23.62	10.41	49.96	**69.38**
Evergreen pear	11.85	0.78	3.43	3.70	28.74	**48.50**
Chinese pistache	8.56	0.39	1.24	1.62	22.30	**34.11**
Sweetgum	23.74	1.41	- 13.22	4.19	57.20	**73.32**
Canary island pine	23.42	1.85	2.22	6.82	48.04	**82.35**
Chinese elm	23.41	1.44	10.98	8.44	18.38	**62.65**
White mulberry	31.80	2.60	6.78	6.39	48.23	**95.80**
Trident maple	2.72	0.28	0.37	0.46	13.03	**16.86**
Italian stone pine	24.32	1.95	3.01	7.32	48.95	**85.55**
Holly oak	20.23	2.23	- 15.92	6.03	49.58	**62.15**
Black acacia	16.27	2.39	- 0.14	5.20	33.32	**57.04**
All trees	**$15.90**	**$1.59**	**-$7.77**	**$4.42**	**$36.56**	**$50.70**

Net Benefits and Benefit-Investment Ratio (BIR)

Hayward receives valuable benefits from its public trees; however, the City must also consider the costs of maintaining this resource. Applying a *benefit-investment ratio* (BIR) is a useful way to evaluate the public investment in the community tree population. A BIR is an indicator used to summarize the overall value compared to the costs of a given project. Specifically, in this analysis, BIR is the ratio of the total benefits provided by the City's public trees expressed in monetary terms, compared to the costs associated with their management, also expressed in monetary terms.

Hayward's municipal trees have beneficial effects on the environment. Approximately 45% ($413,647) of the total annual benefits quantified in this study are environmental services (Table 12). Energy savings ($464,981) account for 53.6% of the annual environmental benefits and 24% of all annual benefits. Stormwater benefits ($129,354) account for 14.9% of the annual environmental benefits and 6.7% of all benefits. Carbon sequestration, valued at $46,424 accounts for 5.4% of environmental benefits and 2.4% of all benefits. An air quality deficit, resulting from high BVOC emitting tree species, results in a benefit loss of -$227,112. Annual increases in property value, socioeconomic, and other aesthetic values are substantial benefits, accounting for 55.2% of the total benefits. The sum of estimated benefits provided by Hayward's public tree resource is $1,483,016; that's a value of $50.70 per tree and $10.17 per capita. These benefits are realized on an annual basis. It is important to acknowledge that this is not a full accounting of the benefits provided by this resource, as some benefits are intangible and/or difficult to quantify, such as impacts on psychological health, crime, and violence. Empirical evidence of these benefits does exist (Wolf 2007; Kaplan 1989; Ulrich 1986), but there is limited knowledge about the physical processes at work and their interactions make quantification imprecise. Tree growth and mortality rates are highly variable. A true and full accounting of benefits and costs must consider variability among sites (e.g., tree species, growing conditions, maintenance practices) throughout the City, as well as variability in tree growth. In other words, **trees are worth far more than what one can ever quantify!**

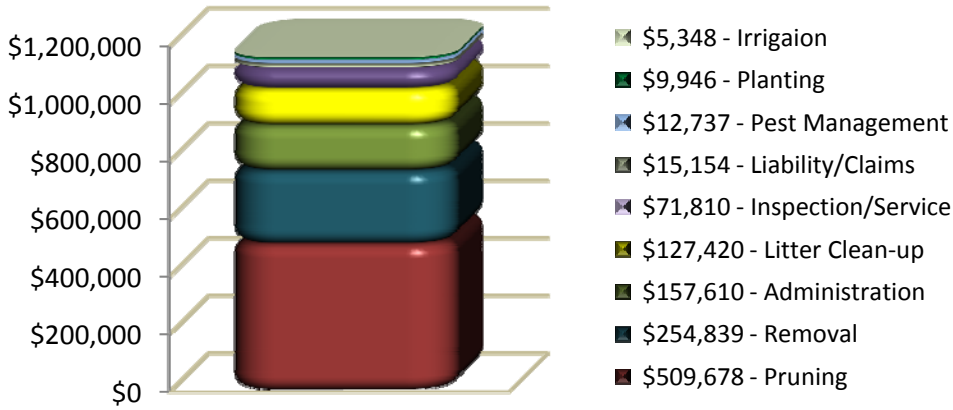
The total annual quantifiable benefit that public trees provide to Hayward is $1,483,016. When the City's annual tree related expenditures (or investment) of $1,164,542 are considered, the net annual benefit (benefits minus investment) to the City is $318,474. The average net benefit for an individual public tree in Hayward is $10.89, and the per capita net benefit is $2.18. Based on the inventory of 29,248 trees, Hayward is receiving $1.27 in benefits for every $1 that is spent on the urban forest resource (Table 12). Considering the young to intermediate age distribution of this population (49.8% are less than 8" DBH), with appropriate maintenance and regular pruning, Hayward can expect even greater benefits from this resource in the future. Increasing the stocking level (currently 78%), and reducing reliance on species that emit high levels of BVOCs, will also increase the value of the benefit stream over time.



Total Annual Benefits from Hayward's Public Tree Resource: $1,483,016

Average Annual per Tree Benefits: $50.70

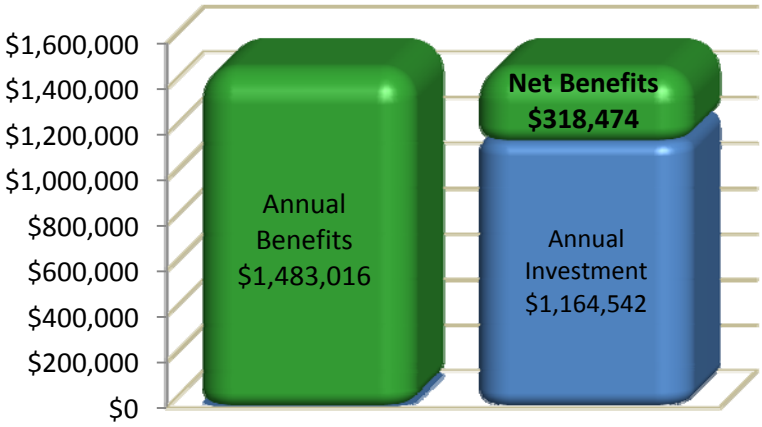
Annual Value of Benefits Per Capita: $10.17



Total Annual Investment to Maintain Hayward's Public Tree Resource: $1,164,542

Average Annual per Tree Investment: $39.82

Annual Investment Per Capita: $7.99



Annual Net Benefits of Hayward's Public Tree Resource: $318,474

For EVERY $1 Invested in street trees, Hayward receives $1.27 in Benefits.

Table 12. Benefit Versus Investment Summary for Hayward's Public Tree Resource

Benefits	Total ($)	$/tree	$/capita
Energy	464,981	15.90	3.19
CO2	46,424	1.59	0.32
Air Quality	- 227,112	- 7.77	- 1.56
Stormwater	129,354	4.42	0.89
Aesthetic/Other	1,069,369	36.56	7.33
Total Benefits	**$1,483,016**	**$50.70**	**$10.17**

Investment			
Planting	9,946	0.34	0.07
Pruning	509,678	17.43	3.49
Pest Management	12,737	0.44	0.09
Irrigation	5,348	0.18	0.04
Tree/Stump Removal	254,839	8.71	1.75
Administration	157,610	5.39	1.08
Inspection/Service	71,810	2.46	0.49
Litter Clean-up	127,420	4.36	0.87
Liability/Claims	15,154	0.52	0.10
Total Investment	**$1,164,542**	**$39.82**	**$7.99**

Net Benefits	**$318,474**	**$10.89**	**$2.18**
Benefit-Investment Ratio	**$1.27**		

Conclusion

This analysis describes the current structural characteristics of Hayward's public urban forest using established tree sampling, numerical modeling, and statistical methods to provide a general accounting of the benefits produced by this resource. The analysis provides a "snapshot" of this resource at its current population and condition level. Rather than examining each individual tree, as an inventory does, the resource analysis examines trends and performance measures over the entire urban forest and each of the major species populations within.

When evaluating the bottom line, Hayward's public trees are worth the investment. This resource gives back more in quantifiable benefits, including energy savings, stormwater runoff reduction, reduction in atmospheric CO_2, and aesthetic benefits, than the community invests in its care. The City's 29,248 trees are providing $1,483,016 in annual gross benefits. Taking into consideration the investment necessary to manage this resource ($1,164,542), Hayward's trees currently provide $318,474, in annual net benefits. That's an average of $10.89 per tree and $2.18 per capita. **For every $1 invested in Hayward's urban forest, the community receives $1.27 in net benefits.**

The estimated gross benefits provided by Hayward's urban forest resource amount to $1,483,016; a value of $50.70 per tree and $10.17 per capita.

The current relative age distribution of Hayward's public tree population is young to intermediate. As these trees continue to mature, the benefits from this resource will continue to increase. While the overall population is in relatively good condition, the inventory identified 857 trees recommended for removal. In conjunction with tree removals, Hayward should focus resources on maximizing the overall flow of benefits by continuing to plant additional trees and increasing the overall stocking level (currently 78%). Based on the resource analysis, Davey Resource Group recommends the following:

- *Continue tree planting efforts with the goal of achieving a 100% stocking rate, utilizing available planting sites identified by the inventory. Where possible, establish replacement trees for the City's most mature trees (and top benefit producers) with trees of similar stature before they must be removed, thereby ensuring a consistent flow of benefits. Focus on planting large-stature trees, where space allows, to maximize benefits.*
- *Increase reliance on species that provide positive air quality benefits.*
- *Promote the health and longevity of the existing tree resource through comprehensive tree maintenance and a cyclical pruning schedule.*
- *Dedicate resources towards a structural (training) pruning program for young and establishing trees to promote healthy structure, extend life expectancy, and reduce future costs and liability.*

Understanding the current status of the City's urban forest allows managers to consider what future trends are likely and what management challenges will need to be met to sustain or, more importantly, increase the current level of benefits. Performance data from the analysis can be used to make determinations regarding species selection, distribution, and maintenance policies. Documenting current structure is necessary for establishing goals and performance objectives and can serve as a benchmark for measuring future success.

Information from the urban forest resource analysis can be used to create an urban forest management or master plan. An urban forest master plan is a critical tool for successful urban forest management, inspiring commitment and providing vision for communication with key decision-makers both inside and outside the organization.

As a Tree City, USA, actively concerned with urban forest protection and management, Hayward, California is a community that recognizes the vital importance of trees to the environmental, social, and economic well-being of the City. Hayward has demonstrated that public trees are a highly valued community resource, a vital component of the urban infrastructure, and an important part of the City's history and identity. The City takes a proactive and forwarding-looking approach to caring for the community's trees, as evidenced by the condition and structure of the current public resource. Complete and up-to-date tree inventory data will help staff to more efficiently track maintenance activities and tree health and will provide a strong basis for making informed management decisions. Though the current resource is already producing a positive return, with additional tree planting and responsible management, Hayward's urban forest can be expected to produce an even greater flow of benefits. With a continued commitment to preserving, maintaining, and maximizing the benefits from its community forest, Hayward will continue to be a great place to live and play for generations to come.

Appendix A: Methods and Procedures

The City of Hayward contracted with Davey Resource Group in 2011 to conduct an inventory of the publicly owned urban forest. The inventory included geo-coding the GIS location of individual trees in the inventory. City staff maintains the inventory data using TreeKeeper® 7.7, a software management system developed by Davey to provide accurate and dependable inventory data specific to tree characteristics, health, and performed maintenance.

Hayward's public tree inventory was collected by Certified Arborists, using ArcPad software to assist the inventory arborist in locating trees on the ground and collecting attributes (details about each tree's species, size, and condition). The data was formatted for use in i-Tree's public tree population assessment tool, ***i-Tree Streets, a STRATUM Analysis Tool*** (*Streets* v 4.0.3; i-Tree v 4.1.3). i-*Tree Streets* assesses tree population structure and the function of those trees, such as their role in building energy use, air pollution removal, stormwater interception, carbon dioxide removal, and property value increases. In order to analyze the economic benefits of Hayward's public trees, *i-Tree Streets* calculates the dollar value of annual resource functionality and compares that to annual program expenditures. This analysis combines the results of the City's public tree inventory with benefit-cost modeling data to produce information regarding resource structure, function, and value for use in determining management recommendations. *i-Tree Streets* regionalizes the calculations of its output by incorporating detailed reference City project information for 17 climate zones across the United States. Hayward is located in the Northern California Coast Climate Zone.

For each of the modeled benefits, an annual resource unit was determined on a per tree basis. Resource units are measured as MWh of electricity saved per tree; MBtu of natural gas conserved per tree, pounds of atmospheric CO_2 reduced per tree; pounds of NO_2, PM_{10}, and VOCs reduced per tree; cubic feet of stormwater runoff reduced per tree; and square feet of leaf area added per tree to increase property values.

Prices were assigned to each resource unit using economic indicators of society's willingness to pay for the environmental benefits trees provide. Estimates of benefits are initial approximations as some benefits are difficult to quantify (e.g., impacts on psychological health, crime, and violence). In addition, limited knowledge about the physical processes at work and their interactions makes estimates imprecise (e.g., fate of air pollutants trapped by trees and then washed to the ground by rainfall). Therefore, this method of quantification provides first-order approximations, based on current research. It is intended to be a general accounting of the benefits produced by urban trees.

Table 13. Hayward Benefit Prices Used In This Analysis.

Benefits	Price	Unit	Source
Electricity	$.151	$/Kwh	*PG&E Residential Schedule*
Natural Gas	$1.0497	$/Therm	*PG&E Residential*
CO_2	$0.0075	$/lb	*Streets* default – Northern California Coast
PM_{10}	$11.7901	$/lb	*Streets* default – Northern California Coast
NO_2	$10.3101	$/lb	*Streets* default – Northern California Coast
SO_2	$3.67	$/lb	*Streets* default – Northern California Coast
VOC	$7.22	$/lb	*Streets* default – Northern California Coast
Stormwater Interception	$0.004	$/gallon	*Streets* default – Northern California Coast
Median Home Value	$240,000	$	*City of Hayward*

i-Tree Streets default values (Table 13) from the Northern California Coast Climate Zone were used for all benefit prices except for median home values and electric and natural gas rates. Electric and natural gas rates are residential schedule rates obtained by City of Hayward from PG&E. Median home value (current) for Hayward was provided by the City of Hayward. Using these rates, the magnitude of the benefits provided by the public tree resource was calculated using *i-Tree Streets***.** Program budget values used in benefit versus investment ratio calculations were supplied by the City of Hayward.

Appendix B: References

Akbari, H., D. Kurn, et al. 1997. Peak power and cooling energy savings of shade trees. *Energy and Buildings* 25:139–148.

Bell ML, McDermott A, Zeger SL, Samet JM, Dominici F. 2004. Ozone and short-term mortality in 95 US urban communities, 1987-2000. J Amer Med Assoc 292:2372-2378.

Chandler TJ. 1965. The Climate of London. London: Hutchinson.

City of Hayward. Hayward's History. Web 02/2012. <http://user.govoutreach.com/hayward/faq.php?cid=10775>

Clark JR, Matheny NP, Cross G, Wake V. 1997. A model of urban forest sustainability. J Arbor 23(1):17-30.

CTLA. 1992. Guide for Plant Appraisal. 8th ed. Savoy, IL: ISA. 103 p.

CUFR. Center For Urban Forest Research Pacific Southwest Research Station. http://www.fs.fed.us/psw/programs/cufr/

Cullen S. 2002. Tree appraisal: can depreciation factors be rated greater than 100%? J Arbor 28(3):153-158.

EPA, U.S. Environmental Protection Agency. Heat Island Effect. www.epa.gov/heatisland/about/index.htm

Hayward Street Tree Program. Web 02/2012. <http://user.govoutreach.com/hayward/faq.php?cid=11179>

Huang, J., H. Akbari, and H. Taha. 1990. The Wind-Shielding and Shading Effects of Trees on Residential Heating and Cooling Requirements. ASHRAE Winter Meeting, American Society of Heating, Refrigerating and Air-Conditioning Engineers. Atlanta, Georgia.

Heisler GM. 1986. Energy savings with trees. J Arbor 12(5):113–125.

i-Tree, STRATUM, *http://www.itreetools.org/*

Kaplan, Rachel and Stephen. 1989. *The Experience of Nature: A Psychological Perspective.* Cambridge: Cambridge University Press.

Keep Hayward Green Program. *hayward-ca.gov*. Web 02/2012. <http://www.hayward-ca.gov/news/pdf/2011/Care%20Broushure.pdf>

Kurn, D., S. Bretz, B. Huang, and H. Akbari. 1994. The Potential for Reducing Urban Air Temperatures and Energy Consumption through Vegetative Cooling (PDF) (31 pp, 1.76MB). ACEEE Summer Study on Energy Efficiency in Buildings, American Council for an Energy Efficient Economy. Pacific Grove, California.

Maco SE, McPherson EG. 2002. Assessing canopy cover over streets and sidewalks in street tree populations. J Arbor 28(6):270-276.

Maco SE, McPherson EG. 2003. A practical approach to assessing structure, function, and value of street tree populations in small communities. J Arbor 29(2):84-97.

McPherson EG, Rowntree RA. 1989. Using structural measures to compare twenty two U.S. street tree populations. Land J 8:13-23.

McPherson EG. 1993. Evaluating the cost-effectiveness of shade trees for demand-side management. Elec J 6(9):57-65.

McPherson, E.G., J. R. Simpson, P. J. Peper, S. E. Maco, and Q. Xiao. 2005. Municipal forest benefits and costs in five US cities (PDF) (6 pp, 267K). *Journal of Forestry* 103(8):411–416.

McPherson et al. 2008. Urban Forest Greenhouse Gas Reporting Protocol

Miller RW. 1997. Urban forestry: planning and managing urban greenspaces. 2nd ed.

Moll G, Kollin C. 1993. A new way to see our City forests. American Forests 99(9-10): 29-31.

Municipal Code. Section 7-2.50□7-2.65. *hayward-ca.gov*. Web 02/2012. <http://www.hayward-ca.gov/municipal/HMCWEB/Streets.pdf>

Richards NA. 1982/83. Diversity and stability in a street tree population. Urban Ecology. 7:159–171.

Simpson JR. 1998. Urban forest impacts on regional space conditioning energy use: Sacramento County case study. Journal of Arboriculture. 24(4): 201–214.

Tree City USA. *www.arborday.org*. Web 01/2012. <http://www.arborday.org/programs/treeCityUSA/index.cfm>

Ulrich, Roger S. 1986. Human Responses to Vegetation and Landscapes. *Landscape and Urban Planning*, 13, 29-44.

Watson G. 2002. Comparing formula methods of tree appraisal. Journal of Arboriculture. 28(1): 11-18.

Williams E, Lotstein R, Galik C, Knuffman H. 2007. A Convenient Guide to Climate Change Policy and Technology. Vol2: 134 p

Wolf, K.L. 2007. The Environmental Psychology of Trees. International Council of Shopping Centers Research Review. 14, 3:39-43.

Appendix C: Reports

Hayward's Complete Population of Public Trees

Species	DBH Class (in) 0-3	3-6	6-12	12-18	18-24	24-30	30-36	36-42	>42	Total	% of Pop.
Broadleaf Deciduous Large (BDL)											
London planetree	90	487	329	191	129	107	59	26	2	1,420	4.86%
Chinese elm	8	21	29	164	240	9	1	0	0	472	1.61%
Elm	24	176	66	13	3	0	0	0	0	282	0.96%
Evergreen ash	4	7	33	64	67	31	25	14	2	247	0.84%
Modesto ash	1	0	3	19	60	90	21	1	0	195	0.67%
Japanese zelkova	15	14	20	44	38	3	0	0	0	134	0.46%
Freeman maple	24	86	0	0	0	0	0	0	0	110	0.38%
Black poplar	0	8	22	7	11	13	12	15	6	94	0.32%
Chinese hackberry	0	18	34	35	2	0	0	0	0	89	0.30%
California sycamore	2	11	25	9	10	6	0	0	1	64	0.22%
Siberian elm	1	8	13	8	13	12	3	2	1	61	0.21%
Northern red oak	9	4	6	14	15	4	0	0	0	52	0.18%
Hind walnut	1	1	13	13	8	7	5	2	1	51	0.17%
Tulip tree	0	6	12	23	7	1	0	0	0	49	0.17%
American elm	0	9	4	5	5	9	0	1	2	35	0.12%
Silver maple	7	2	1	4	9	8	0	0	0	31	0.11%
White ash	1	13	6	2	1	0	0	0	0	23	0.08%
Boxelder	0	6	8	7	0	1	0	0	0	22	0.08%
Scarlet oak	0	0	10	5	2	0	0	0	0	17	0.06%
Norway maple	3	2	7	4	0	0	0	0	0	16	0.05%
European hackberry	4	1	9	0	0	0	0	0	0	14	0.05%
Oak	1	0	4	4	1	1	1	0	0	12	0.04%
Fremont cottonwood	0	1	4	3	3	0	0	0	0	11	0.04%
Bigleaf maple	3	1	3	1	0	0	0	0	0	8	0.03%
Northern hackberry	0	0	1	3	4	0	0	0	0	8	0.03%
Valley oak	0	2	4	2	0	0	0	0	0	8	0.03%
Northern catalpa	0	0	1	0	5	0	0	0	0	6	0.02%
European beech	2	2	1	1	0	0	0	0	0	6	0.02%
Pin oak	0	0	1	4	1	0	0	0	0	6	0.02%
Walnut	2	0	2	1	0	0	0	0	0	5	0.02%
Dawn redwood	1	1	1	0	1	0	0	0	1	5	0.02%
Paper birch	1	3	0	0	0	0	0	0	0	4	0.01%
Black walnut	0	0	1	1	0	0	1	1	0	4	0.01%
Cottonwood	0	0	1	2	1	0	0	0	0	4	0.01%
Sugar maple	0	0	1	0	1	1	0	0	0	3	0.01%
Pecan	0	0	1	1	0	0	0	0	0	2	0.01%
Water oak	0	2	0	0	0	0	0	0	0	2	0.01%
Shumard oak	2	0	0	0	0	0	0	0	0	2	0.01%
Butternut	0	0	0	0	1	0	0	0	0	1	0.00%
BDL Total	**206**	**892**	**676**	**654**	**638**	**303**	**128**	**62**	**16**	**3,575**	**12.22%**
Broadleaf Deciduous Medium (BDM)											
Callery pear	99	391	499	121	19	0	0	1	0	1,130	3.86%
Chinese pistache	224	293	290	44	4	0	0	0	0	855	2.92%
Sweetgum	61	160	199	244	78	13	4	0	0	759	2.60%
White mulberry	3	3	32	136	134	89	15	0	0	412	1.41%
Ginkgo	80	25	121	21	4	0	1	0	0	252	0.86%

Species	DBH Class (in) 0-3	3-6	6-12	12-18	18-24	24-30	30-36	36-42	>42	Total	% of Pop.
Chinese flame tree	47	64	102	18	0	0	0	0	0	231	0.79%
Raywood ash	7	25	81	48	33	12	0	0	0	206	0.70%
Red maple	45	71	26	1	1	0	0	0	0	144	0.49%
White alder	0	6	51	46	16	12	5	1	0	137	0.47%
Italian alder	46	11	50	15	4	2	0	0	0	128	0.44%
Callery pear ' Chanticleer'	21	64	32	0	0	0	0	0	0	117	0.40%
European white birch	10	34	54	14	1	0	0	0	0	113	0.39%
Honeylocust	11	30	50	13	4	0	0	0	0	108	0.37%
Tallowtree	0	12	70	5	0	0	0	0	0	87	0.30%
Idaho locust	2	22	38	9	7	0	0	0	0	78	0.27%
Black tupelo	7	25	30	13	1	1	0	0	0	77	0.26%
Moraine ash	0	2	6	29	26	7	3	2	0	75	0.26%
Ash	2	7	3	19	24	5	1	1	3	65	0.22%
Jacaranda	4	25	22	2	0	0	0	0	0	53	0.18%
Goldenrain tree	8	22	16	6	0	0	0	0	0	52	0.18%
Mimosa	1	16	23	4	1	0	0	0	0	45	0.15%
Weeping willow	3	3	3	9	4	8	5	3	3	41	0.14%
Black locust	1	5	11	9	7	6	0	1	0	40	0.14%
Green ash	0	0	0	0	8	11	7	3	2	31	0.11%
Tree of heaven	0	23	5	1	0	0	0	0	0	29	0.10%
BDM Other	17	4	3	1	1	0	1	0	0	27	0.09%
Basswood	0	0	0	0	1	6	10	7	2	26	0.09%
Littleleaf linden	1	13	8	1	2	1	0	0	0	26	0.09%
English walnut	1	6	8	4	4	0	0	0	0	23	0.08%
Willow	0	3	14	1	1	0	0	0	0	19	0.06%
Fastigate hornbeam	15	0	0	0	0	0	0	0	0	15	0.05%
Black ash	0	0	5	7	3	0	0	0	0	15	0.05%
Maple	11	2	1	0	0	0	0	0	0	14	0.05%
American hornbeam	0	0	9	1	0	0	0	0	0	10	0.03%
Hedge maple	1	1	3	1	0	0	0	0	0	6	0.02%
Velvet ash	0	0	0	0	3	1	0	1	0	5	0.02%
Mulberry	0	0	3	1	0	0	0	0	0	4	0.01%
Southern catalpa	0	2	1	0	0	0	0	0	0	3	0.01%
Oriental sweetgum	0	0	0	2	1	0	0	0	0	3	0.01%
Birch	1	0	0	0	1	0	0	0	0	2	0.01%
Japanese persimmon	1	0	1	0	0	0	0	0	0	2	0.01%
Chinaberry	1	1	0	0	0	0	0	0	0	2	0.01%
Black willow	0	0	1	0	1	0	0	0	0	2	0.01%
Paulownia	1	0	0	0	0	0	0	0	0	1	0.00%
Corkscrew willow	1	0	0	0	0	0	0	0	0	1	0.00%
BDM Total	**733**	**1,371**	**1,871**	**846**	**394**	**174**	**52**	**20**	**10**	**5,471**	**18.71%**
Broadleaf Deciduous Small (BDS)											
Crapemyrtle	720	1,036	433	4	1	0	0	0	0	2,194	7.50%
Purple-leaf plum	275	468	651	44	0	1	0	0	0	1,439	4.92%
Trident maple	213	162	24	0	0	0	0	0	0	399	1.36%
Eastern redbud	121	116	51	0	0	0	0	0	0	288	0.98%
Kwanzan cherry	46	45	73	8	3	0	0	0	0	175	0.60%
Almond	27	85	43	4	0	0	0	0	0	159	0.54%
Blierana plum	39	46	15	1	0	1	0	0	0	102	0.35%
Carolina laurelcherry	55	14	17	4	1	0	0	0	0	91	0.31%
Red horsechestnut	50	18	3	5	2	0	0	0	0	78	0.27%
Almendro	12	35	25	1	0	0	0	0	0	73	0.25%

Species	DBH Class (in) 0-3	3-6	6-12	12-18	18-24	24-30	30-36	36-42	>42	Total	% of Pop.
Japanese maple	32	20	9	0	1	0	0	0	0	62	0.21%
Stonefruit species	14	21	11	1	0	0	0	0	0	47	0.16%
Catalina cherry	2	9	25	2	0	0	0	0	0	38	0.13%
Apple	14	14	6	0	0	0	0	0	0	34	0.12%
Smooth hawthorn	1	3	11	16	0	0	0	0	0	31	0.11%
Carriere hawthorn	3	3	14	9	1	0	0	0	0	30	0.10%
Crabapple	18	8	3	0	0	0	0	0	0	29	0.10%
Western redbud	10	11	3	0	0	0	0	0	0	24	0.08%
Washington hawthorn	0	15	8	0	0	0	0	0	0	23	0.08%
Chitalpa	6	6	5	0	0	0	0	0	0	17	0.06%
Saucer magnolia	5	9	2	1	0	0	0	0	0	17	0.06%
Apricot	8	6	2	0	0	0	0	0	0	16	0.05%
BDS Other	7	4	2	0	0	0	0	0	0	13	0.04%
Buckthorn	12	0	0	0	0	0	0	0	0	12	0.04%
Common fig	3	1	5	0	0	0	0	0	0	9	0.03%
Common plum	0	4	4	0	0	0	0	0	0	8	0.03%
Peach	7	0	0	0	0	0	0	0	0	7	0.02%
Redbud	3	1	0	0	0	0	0	0	0	4	0.01%
Patagua	1	0	0	0	1	1	0	0	0	3	0.01%
Golden chain tree	0	1	2	0	0	0	0	0	0	3	0.01%
Hollyleaf cherry	0	0	2	0	0	1	0	0	0	3	0.01%
Common pear	3	0	0	0	0	0	0	0	0	3	0.01%
Elderberry	0	1	2	0	0	0	0	0	0	3	0.01%
Hawthorn	0	1	0	1	0	0	0	0	0	2	0.01%
Pomegranate	0	2	0	0	0	0	0	0	0	2	0.01%
Sumac	0	0	1	1	0	0	0	0	0	2	0.01%
Chaste tree	1	0	0	0	0	0	1	0	0	2	0.01%
Star magnolia	1	0	0	0	0	0	0	0	0	1	0.00%
BDS Total	**1,709**	**2,165**	**1,452**	**102**	**10**	**4**	**1**	**0**	**0**	**5,443**	**18.61%**
Broadleaf Evergreen Large (BEL)											
Blue gum	5	39	141	152	116	133	115	122	266	1,089	3.72%
Coast live oak	201	302	303	136	61	33	13	10	2	1,061	3.63%
Red gum	4	15	139	321	222	138	40	11	5	895	3.06%
Holly oak	7	53	116	95	37	10	2	1	1	322	1.10%
Silver dollar gum	11	10	11	35	43	31	13	5	0	159	0.54%
Live oak	47	74	17	8	1	0	0	0	0	147	0.50%
Red ironbark	1	0	11	23	22	18	12	3	0	90	0.31%
Brisbane box	13	39	17	4	0	3	4	0	0	80	0.27%
Fern pine	3	21	27	14	6	1	0	0	0	72	0.25%
California laurel	30	12	11	4	2	3	1	2	2	67	0.23%
Silk oak	0	0	4	11	22	7	0	0	0	44	0.15%
Gum	3	2	3	11	10	6	1	2	2	40	0.14%
Cork oak	11	7	3	1	0	4	1	1	0	28	0.10%
Ribbon gum	0	0	1	5	2	2	0	4	4	18	0.06%
Desert gum	0	0	1	3	2	0	0	0	0	6	0.02%
Tanoak	0	3	0	0	0	0	0	0	0	3	0.01%
Interior live oak	0	0	1	2	0	0	0	0	0	3	0.01%
BEL Other	0	2	0	0	0	0	0	0	0	2	0.01%
Sugargum	0	0	0	0	0	1	0	0	0	1	0.00%
Canyon live oak	0	0	1	0	0	0	0	0	0	1	0.00%
BEL Total	**336**	**579**	**807**	**825**	**546**	**390**	**202**	**161**	**282**	**4,128**	**14.11%**

Species	DBH Class (in) 0-3	3-6	6-12	12-18	18-24	24-30	30-36	36-42	>42	Total	% of Pop.
Broadleaf Evergreen Medium (BEM)											
Southern magnolia	284	274	508	247	60	6	1	1	1	1,382	4.73%
Chinese privet	35	163	365	262	73	10	0	0	0	908	3.10%
Black acacia	9	71	95	38	38	28	14	0	0	293	1.00%
Bailey acacia	6	113	132	29	4	0	1	0	0	285	0.97%
Camphor tree	7	25	21	47	50	59	21	6	1	237	0.81%
Carob	1	2	47	56	60	24	6	6	1	203	0.69%
Australian willow	22	40	61	36	8	0	0	0	0	167	0.57%
Olive	9	7	60	54	5	4	1	1	0	141	0.48%
California peppertree	4	8	31	41	15	6	1	1	1	108	0.37%
Mayten	5	20	41	18	3	2	0	0	0	89	0.30%
Victorian box	0	3	17	15	7	4	0	0	0	46	0.16%
Brush cherry	1	0	38	4	0	0	0	0	0	43	0.15%
Bay laurel	9	13	8	2	1	0	0	0	0	33	0.11%
Willow-leaved gimlet	1	1	6	6	1	2	0	0	1	18	0.06%
Avocado	2	5	6	2	2	1	0	0	0	18	0.06%
Green acacia	0	1	3	9	2	1	0	0	0	16	0.05%
Sydney golden wattle	1	13	2	0	0	0	0	0	0	16	0.05%
Surinam cherry	1	1	6	2	0	0	0	0	0	10	0.03%
Redflower gum	0	0	2	2	1	1	0	0	0	6	0.02%
Bottle tree	0	0	1	0	2	1	0	0	0	4	0.01%
White ironbark	0	0	0	3	1	0	0	0	0	4	0.01%
Acacia	0	0	2	0	1	0	0	0	0	3	0.01%
Catalina ironwood	0	0	1	1	0	0	0	0	0	2	0.01%
Pacific madrone	1	0	0	0	0	0	0	0	0	1	0.00%
Silver dollar eucalyptus	0	0	0	1	0	0	0	0	0	1	0.00%
Benjamin fig	0	1	0	0	0	0	0	0	0	1	0.00%
BEM Total	**398**	**761**	**1,453**	**875**	**334**	**149**	**45**	**15**	**5**	**4,035**	**13.80%**
Broadleaf Evergreen Small (BES)											
Evergreen pear	82	182	461	131	31	6	1	0	0	894	3.06%
Bronze loquat	47	58	123	45	5	1	0	0	0	279	0.95%
Water gum	45	83	35	1	0	0	0	0	0	164	0.56%
Strawberry tree	51	45	27	6	2	0	0	0	0	131	0.45%
California buckeye	75	4	11	4	1	1	0	0	0	96	0.33%
Mioporo	2	23	31	12	4	6	5	4	1	88	0.30%
Fraser photinia	14	33	33	6	0	0	0	0	0	86	0.29%
Lemon bottlebrush	4	6	55	13	2	1	0	1	0	82	0.28%
African sumac	0	12	22	11	0	0	0	0	0	45	0.15%
Shiny xylosma	16	6	16	0	0	0	0	0	0	38	0.13%
Loquat	13	11	8	2	0	0	0	0	0	34	0.12%
Indian hawthorn	6	26	0	0	0	0	0	0	0	32	0.11%
Brazilian pepper	0	1	10	10	4	3	0	0	0	28	0.10%
Weeping bottlebrush	0	7	14	4	1	0	0	0	0	26	0.09%
Horsechestnut	14	5	3	0	1	0	0	0	0	23	0.08%
Cajeput tree	0	1	1	6	5	3	6	1	0	23	0.08%
Japanese pittosporum	1	14	5	0	0	0	0	0	0	20	0.07%
Marina arbutus	10	6	0	0	0	0	0	0	0	16	0.05%
Flowering dogwood	12	2	0	0	0	0	0	0	0	14	0.05%
BES Other	7	1	2	1	0	1	0	0	0	12	0.04%
English holly	0	9	3	0	0	0	0	0	0	12	0.04%
Pink melaleuca	7	3	1	0	0	0	0	0	0	11	0.04%
Yew podocarpus	1	4	3	0	1	0	0	0	0	9	0.03%

Species	DBH Class (in) 0-3	3-6	6-12	12-18	18-24	24-30	30-36	36-42	>42	Total	% of Pop.
Florida hopbush	8	0	0	0	0	0	0	0	0	8	0.03%
Lemon	7	0	0	0	0	0	0	0	0	7	0.02%
Mulga	3	3	0	0	0	0	0	0	0	6	0.02%
Orange	2	3	1	0	0	0	0	0	0	6	0.02%
Myrtle	0	2	3	1	0	0	0	0	0	6	0.02%
Oleander	1	5	0	0	0	0	0	0	0	6	0.02%
Long-leaf yellowwood	0	3	2	0	0	0	0	0	0	5	0.02%
Carrotwood	0	0	2	2	0	0	0	0	0	4	0.01%
Coastal teatree	0	1	3	0	0	0	0	0	0	4	0.01%
Stiffleaf cheesewood	0	2	2	0	0	0	0	0	0	4	0.01%
Queensland pittosporum	0	0	2	1	1	0	0	0	0	4	0.01%
Citrus	1	1	1	0	0	0	0	0	0	3	0.01%
Wavyleaf silktassel	2	1	0	0	0	0	0	0	0	3	0.01%
Kousa dogwood	2	0	0	0	0	0	0	0	0	2	0.01%
Christmasberry	0	2	0	0	0	0	0	0	0	2	0.01%
Holly	0	0	1	1	0	0	0	0	0	2	0.01%
Tarata	1	1	0	0	0	0	0	0	0	2	0.01%
Blue blossom	1	0	0	0	0	0	0	0	0	1	0.00%
California flannelbush	1	0	0	0	0	0	0	0	0	1	0.00%
Southern bayberry	0	1	0	0	0	0	0	0	0	1	0.00%
Cheesewood	1	0	0	0	0	0	0	0	0	1	0.00%
Cherry laurel	0	0	1	0	0	0	0	0	0	1	0.00%
Firethorn	0	0	0	0	1	0	0	0	0	1	0.00%
BES Total	**437**	**567**	**882**	**257**	**59**	**22**	**12**	**6**	**1**	**2,243**	**7.67%**
Conifer Evergreen Large (CEL)											
Coast redwood	150	341	597	408	186	142	79	28	21	1,952	6.67%
Canary island pine	35	94	172	122	191	70	30	2	1	717	2.45%
Italian stone pine	11	16	131	105	55	38	14	9	10	389	1.33%
Deodar cedar	7	15	43	80	41	26	5	1	1	219	0.75%
Aleppo pine	19	26	45	31	49	21	8	9	8	216	0.74%
Monterey pine	3	10	19	28	48	53	30	16	4	211	0.72%
Incense cedar	5	6	18	13	12	4	6	1	1	66	0.23%
Giant sequoia	0	0	2	6	4	6	5	3	0	26	0.09%
Australian pine	0	1	14	7	0	1	0	0	0	23	0.08%
Atlas cedar	3	1	3	7	2	2	1	0	0	19	0.06%
Cypress	0	0	6	10	2	1	0	0	0	19	0.06%
Japanese black pine	3	3	7	3	0	0	0	0	0	16	0.05%
Monterey cypress	0	1	1	2	1	1	0	0	6	12	0.04%
Norway spruce	2	3	1	3	0	0	0	0	0	9	0.03%
Blue spruce	3	3	1	2	0	0	0	0	0	9	0.03%
Araucaria	3	3	0	0	0	0	0	0	0	6	0.02%
Mexican weeping pine	0	0	1	2	1	0	0	0	0	4	0.01%
Douglas fir	0	0	1	1	1	1	0	0	0	4	0.01%
Ponderosa pine	0	1	0	1	1	0	0	0	0	3	0.01%
Fir	0	0	1	0	0	0	1	0	0	2	0.01%
River sheoak	0	0	0	1	1	0	0	0	0	2	0.01%
Japanese red cedar	0	0	2	0	0	0	0	0	0	2	0.01%
Scotch pine	1	0	0	1	0	0	0	0	0	2	0.01%
Pacific yew	0	0	1	1	0	0	0	0	0	2	0.01%
Bunya bunya	0	0	0	0	0	0	0	0	1	1	0.00%
Japanese red pine	0	1	0	0	0	0	0	0	0	1	0.00%
Western red cedar	0	0	0	0	1	0	0	0	0	1	0.00%

Species	DBH Class (in) 0-3	3-6	6-12	12-18	18-24	24-30	30-36	36-42	>42	Total	% of Pop.
CEL Total	**245**	**525**	**1,066**	**834**	**596**	**366**	**179**	**69**	**53**	**3,933**	**13.45%**
Conifer Evergreen Medium (CEM)											
Italian cypress	28	37	38	4	1	0	0	0	0	108	0.37%
Smooth Arizona cypress	36	2	0	0	0	0	0	0	0	38	0.13%
Pine	3	3	10	5	2	2	1	0	0	26	0.09%
Oriental arborvitae	12	5	1	1	0	0	0	0	0	19	0.06%
Turkish pine	0	1	1	4	5	0	0	0	0	11	0.04%
California juniper	0	0	4	5	0	0	0	0	0	9	0.03%
Leyland cypress	0	0	1	0	1	0	0	0	0	2	0.01%
CEM Total	**79**	**48**	**55**	**19**	**9**	**2**	**1**	**0**	**0**	**213**	**0.73%**
Conifer Evergreen Small (CES)											
Hollywood juniper	0	10	36	15	3	1	1	0	0	66	0.23%
Rocky mountain juniper	0	13	17	0	0	0	0	0	0	30	0.10%
Juniper	1	5	4	0	0	0	0	0	0	10	0.03%
Chinese juniper	1	1	0	0	0	1	0	1	1	5	0.02%
Sawara false cypress	0	1	1	0	0	0	0	0	0	2	0.01%
Sweet hakea	0	0	1	0	0	0	0	0	0	1	0.00%
CES Total	**2**	**30**	**59**	**15**	**3**	**2**	**1**	**1**	**1**	**114**	**0.39%**
Palm Evergreen Large (PEL)											
Canary island date palm	0	0	1	5	2	5	9	1	2	25	0.09%
Date palm	0	0	0	3	8	0	0	0	0	11	0.04%
PEL Total	**0**	**0**	**1**	**8**	**10**	**5**	**9**	**1**	**2**	**36**	**0.12%**
Palm Evergreen Small (PES)											
Mexican fan palm	0	3	2	5	9	5	0	0	0	24	0.08%
California fan palm	0	1	2	5	5	3	2	0	0	18	0.06%
Queen palm	3	0	3	3	0	0	0	0	0	9	0.03%
Giant dracaena	0	2	0	0	0	0	0	0	0	2	0.01%
Windmill palm	0	0	0	2	0	0	0	0	0	2	0.01%
Yucca	0	2	0	0	0	0	0	0	0	2	0.01%
PES Total	**3**	**8**	**7**	**15**	**14**	**8**	**2**	**0**	**0**	**57**	**0.19%**
All Trees	**4,148**	**6,946**	**8,329**	**4,450**	**2,613**	**1,425**	**632**	**335**	**370**	**29,248**	**100%**

Relative Performance Index (RPI) for Hayward's Public Trees

Species	Excellent	Very Good	Good	Fair	Poor	Critical	Dead	RPI	# of Trees	% of All Trees
Crapemyrtle	2.10	12.67	67.96	14.95	1.46	0.32	0.55	**1.09**	2194	7.50
Coast redwood	1.43	26.08	54.56	13.68	2.92	0.92	0.41	**1.10**	1952	6.67
Purple-leaf plum	0.07	11.12	57.12	27.87	2.36	0.42	1.04	**1.04**	1439	4.92
London planetree	3.94	19.23	45.99	29.23	1.20	0.21	0.21	**1.07**	1420	4.86
Southern magnolia	1.52	9.91	57.24	27.79	2.89	0.29	0.36	**1.05**	1382	4.73
Callery pear	5.13	11.15	55.22	25.04	2.12	0.27	1.06	**1.06**	1130	3.86
Blue gum	0.00	0.00	31.31	53.99	8.26	1.74	4.68	**0.86**	1089	3.72
Coast live oak	0.09	0.66	64.84	30.63	2.73	0.66	0.38	**1.02**	1061	3.63
Chinese privet	0.00	0.00	40.31	48.13	8.70	2.42	0.44	**0.92**	908	3.10
Red gum	0.00	0.00	27.82	32.29	14.30	6.26	19.33	**0.69**	895	3.06
Evergreen pear	0.00	9.28	46.42	41.39	2.46	0.11	0.34	**1.01**	894	3.06
Chinese pistache	5.50	6.32	58.48	25.96	2.81	0.58	0.35	**1.06**	855	2.92
Sweetgum	0.00	3.56	50.46	43.21	2.50	0.13	0.13	**1.00**	759	2.60
Canary island pine	1.26	14.64	68.48	14.78	0.70	0.14	0.00	**1.11**	717	2.45
Chinese elm	0.00	0.00	36.44	60.17	2.54	0.42	0.42	**0.94**	472	1.61
White mulberry	0.00	0.00	4.85	69.90	24.51	0.73	0.00	**0.79**	412	1.41
Trident maple	0.50	18.05	58.15	18.05	2.76	1.25	1.25	**1.06**	399	1.36
Italian stone pine	0.00	2.31	60.15	36.50	1.03	0.00	0.00	**1.02**	389	1.33
Holly oak	0.00	2.80	51.24	40.06	4.66	1.24	0.00	**0.98**	322	1.10
Black acacia	0.34	6.14	40.96	43.34	7.17	1.37	0.68	**0.96**	293	1.00
Eastern redbud	0.00	1.39	69.10	22.57	4.51	1.39	1.04	**1.02**	288	0.98
Bailey acacia	0.00	0.00	51.58	31.58	11.23	3.86	1.75	**0.92**	285	0.97
Elm	0.00	0.00	56.03	8.87	2.48	2.13	30.50	**0.73**	282	0.96
Bronze loquat	0.00	2.15	56.99	32.26	6.45	0.72	1.43	**0.98**	279	0.95
Ginkgo	1.19	3.17	60.32	32.54	2.38	0.00	0.40	**1.03**	252	0.86
Evergreen ash	0.00	0.00	51.42	47.77	0.81	0.00	0.00	**0.99**	247	0.84
Camphor tree	0.00	0.00	43.88	48.52	7.17	0.42	0.00	**0.95**	237	0.81
Chinese flame tree	0.00	19.05	50.22	25.54	3.03	0.43	1.73	**1.04**	231	0.79
Deodar cedar	0.00	6.85	63.01	29.68	0.46	0.00	0.00	**1.05**	219	0.75
Aleppo pine	0.00	0.00	35.19	61.11	2.31	0.00	1.39	**0.93**	216	0.74
Monterey pine	0.00	0.00	53.08	37.44	7.11	1.90	0.47	**0.96**	211	0.72
Raywood ash	0.00	0.49	60.19	31.55	7.77	0.00	0.00	**1.00**	206	0.70
Carob	0.00	0.00	11.33	81.28	5.91	0.49	0.99	**0.85**	203	0.69
Modesto ash	0.00	0.00	9.74	77.44	12.31	0.51	0.00	**0.84**	195	0.67
Kwanzan cherry	0.00	12.00	44.57	30.86	8.57	4.00	0.00	**0.98**	175	0.60
Australian willow	0.00	0.00	55.69	38.92	3.59	0.00	1.80	**0.98**	167	0.57
Water gum	0.00	25.00	58.54	14.63	1.22	0.00	0.61	**1.11**	164	0.56
Silver dollar gum	0.00	0.00	50.94	47.17	1.26	0.63	0.00	**0.98**	159	0.54
Almond	0.00	0.00	64.78	30.19	3.77	0.63	0.63	**1.01**	159	0.54
Live oak	1.36	16.33	65.31	15.65	1.36	0.00	0.00	**1.10**	147	0.50
Red maple	0.00	18.06	58.33	22.22	1.39	0.00	0.00	**1.08**	144	0.49
Olive	0.00	0.00	26.95	54.61	17.73	0.71	0.00	**0.87**	141	0.48
White alder	0.00	0.73	39.42	53.28	5.84	0.00	0.73	**0.94**	137	0.47
Japanese zelkova	0.00	6.72	47.01	35.82	5.97	3.73	0.75	**0.96**	134	0.46
Strawberry tree	0.00	16.03	45.80	25.19	3.82	6.11	3.05	**0.97**	131	0.45
Italian alder	0.00	0.00	57.03	32.81	5.47	0.00	4.69	**0.95**	128	0.44
Callery pear ' Chanticleer'	45.30	10.26	33.33	10.26	0.85	0.00	0.00	**1.24**	117	0.40
European white birch	0.00	6.19	45.13	37.17	7.08	3.54	0.88	**0.95**	113	0.39
Freeman maple	55.45	36.36	8.18	0.00	0.00	0.00	0.00	**1.34**	110	0.38
California peppertree	0.00	0.00	54.63	35.19	6.48	1.85	1.85	**0.96**	108	0.37

Species	Excellent	Very Good	Good	Fair	Poor	Critical	Dead	RPI	# of Trees	% of All Trees
Honeylocust	5.56	0.00	54.63	35.19	2.78	1.85	0.00	**1.01**	108	0.37
Italian cypress	5.56	6.48	82.41	5.56	0.00	0.00	0.00	**1.14**	108	0.37
Blierana plum	0.00	0.00	57.84	35.29	5.88	0.98	0.00	**0.99**	102	0.35
California buckeye	26.04	10.42	39.58	21.88	1.04	1.04	0.00	**1.14**	96	0.33
Black poplar	0.00	0.00	31.91	56.38	5.32	0.00	6.38	**0.87**	94	0.32
Carolina laurelcherry	0.00	9.89	59.34	25.27	4.40	1.10	0.00	**1.04**	91	0.31
Red ironbark	0.00	0.00	47.78	42.22	8.89	1.11	0.00	**0.95**	90	0.31
Mayten	0.00	2.25	52.81	42.70	0.00	1.12	1.12	**0.99**	89	0.30
Chinese hackberry	0.00	3.37	61.80	30.34	4.49	0.00	0.00	**1.02**	89	0.30
Mioporo	0.00	0.00	26.14	45.45	26.14	2.27	0.00	**0.83**	88	0.30
Tallowtree	0.00	31.03	56.32	12.64	0.00	0.00	0.00	**1.14**	87	0.30
Fraser photinia	0.00	0.00	34.88	55.81	8.14	1.16	0.00	**0.92**	86	0.29
Lemon bottlebrush	0.00	0.00	75.61	19.51	4.88	0.00	0.00	**1.05**	82	0.28
Brisbane box	0.00	5.00	65.00	26.25	3.75	0.00	0.00	**1.04**	80	0.27
Idaho locust	0.00	0.00	28.21	48.72	16.67	5.13	1.28	**0.84**	78	0.27
Red horsechestnut	0.00	48.72	39.74	8.97	0.00	2.56	0.00	**1.15**	78	0.27
Black tupelo	0.00	9.09	55.84	31.17	2.60	1.30	0.00	**1.03**	77	0.26
Moraine ash	0.00	0.00	50.67	45.33	4.00	0.00	0.00	**0.98**	75	0.26
Almendro	0.00	0.00	45.21	45.21	9.59	0.00	0.00	**0.95**	73	0.25
Fern pine	0.00	18.06	29.17	52.78	0.00	0.00	0.00	**1.01**	72	0.25
California laurel	0.00	2.99	50.75	32.84	7.46	5.97	0.00	**0.95**	67	0.23
Incense cedar	0.00	1.52	63.64	28.79	3.03	3.03	0.00	**1.01**	66	0.23
Hollywood juniper	0.00	0.00	87.88	10.61	1.52	0.00	0.00	**1.09**	66	0.23
Ash	0.00	0.00	12.31	81.54	6.15	0.00	0.00	**0.86**	65	0.22
California sycamore	0.00	6.25	54.69	31.25	3.13	1.56	3.13	**0.98**	64	0.22
Japanese maple	0.00	9.68	59.68	25.81	3.23	0.00	1.61	**1.03**	62	0.21
Siberian elm	0.00	0.00	26.23	50.82	21.31	1.64	0.00	**0.85**	61	0.21
Jacaranda	0.00	0.00	45.28	49.06	5.66	0.00	0.00	**0.96**	53	0.18
Goldenrain tree	0.00	0.00	63.46	19.23	13.46	3.85	0.00	**0.97**	52	0.18
Northern red oak	0.00	0.00	44.23	46.15	9.62	0.00	0.00	**0.94**	52	0.18
Hind walnut	0.00	0.00	25.49	50.98	21.57	1.96	0.00	**0.85**	51	0.17
Tulip tree	0.00	16.33	40.82	38.78	2.04	2.04	0.00	**1.01**	49	0.17
Stonefruit	0.00	0.00	55.32	36.17	6.38	0.00	2.13	**0.97**	47	0.16
Victorian box	0.00	0.00	36.96	50.00	13.04	0.00	0.00	**0.91**	46	0.16
African sumac	0.00	0.00	31.11	62.22	6.67	0.00	0.00	**0.92**	45	0.15
Mimosa	0.00	0.00	66.67	31.11	2.22	0.00	0.00	**1.03**	45	0.15
Silk oak	0.00	0.00	29.55	65.91	4.55	0.00	0.00	**0.92**	44	0.15
Brush cherry	0.00	0.00	32.56	55.81	11.63	0.00	0.00	**0.91**	43	0.15
Weeping willow	0.00	2.44	9.76	46.34	36.59	4.88	0.00	**0.75**	41	0.14
Black locust	0.00	0.00	17.50	62.50	15.00	5.00	0.00	**0.83**	40	0.14
Gum	0.00	0.00	25.00	52.50	15.00	2.50	5.00	**0.82**	40	0.14
Catalina cherry	0.00	0.00	0.00	36.84	55.26	7.89	0.00	**0.65**	38	0.13
Smooth Arizona cypress	0.00	81.58	13.16	2.63	2.63	0.00	0.00	**1.22**	38	0.13
Shiny xylosma	0.00	0.00	26.32	73.68	0.00	0.00	0.00	**0.92**	38	0.13
American elm	0.00	2.86	37.14	45.71	11.43	2.86	0.00	**0.92**	35	0.12
Loquat tree	0.00	0.00	70.59	26.47	2.94	0.00	0.00	**1.04**	34	0.12
Apple	0.00	0.00	32.35	52.94	11.76	2.94	0.00	**0.89**	34	0.12
Bay laurel	0.00	36.36	30.30	33.33	0.00	0.00	0.00	**1.09**	33	0.11
Indian hawthorn	0.00	0.00	87.50	12.50	0.00	0.00	0.00	**1.09**	32	0.11
Smooth hawthorn	0.00	0.00	6.45	93.55	0.00	0.00	0.00	**0.86**	31	0.11
Green ash	0.00	0.00	16.13	54.84	25.81	3.23	0.00	**0.80**	31	0.11

Species	Excellent	Very Good	Good	Fair	Poor	Critical	Dead	RPI	# of Trees	% of All Trees
Silver maple	0.00	0.00	61.29	35.48	3.23	0.00	0.00	**1.01**	31	0.11
Carriere hawthorn	0.00	3.33	43.33	50.00	0.00	3.33	0.00	**0.96**	30	0.10
Rocky mountain juniper	0.00	0.00	83.33	16.67	0.00	0.00	0.00	**1.08**	30	0.10
Crabapple	0.00	0.00	58.62	41.38	0.00	0.00	0.00	**1.01**	29	0.10
Tree of heaven	0.00	0.00	79.31	17.24	3.45	0.00	0.00	**1.06**	29	0.10
Brazilian pepper	0.00	0.00	53.57	39.29	0.00	0.00	7.14	**0.94**	28	0.10
Cork oak	0.00	0.00	64.29	28.57	3.57	3.57	0.00	**1.00**	28	0.10
BDM Other	0.00	0.00	51.85	25.93	0.00	0.00	22.22	**0.80**	27	0.09
Littleleaf linden	0.00	42.31	38.46	19.23	0.00	0.00	0.00	**1.13**	26	0.09
Basswood	0.00	0.00	30.77	42.31	15.38	11.54	0.00	**0.82**	26	0.09
Giant sequoia	0.00	15.38	53.85	23.08	7.69	0.00	0.00	**1.04**	26	0.09
Weeping bottlebrush	0.00	0.00	53.85	46.15	0.00	0.00	0.00	**1.00**	26	0.09
Pine	0.00	0.00	57.69	30.77	7.69	0.00	3.85	**0.96**	26	0.09
Canary island date palm	0.00	12.00	76.00	12.00	0.00	0.00	0.00	**1.11**	25	0.09
Western redbud	0.00	33.33	8.33	37.50	20.83	0.00	0.00	**0.95**	24	0.08
Mexican fan palm	0.00	0.00	95.83	4.17	0.00	0.00	0.00	**1.12**	24	0.08
Cajeput tree	0.00	0.00	39.13	60.87	0.00	0.00	0.00	**0.96**	23	0.08
English walnut	0.00	0.00	26.09	56.52	13.04	0.00	4.35	**0.85**	23	0.08
Horsechestnut	0.00	0.00	86.96	13.04	0.00	0.00	0.00	**1.09**	23	0.08
Washington hawthorn	0.00	0.00	26.09	65.22	8.70	0.00	0.00	**0.90**	23	0.08
White ash	0.00	0.00	65.22	30.43	4.35	0.00	0.00	**1.02**	23	0.08
Australian pine	0.00	0.00	17.39	69.57	13.04	0.00	0.00	**0.86**	23	0.08
Boxelder	0.00	0.00	31.82	45.45	18.18	4.55	0.00	**0.86**	22	0.08
Japanese pittosporum	0.00	0.00	0.00	90.00	10.00	0.00	0.00	**0.82**	20	0.07
Oriental arborvitae	0.00	73.68	21.05	5.26	0.00	0.00	0.00	**1.22**	19	0.06
Atlas cedar	0.00	21.05	47.37	26.32	5.26	0.00	0.00	**1.05**	19	0.06
Cypress	0.00	0.00	47.37	47.37	5.26	0.00	0.00	**0.97**	19	0.06
Willow	0.00	0.00	26.32	73.68	0.00	0.00	0.00	**0.92**	19	0.06
Ribbon gum	0.00	0.00	44.44	50.00	5.56	0.00	0.00	**0.96**	18	0.06
Avocado	0.00	0.00	33.33	55.56	5.56	0.00	5.56	**0.88**	18	0.06
California fan palm	0.00	5.56	66.67	22.22	5.56	0.00	0.00	**1.04**	18	0.06
Willow-leaved gimlet	0.00	0.00	11.11	83.33	5.56	0.00	0.00	**0.86**	18	0.06
Saucer magnolia	0.00	0.00	70.59	23.53	0.00	0.00	5.88	**1.00**	17	0.06
Chitalpa	0.00	0.00	52.94	47.06	0.00	0.00	0.00	**1.00**	17	0.06
Scarlet oak	0.00	5.88	58.82	35.29	0.00	0.00	0.00	**1.04**	17	0.06
Norway maple	0.00	0.00	43.75	56.25	0.00	0.00	0.00	**0.97**	16	0.05
marina arbutus	0.00	62.50	31.25	6.25	0.00	0.00	0.00	**1.20**	16	0.05
Apricot	0.00	0.00	75.00	25.00	0.00	0.00	0.00	**1.06**	16	0.05
Japanese black pine	0.00	0.00	43.75	56.25	0.00	0.00	0.00	**0.97**	16	0.05
Green acacia	0.00	0.00	12.50	75.00	12.50	0.00	0.00	**0.85**	16	0.05
Sydney golden wattle	0.00	0.00	0.00	43.75	50.00	0.00	6.25	**0.65**	16	0.05
Black ash	0.00	0.00	60.00	40.00	0.00	0.00	0.00	**1.02**	15	0.05
Fastigate hornbeam	0.00	0.00	93.33	6.67	0.00	0.00	0.00	**1.11**	15	0.05
Maple	0.00	0.00	42.86	28.57	14.29	0.00	14.29	**0.81**	14	0.05
Flowering dogwood	0.00	28.57	42.86	28.57	0.00	0.00	0.00	**1.09**	14	0.05
European hackberry	0.00	0.00	21.43	57.14	21.43	0.00	0.00	**0.85**	14	0.05
BDS Other	0.00	7.69	46.15	38.46	7.69	0.00	0.00	**0.99**	13	0.04
Oak	0.00	0.00	83.33	8.33	8.33	0.00	0.00	**1.06**	12	0.04
English holly	0.00	0.00	8.33	66.67	16.67	8.33	0.00	**0.78**	12	0.04
BES Other	0.00	0.00	66.67	16.67	16.67	0.00	0.00	**0.99**	12	0.04

Species	Excellent	Very Good	Good	Fair	Poor	Critical	Dead	RPI	# of Trees	% of All Trees
Monterey cypress	0.00	0.00	83.33	16.67	0.00	0.00	0.00	**1.08**	12	0.04
Buckthorn	0.00	0.00	100.00	0.00	0.00	0.00	0.00	**1.13**	12	0.04
Pink melaleuca	0.00	0.00	9.09	90.91	0.00	0.00	0.00	**0.87**	11	0.04
Fremont cottonwood	0.00	0.00	18.18	45.45	18.18	9.09	9.09	**0.72**	11	0.04
Turkish pine	0.00	0.00	9.09	81.82	9.09	0.00	0.00	**0.85**	11	0.04
Date palm	0.00	0.00	90.91	0.00	9.09	0.00	0.00	**1.08**	11	0.04
Surinam cherry	0.00	0.00	70.00	30.00	0.00	0.00	0.00	**1.04**	10	0.03
American hornbeam	0.00	0.00	10.00	90.00	0.00	0.00	0.00	**0.87**	10	0.03
Juniper	0.00	0.00	70.00	30.00	0.00	0.00	0.00	**1.04**	10	0.03
Yew podocarpus	0.00	0.00	22.22	77.78	0.00	0.00	0.00	**0.91**	9	0.03
California juniper	0.00	0.00	66.67	33.33	0.00	0.00	0.00	**1.03**	9	0.03
Common fig	0.00	0.00	22.22	66.67	11.11	0.00	0.00	**0.88**	9	0.03
Blue spruce	0.00	0.00	55.56	33.33	11.11	0.00	0.00	**0.97**	9	0.03
Norway spruce	0.00	22.22	33.33	44.44	0.00	0.00	0.00	**1.03**	9	0.03
Queen palm	0.00	11.11	77.78	11.11	0.00	0.00	0.00	**1.11**	9	0.03
Valley oak	0.00	0.00	75.00	25.00	0.00	0.00	0.00	**1.06**	8	0.03
Common plum	0.00	12.50	75.00	12.50	0.00	0.00	0.00	**1.11**	8	0.03
Florida hopbush	0.00	25.00	62.50	0.00	0.00	12.50	0.00	**1.06**	8	0.03
Bigleaf maple	0.00	0.00	12.50	37.50	25.00	12.50	12.50	**0.63**	8	0.03
Northern hackberry	0.00	0.00	62.50	25.00	12.50	0.00	0.00	**0.99**	8	0.03
Peach	0.00	0.00	42.86	57.14	0.00	0.00	0.00	**0.97**	7	0.02
Lemon	0.00	0.00	85.71	14.29	0.00	0.00	0.00	**1.09**	7	0.02
European beech	0.00	83.33	16.67	0.00	0.00	0.00	0.00	**1.25**	6	0.02
Pin oak	0.00	16.67	66.67	16.67	0.00	0.00	0.00	**1.11**	6	0.02
Northern catalpa	0.00	0.00	16.67	0.00	66.67	16.67	0.00	**0.61**	6	0.02
Mulga	0.00	83.33	16.67	0.00	0.00	0.00	0.00	**1.25**	6	0.02
Araucaria	0.00	0.00	83.33	16.67	0.00	0.00	0.00	**1.08**	6	0.02
Hedge maple	0.00	16.67	66.67	16.67	0.00	0.00	0.00	**1.11**	6	0.02
Oleander	0.00	0.00	0.00	100.00	0.00	0.00	0.00	**0.85**	6	0.02
Orange	0.00	0.00	83.33	16.67	0.00	0.00	0.00	**1.08**	6	0.02
Myrtle	0.00	0.00	0.00	66.67	16.67	16.67	0.00	**0.71**	6	0.02
Desert gum	0.00	0.00	0.00	100.00	0.00	0.00	0.00	**0.85**	6	0.02
Redflower gum	0.00	0.00	16.67	66.67	16.67	0.00	0.00	**0.85**	6	0.02
Dawn redwood	0.00	60.00	20.00	20.00	0.00	0.00	0.00	**1.16**	5	0.02
Walnut	0.00	0.00	100.00	0.00	0.00	0.00	0.00	**1.13**	5	0.02
Velvet ash	0.00	0.00	80.00	20.00	0.00	0.00	0.00	**1.07**	5	0.02
Long-leaf yellowwood	0.00	0.00	0.00	100.00	0.00	0.00	0.00	**0.85**	5	0.02
Chinese juniper	0.00	0.00	40.00	60.00	0.00	0.00	0.00	**0.96**	5	0.02
Mulberry	0.00	0.00	50.00	50.00	0.00	0.00	0.00	**0.99**	4	0.01
Douglas fir	0.00	0.00	50.00	25.00	0.00	25.00	0.00	**0.85**	4	0.01
Stiffleaf cheesewood	0.00	0.00	0.00	25.00	25.00	50.00	0.00	**0.49**	4	0.01
Black walnut	0.00	0.00	25.00	50.00	0.00	25.00	0.00	**0.78**	4	0.01
Cottonwood	0.00	0.00	25.00	75.00	0.00	0.00	0.00	**0.92**	4	0.01
Coastal teatree	0.00	0.00	0.00	100.00	0.00	0.00	0.00	**0.85**	4	0.01
Queensland pittosporum	0.00	0.00	25.00	75.00	0.00	0.00	0.00	**0.92**	4	0.01
Mexican weeping pine	0.00	0.00	100.00	0.00	0.00	0.00	0.00	**1.13**	4	0.01
Bottle tree	0.00	0.00	75.00	25.00	0.00	0.00	0.00	**1.06**	4	0.01
Redbud	0.00	0.00	75.00	25.00	0.00	0.00	0.00	**1.06**	4	0.01
White ironbark	0.00	0.00	50.00	50.00	0.00	0.00	0.00	**0.99**	4	0.01
Paper birch	100.00	0.00	0.00	0.00	0.00	0.00	0.00	**1.41**	4	0.01
Carrotwood	0.00	0.00	0.00	75.00	25.00	0.00	0.00	**0.78**	4	0.01

Species	Excellent	Very Good	Good	Fair	Poor	Critical	Dead	RPI	# of Trees	% of All Trees
Golden chain tree	0.00	0.00	66.67	33.33	0.00	0.00	0.00	**1.03**	3	0.01
Southern catalpa	0.00	0.00	33.33	33.33	33.33	0.00	0.00	**0.85**	3	0.01
Ponderosa pine	0.00	33.33	66.67	0.00	0.00	0.00	0.00	**1.18**	3	0.01
Acacia	0.00	0.00	33.33	66.67	0.00	0.00	0.00	**0.94**	3	0.01
Oriental sweetgum	0.00	0.00	0.00	66.67	33.33	0.00	0.00	**0.75**	3	0.01
Elderberry	0.00	0.00	33.33	66.67	0.00	0.00	0.00	**0.94**	3	0.01
Citrus	0.00	0.00	33.33	33.33	33.33	0.00	0.00	**0.85**	3	0.01
Sugar maple	0.00	0.00	33.33	66.67	0.00	0.00	0.00	**0.94**	3	0.01
Interior live oak	0.00	0.00	66.67	33.33	0.00	0.00	0.00	**1.03**	3	0.01
Hollyleaf cherry	0.00	0.00	66.67	33.33	0.00	0.00	0.00	**1.03**	3	0.01
Wavyleaf silktassel	0.00	0.00	33.33	66.67	0.00	0.00	0.00	**0.94**	3	0.01
Tanoak	0.00	0.00	100.00	0.00	0.00	0.00	0.00	**1.13**	3	0.01
Common pear	0.00	0.00	66.67	33.33	0.00	0.00	0.00	**1.03**	3	0.01
Patagua	0.00	0.00	0.00	33.33	33.33	0.00	33.33	**0.47**	3	0.01
Pacific yew	0.00	0.00	50.00	50.00	0.00	0.00	0.00	**0.99**	2	0.01
Shumard oak	0.00	100.00	0.00	0.00	0.00	0.00	0.00	**1.27**	2	0.01
Kousa dogwood	0.00	0.00	100.00	0.00	0.00	0.00	0.00	**1.13**	2	0.01
Sawara false cypress	0.00	0.00	50.00	50.00	0.00	0.00	0.00	**0.99**	2	0.01
Fir	0.00	0.00	50.00	50.00	0.00	0.00	0.00	**0.99**	2	0.01
Hawthorn	0.00	0.00	50.00	50.00	0.00	0.00	0.00	**0.99**	2	0.01
Sumac	0.00	0.00	50.00	50.00	0.00	0.00	0.00	**0.99**	2	0.01
Holly	0.00	0.00	50.00	50.00	0.00	0.00	0.00	**0.99**	2	0.01
Scotch pine	0.00	0.00	100.00	0.00	0.00	0.00	0.00	**1.13**	2	0.01
Birch	0.00	0.00	50.00	50.00	0.00	0.00	0.00	**0.99**	2	0.01
Christmasberry	0.00	0.00	0.00	50.00	50.00	0.00	0.00	**0.71**	2	0.01
Tarata	0.00	50.00	0.00	50.00	0.00	0.00	0.00	**1.06**	2	0.01
Leyland cypress	0.00	0.00	0.00	50.00	50.00	0.00	0.00	**0.71**	2	0.01
Black willow	0.00	0.00	0.00	50.00	50.00	0.00	0.00	**0.71**	2	0.01
Pecan	0.00	0.00	50.00	50.00	0.00	0.00	0.00	**0.99**	2	0.01
Catalina ironwood	0.00	0.00	0.00	100.00	0.00	0.00	0.00	**0.85**	2	0.01
BEL Other	0.00	0.00	50.00	0.00	50.00	0.00	0.00	**0.85**	2	0.01
Japanese red cedar	0.00	0.00	0.00	100.00	0.00	0.00	0.00	**0.85**	2	0.01
Chinaberry	0.00	0.00	50.00	50.00	0.00	0.00	0.00	**0.99**	2	0.01
River sheoak	0.00	0.00	100.00	0.00	0.00	0.00	0.00	**1.13**	2	0.01
Pomegranate	0.00	0.00	0.00	100.00	0.00	0.00	0.00	**0.85**	2	0.01
Japanese persimmon	0.00	0.00	50.00	50.00	0.00	0.00	0.00	**0.99**	2	0.01
Chaste tree	0.00	50.00	0.00	0.00	50.00	0.00	0.00	**0.92**	2	0.01
Yucca	0.00	0.00	100.00	0.00	0.00	0.00	0.00	**1.13**	2	0.01
Water oak	100.00	0.00	0.00	0.00	0.00	0.00	0.00	**1.41**	2	0.01
Windmill palm	0.00	0.00	0.00	0.00	100.00	0.00	0.00	**0.56**	2	0.01
Giant dracaena	0.00	0.00	100.00	0.00	0.00	0.00	0.00	**1.13**	2	0.01
Blue blossom	0.00	0.00	0.00	0.00	0.00	100.00	0.00	**0.28**	1	0.00
Paulownia	0.00	0.00	0.00	100.00	0.00	0.00	0.00	**0.85**	1	0.00
Bunya bunya	0.00	0.00	100.00	0.00	0.00	0.00	0.00	**1.13**	1	0.00
Japanese red pine	0.00	0.00	100.00	0.00	0.00	0.00	0.00	**1.13**	1	0.00
Cherry laurel	0.00	0.00	0.00	100.00	0.00	0.00	0.00	**0.85**	1	0.00
Pacific madrone	0.00	0.00	100.00	0.00	0.00	0.00	0.00	**1.13**	1	0.00
California flannelbush	0.00	0.00	100.00	0.00	0.00	0.00	0.00	**1.13**	1	0.00
Sugargum	0.00	0.00	100.00	0.00	0.00	0.00	0.00	**1.13**	1	0.00
Sweet hakea	0.00	0.00	0.00	100.00	0.00	0.00	0.00	**0.85**	1	0.00
Butternut	0.00	0.00	100.00	0.00	0.00	0.00	0.00	**1.13**	1	0.00

Species	Excellent	Very Good	Good	Fair	Poor	Critical	Dead	RPI	# of Trees	% of All Trees
Star magnolia	0.00	0.00	100.00	0.00	0.00	0.00	0.00	**1.13**	1	0.00
Corkscrew willow	0.00	0.00	100.00	0.00	0.00	0.00	0.00	**1.13**	1	0.00
Benjamin fig	0.00	0.00	0.00	00.00	0.00	0.00	0.00	**0.85**	1	0.00
Cheesewood	0.00	100.00	0.00	0.00	0.00	0.00	0.00	**1.27**	1	0.00
Southern bayberry	0.00	0.00	100.00	0.00	0.00	0.00	0.00	**1.13**	1	0.00
Western red cedar	0.00	0.00	0.00	100.00	0.00	0.00	0.00	**0.85**	1	0.00
Canyon live oak	0.00	0.00	100.00	0.00	0.00	0.00	0.00	**1.13**	1	0.00
Silver dollar eucalyptus	0.00	0.00	0.00	00.00	0.00	0.00	0.00	**0.85**	1	0.00
Firethorn	0.00	0.00	100.00	0.00	0.00	0.00	0.00	**1.13**	1	0.00
All Trees	**1.48**	**8.28**	**50.35**	**32.66**	**4.66**	**0.98**	**1.59**	**1.00**	**29248**	**100%**

Replacement Value of Hayward's Public Tree Species

Species	DBH Class (in)									Total	% of Total
	0-3	3-6	6-12	12-18	18-24	24-30	30-36	36-42	>42		
Crapemyrtle	126,748	519,333	691,932	16,963	8,173	0	0	0	0	**1,363,150**	2.36
Coast redwood	17,781	128,115	762,027	1,369,853	1,157,848	1,492,348	1,202,114	568,019	472,494	**7,170,599**	12.40
Purple-leaf plum	49,829	165,482	568,265	82,091	0	3,786	0	0	0	**869,453**	1.50
London planetree	13,750	236,303	463,892	732,520	932,423	1,232,582	932,849	566,277	56,886	**5,167,482**	8.93
Southern magnolia	39,102	124,063	744,299	895,533	411,954	62,786	19,240	25,451	21,332	**2,343,759**	4.05
Callery pear	16,180	146,139	461,006	244,435	68,514	0	0	10,861	0	**947,135**	1.64
Blue gum	703	6,160	31,091	56,516	78,425	135,913	172,563	239,957	587,696	**1,309,025**	2.26
Coast live oak	25,095	132,240	433,409	500,460	438,078	406,455	223,749	222,693	56,886	**2,439,065**	4.22
Chinese privet	4,848	38,660	198,266	311,754	161,480	35,146	0	0	0	**750,155**	1.30
Red gum	766	2,208	24,738	163,150	253,275	286,490	125,938	40,887	23,458	**920,910**	1.59
Evergreen pear	14,806	87,187	664,401	459,072	194,106	63,724	14,633	0	0	**1,497,929**	2.59
Chinese pistache	37,353	170,477	551,157	200,649	34,387	0	0	0	0	**994,022**	1.72
Sweetgum	10,261	71,559	271,307	825,143	494,830	131,141	63,556	0	0	**1,867,797**	3.23
Canary island pine	5,103	44,590	265,165	494,230	1,503,130	892,217	532,888	38,176	28,443	**3,803,943**	6.58
Chinese elm	941	11,057	51,663	732,982	2,116,097	130,560	25,345	0	0	**3,068,645**	5.31
White mulberry	489	858	15,439	139,608	259,772	283,436	69,751	0	0	**769,353**	1.33
Trident maple	35,024	95,879	46,036	0	0	0	0	0	0	**176,939**	0.31
Italian stone pine	1,585	5,109	121,265	244,497	263,751	296,093	153,854	131,109	155,344	**1,372,607**	2.37
Holly oak	1,053	28,627	204,606	458,626	330,640	147,968	44,354	33,532	28,107	**1,277,512**	2.21
Black acacia	1,535	18,615	55,254	44,266	82,144	92,967	69,033	0	0	**363,815**	0.63
Eastern redbud	19,484	68,580	101,558	0	0	0	0	0	0	**189,621**	0.33
Bailey acacia	753	21,080	38,195	13,460	3,195	0	1,180	0	0	**77,863**	0.13
Elm	3,619	64,421	42,848	6,922	0	0	0	0	0	**117,810**	0.20
Bronze loquat	6,987	32,111	217,394	217,028	42,322	13,056	0	0	0	**528,898**	0.91
Ginkgo	14,705	8,191	105,038	43,496	17,419	0	8,422	0	0	**197,270**	0.34
Evergreen ash	570	1,438	15,480	70,560	134,467	99,738	120,456	86,518	11,579	**540,806**	0.94
Camphor tree	941	13,026	37,341	227,948	431,155	887,810	387,857	150,892	28,107	**2,165,076**	3.74
Chinese flame tree	5,896	24,234	126,199	54,009	0	0	0	0	0	**210,338**	0.36
Deodar cedar	918	6,883	63,116	310,451	302,435	317,233	91,389	25,451	21,332	**1,139,207**	1.97
Aleppo pine	2,597	7,209	36,746	63,423	185,478	117,012	72,729	96,020	99,298	**680,514**	1.18
Monterey pine	482	2,354	9,122	30,462	92,874	164,705	126,977	93,439	28,947	**549,362**	0.95
Raywood ash	1,051	6,081	42,846	47,869	59,542	38,431	0	0	0	**195,820**	0.34
Carob	168	521	33,644	101,716	200,271	139,300	48,675	67,570	11,916	**603,780**	1.04
Modesto ash	88	0	1,520	18,029	102,560	241,567	79,648	5,191	0	**448,602**	0.78
Kwanzan cherry	8,062	20,254	89,298	20,765	13,322	0	0	0	0	**151,701**	0.26

Species	DBH Class (in)									Total	% of Total
	0-3	3-6	6-12	12-18	18-24	24-30	30-36	36-42	>42		
Australian willow	3,848	17,813	78,112	115,688	49,483	0	0	0	0	**264,945**	0.46
Water gum	7,513	63,408	99,372	7,479	0	0	0	0	0	**177,772**	0.31
Silver dollar gum	1,702	4,847	18,926	169,255	402,058	465,665	299,896	142,509	0	**1,504,858**	2.60
Almond	4,402	28,598	38,016	7,351	0	0	0	0	0	**78,368**	0.14
Live oak	8,009	54,821	38,631	47,010	6,774	0	0	0	0	**155,245**	0.27
Red maple	6,358	24,266	26,059	2,643	5,060	0	0	0	0	**64,387**	0.11
Olive	1,258	2,659	56,333	131,748	28,327	33,552	11,520	9,919	0	**275,316**	0.48
White alder	0	1,121	14,993	23,595	14,112	15,996	9,816	3,000	0	**82,634**	0.14
Japanese zelkova	2,428	7,016	23,130	140,408	256,931	28,102	0	0	0	**458,014**	0.79
Strawberry tree	7,615	28,796	44,620	24,904	19,888	0	0	0	0	**125,823**	0.22
Italian alder	6,850	3,001	27,140	20,809	7,021	4,535	0	0	0	**69,356**	0.12
Callery pear ' Chanticleer'	4,777	26,840	29,870	0	0	0	0	0	0	**61,487**	0.11
European white birch	1,690	8,254	29,415	16,647	2,106	0	0	0	0	**58,112**	0.10
Freeman maple	5,406	49,170	0	0	0	0	0	0	0	**54,575**	0.09
Italian cypress	4,566	13,029	37,581	8,676	5,121	0	0	0	0	**68,973**	0.12
Honeylocust	2,393	7,193	19,241	10,167	5,451	0	0	0	0	**44,445**	0.08
California peppertree	628	2,519	26,247	80,774	56,895	37,147	5,387	10,669	7,944	**228,211**	0.39
Blierana plum	6,556	14,808	12,590	1,838	0	5,678	0	0	0	**41,471**	0.07
California buckeye	12,617	1,636	10,700	10,638	4,721	2,581	0	0	0	**42,893**	0.07
Black poplar	0	1,569	8,846	4,352	21,082	38,431	51,550	84,788	38,596	**249,214**	0.43
Carolina laurelcherry	9,517	7,119	28,133	21,839	10,580	0	0	0	0	**77,189**	0.13
Red ironbark	191	0	4,581	19,389	28,514	38,464	38,015	13,629	0	**142,784**	0.25
Chinese hackberry	0	6,080	29,946	71,799	7,965	0	0	0	0	**115,791**	0.20
Mayten	814	8,924	59,112	65,733	18,389	26,831	0	0	0	**179,803**	0.31
Mioporo	222	5,217	15,276	12,107	7,723	19,274	21,338	27,991	4,805	**113,952**	0.20
Tallowtree	0	3,302	38,976	5,595	0	0	0	0	0	**47,873**	0.08
Fraser photinia	2,173	10,506	27,014	13,765	0	0	0	0	0	**53,458**	0.09
Lemon bottlebrush	697	2,696	83,809	51,950	8,173	13,416	0	25,797	0	**186,538**	0.32
Brisbane box	1,579	18,059	24,816	13,498	0	29,741	62,529	0	0	**150,222**	0.26
Red horsechestnut	9,741	7,219	2,469	10,415	5,806	0	0	0	0	**35,649**	0.06
Idaho locust	263	4,381	16,033	7,771	10,256	0	0	0	0	**38,703**	0.07
Black tupelo	1,008	14,541	55,499	63,471	7,935	17,408	0	0	0	**159,862**	0.28
Moraine ash	0	458	3,041	31,084	49,571	22,876	14,480	13,843	0	**135,352**	0.23
Almendro	2,154	10,829	19,502	1,838	0	0	0	0	0	**34,322**	0.06
Fern pine	515	12,269	49,105	58,693	55,548	17,408	0	0	0	**193,538**	0.33
California laurel	4,524	6,968	19,949	16,379	10,580	39,168	19,009	50,297	46,845	**213,719**	0.37

Species	DBH Class (in)									Total	% of Total
	0-3	3-6	6-12	12-18	18-24	24-30	30-36	36-42	>42		
Incense cedar	590	2,352	21,715	38,461	70,817	30,971	69,849	14,878	16,624	**266,257**	0.46
Hollywood juniper	0	4,879	56,278	61,492	24,519	13,416	19,510	0	0	**180,094**	0.31
Ash	307	1,438	1,244	18,029	42,163	11,895	5,266	6,921	15,438	**102,702**	0.18
California sycamore	295	4,448	26,121	25,368	58,228	51,618	0	0	5,541	**171,619**	0.30
Japanese maple	5,330	10,906	16,368	0	10,580	0	0	0	0	**43,184**	0.07
Siberian elm	188	1,402	3,716	4,117	10,651	11,895	5,197	3,750	2,499	**43,414**	0.08
Jacaranda	562	8,052	18,514	3,676	0	0	0	0	0	**30,804**	0.05
Goldenrain tree	1,183	4,969	8,016	5,284	0	0	0	0	0	**19,453**	0.03
Northern red oak	1,182	1,809	13,521	85,315	179,514	78,143	0	0	0	**359,483**	0.62
Hind walnut	122	307	8,123	20,890	22,017	32,842	21,617	11,407	6,368	**123,693**	0.21
Tulip tree	0	1,393	7,557	31,024	17,552	3,401	0	0	0	**60,928**	0.11
Stonefruit	2,388	6,941	7,899	1,838	0	0	0	0	0	**19,067**	0.03
Victorian box	0	1,604	27,374	71,783	71,029	70,142	0	0	0	**241,932**	0.42
Mimosa	168	5,125	20,282	7,778	3,414	0	0	0	0	**36,766**	0.06
African sumac	0	5,756	37,341	47,774	0	0	0	0	0	**90,870**	0.16
Silk oak	0	0	1,603	8,039	31,030	13,927	0	0	0	**54,600**	0.09
Brush cherry	179	0	61,893	17,744	0	0	0	0	0	**79,817**	0.14
Weeping willow	394	687	1,382	8,703	5,698	20,131	11,847	10,382	9,649	**68,873**	0.12
Gum	562	378	470	3,668	6,887	5,733	1,413	3,654	4,729	**27,495**	0.05
Black locust	191	1,073	3,779	6,384	6,709	11,937	0	2,478	0	**32,552**	0.06
Smooth Arizona cypress	7,169	976	0	0	0	0	0	0	0	**8,145**	0.01
Catalina cherry	275	2,684	20,855	3,955	0	0	0	0	0	**27,769**	0.05
Shiny xylosma	2,324	2,440	22,268	0	0	0	0	0	0	**27,032**	0.05
American elm	0	2,801	2,972	7,773	11,926	38,813	0	8,555	12,736	**85,576**	0.15
Loquat tree	2,290	4,758	10,617	7,910	0	0	0	0	0	**25,576**	0.04
Apple	1,999	6,163	6,478	0	0	0	0	0	0	**14,640**	0.03
Bay laurel	1,657	7,573	14,322	10,920	10,580	0	0	0	0	**45,053**	0.08
Indian hawthorn	1,116	12,840	0	0	0	0	0	0	0	**13,956**	0.02
Silver maple	1,323	578	1,049	9,832	38,604	54,855	0	0	0	**106,241**	0.18
Smooth hawthorn	140	833	8,640	29,406	0	0	0	0	0	**39,019**	0.07
Green ash	0	0	0	0	10,256	28,366	29,202	19,034	11,579	**98,437**	0.17
Carriere hawthorn	515	1,064	12,343	16,541	3,484	0	0	0	0	**33,947**	0.06
Rocky mountain juniper	0	6,292	26,722	0	0	0	0	0	0	**33,014**	0.06
Tree of heaven	0	4,917	1,253	272	0	0	0	0	0	**6,442**	0.01
Common crabapple	3,044	2,684	2,469	0	0	0	0	0	0	**8,197**	0.01
Cork oak	1,576	4,704	6,438	5,223	0	89,306	32,531	43,057	0	**182,836**	0.32

Species	DBH Class (in)									Total	% of Total
	0-3	3-6	6-12	12-18	18-24	24-30	30-36	36-42	>42		
Brazilian pepper	0	514	15,790	29,686	26,562	30,185	0	0	0	**102,737**	0.18
BDM Other	2,059	915	1,382	933	1,709	0	0	0	0	**6,998**	0.01
Weeping bottlebrush	0	3,082	19,839	15,903	8,173	0	0	0	0	**46,997**	0.08
Pine	526	719	4,837	5,284	3,419	2,745	5,266	0	0	**22,796**	0.04
Giant sequoia	0	0	898	7,305	8,547	21,503	21,334	19,899	0	**79,486**	0.14
Basswood	0	0	0	0	1,709	11,895	41,080	39,798	11,579	**106,062**	0.18
Littleleaf linden	197	10,313	18,671	6,965	20,322	22,326	0	0	0	**78,794**	0.14
Canary island date palm	0	0	1,835	9,933	4,829	13,320	30,584	3,784	6,622	**70,906**	0.12
Western redbud	2,014	2,869	1,728	0	0	0	0	0	0	**6,611**	0.01
Mexican fan palm	0	662	479	1,237	2,544	1,532	0	0	0	**6,454**	0.01
Horsechestnut	2,463	2,878	5,627	0	10,580	0	0	0	0	**21,548**	0.04
Australian pine	0	214	6,826	8,324	0	3,401	0	0	0	**18,765**	0.03
Washington hawthorn	0	7,379	14,782	0	0	0	0	0	0	**22,161**	0.04
White ash	122	3,606	4,755	3,401	1,835	0	0	0	0	**13,719**	0.02
English walnut	133	1,644	3,413	4,540	7,021	0	0	0	0	**16,751**	0.03
Cajeput tree	0	642	1,642	30,764	51,141	42,085	137,148	27,028	0	**290,451**	0.50
Boxelder	0	1,177	3,594	6,838	0	915	0	0	0	**12,524**	0.02
Japanese pittosporum	137	6,577	7,665	0	0	0	0	0	0	**14,379**	0.02
Atlas cedar	496	529	4,690	25,957	16,076	16,523	14,770	0	0	**79,041**	0.14
Cypress	0	0	7,963	33,619	13,322	9,367	0	0	0	**64,271**	0.11
Willow	0	719	6,220	933	1,709	0	0	0	0	**9,581**	0.02
Oriental arborvitae	2,122	2,147	944	3,273	0	0	0	0	0	**8,487**	0.01
Willow-leaved gimlet	118	307	5,980	14,730	4,721	15,486	0	0	16,624	**57,965**	0.10
Ribbon gum	0	0	229	3,547	3,355	4,642	0	18,585	19,318	**49,676**	0.09
Avocado	311	1,072	3,088	2,270	4,213	3,401	0	0	0	**14,355**	0.02
California fan palm	0	390	876	2,388	2,455	1,664	1,004	0	0	**8,778**	0.02
Chitalpa	1,030	1,851	4,443	0	0	0	0	0	0	**7,325**	0.01
Saucer magnolia	700	6,151	4,507	5,223	0	0	0	0	0	**16,582**	0.03
Scarlet oak	0	0	13,874	20,766	14,067	0	0	0	0	**48,706**	0.08
Green acacia	0	162	783	3,668	1,111	1,012	0	0	0	**6,736**	0.01
Sydney golden wattle	94	2,777	1,234	0	0	0	0	0	0	**4,104**	0.01
Norway maple	412	854	9,100	14,832	0	0	0	0	0	**25,199**	0.04
marina arbutus	1,929	3,403	0	0	0	0	0	0	0	**5,332**	0.01
Japanese black pine	457	1,765	13,140	14,650	0	0	0	0	0	**30,011**	0.05
Apricot	1,466	2,684	2,275	0	0	0	0	0	0	**6,425**	0.01
Fastigate hornbeam	2,642	0	0	0	0	0	0	0	0	**2,642**	0.00

Species	DBH Class (in)									Total	% of Total
	0-3	3-6	6-12	12-18	18-24	24-30	30-36	36-42	>42		
Black ash	0	0	2,488	7,460	6,837	0	0	0	0	**16,785**	0.03
Maple	1,314	458	415	0	0	0	0	0	0	**2,187**	0.00
European hackberry	354	409	9,127	0	0	0	0	0	0	**9,889**	0.02
Flowering dogwood	2,162	963	0	0	0	0	0	0	0	**3,125**	0.01
BDS Other	1,171	1,296	1,605	0	0	0	0	0	0	**4,071**	0.01
BES Other	1,255	514	2,834	2,120	0	6,708	0	0	0	**13,431**	0.02
Monterey cypress	0	488	1,517	6,922	7,613	12,490	0	0	154,237	**183,266**	0.32
English holly	0	3,210	3,239	0	0	0	0	0	0	**6,449**	0.01
Oak	147	0	5,862	16,613	8,038	6,609	19,693	0	0	**56,962**	0.10
Buckthorn	2,231	0	0	0	0	0	0	0	0	**2,231**	0.00
Pink melaleuca	976	1,284	1,215	0	0	0	0	0	0	**3,475**	0.01
Date palm	0	0	0	2,199	5,833	0	0	0	0	**8,032**	0.01
Turkish pine	0	235	1,172	13,498	30,143	0	0	0	0	**45,049**	0.08
Fremont cottonwood	0	262	1,382	1,243	5,698	0	0	0	0	**8,585**	0.01
American hornbeam	0	0	14,322	4,095	0	0	0	0	0	**18,417**	0.03
Surinam cherry	179	454	11,253	10,920	0	0	0	0	0	**22,807**	0.04
Juniper	168	1,650	3,341	0	0	0	0	0	0	**5,158**	0.01
Queen palm	830	0	1,150	1,155	0	0	0	0	0	**3,135**	0.01
Common fig	504	366	5,309	0	0	0	0	0	0	**6,179**	0.01
California juniper	0	0	3,579	10,770	0	0	0	0	0	**14,349**	0.02
Norway spruce	312	994	954	9,194	0	0	0	0	0	**11,454**	0.02
Blue spruce	461	782	954	4,188	0	0	0	0	0	**6,385**	0.01
Yew podocarpus	183	1,925	5,475	0	8,523	0	0	0	0	**16,106**	0.03
Bigleaf maple	400	143	650	1,135	0	0	0	0	0	**2,328**	0.00
Northern hackberry	0	0	1,259	9,001	20,458	0	0	0	0	**30,719**	0.05
Florida hopbush	1,395	0	0	0	0	0	0	0	0	**1,395**	0.00
Common plum	0	1,388	4,073	0	0	0	0	0	0	**5,461**	0.01
Valley oak	0	1,447	9,658	12,188	0	0	0	0	0	**23,293**	0.04
Lemon	1,237	0	0	0	0	0	0	0	0	**1,237**	0.00
Peach	1,134	0	0	0	0	0	0	0	0	**1,134**	0.00
Mulga	628	1,669	0	0	0	0	0	0	0	**2,297**	0.00
Hedge maple	151	396	3,096	1,982	0	0	0	0	0	**5,626**	0.01
Araucaria	382	1,193	0	0	0	0	0	0	0	**1,575**	0.00
Northern catalpa	0	0	954	0	10,241	0	0	0	0	**11,196**	0.02
Orange	358	1,666	2,046	0	0	0	0	0	0	**4,071**	0.01
Redflower gum	0	0	1,896	5,933	5,710	12,490	0	0	0	**26,028**	0.04

Species	DBH Class (in)									Total	% of Total
	0-3	3-6	6-12	12-18	18-24	24-30	30-36	36-42	>42		
Desert gum	0	0	488	3,405	4,213	0	0	0	0	**8,105**	0.01
European beech	334	920	1,416	3,682	0	0	0	0	0	**6,353**	0.01
Myrtle	0	642	2,834	3,181	0	0	0	0	0	**6,657**	0.01
Oleander	139	1,926	0	0	0	0	0	0	0	**2,066**	0.00
Pin oak	0	0	1,138	16,315	7,613	0	0	0	0	**25,065**	0.04
Velvet ash	0	0	0	0	6,268	3,660	0	6,921	0	**16,849**	0.03
Walnut	326	0	1,585	1,943	0	0	0	0	0	**3,854**	0.01
Chinese juniper	168	347	0	0	0	5,572	0	10,669	11,916	**28,672**	0.05
Dawn redwood	104	398	1,431	0	7,257	0	0	0	25,617	**34,806**	0.06
Long-leaf yellowwood	0	1,444	3,285	0	0	0	0	0	0	**4,729**	0.01
Paper birch	229	1,830	0	0	0	0	0	0	0	**2,059**	0.00
Bottle tree	0	0	2,046	0	18,516	17,408	0	0	0	**37,970**	0.07
Redbud	515	370	0	0	0	0	0	0	0	**885**	0.00
Carrotwood	0	0	1,193	3,590	0	0	0	0	0	**4,783**	0.01
White ironbark	0	0	0	10,877	5,710	0	0	0	0	**16,586**	0.03
Black walnut	0	0	594	1,943	0	0	6,636	2,852	0	**12,026**	0.02
Coastal teatree	0	454	4,604	0	0	0	0	0	0	**5,058**	0.01
Mulberry	0	0	1,520	933	0	0	0	0	0	**2,453**	0.00
Stiffleaf cheesewood	0	193	1,311	0	0	0	0	0	0	**1,504**	0.00
Mexican weeping pine	0	0	2,046	10,920	10,580	0	0	0	0	**23,546**	0.04
Queensland pittosporum	0	0	1,574	2,622	3,736	0	0	0	0	**7,931**	0.01
Cottonwood	0	0	594	2,915	3,670	0	0	0	0	**7,179**	0.01
Douglas fir	0	0	792	1,457	3,670	1,493	0	0	0	**7,412**	0.01
Sugar maple	0	0	944	0	4,721	10,324	0	0	0	**15,989**	0.03
Acacia	0	0	1,138	0	2,106	0	0	0	0	**3,244**	0.01
Southern catalpa	0	392	415	0	0	0	0	0	0	**807**	0.00
Citrus	137	244	1,517	0	0	0	0	0	0	**1,898**	0.00
Patagua	0	0	0	0	3,484	3,786	0	0	0	**7,269**	0.01
Wavyleaf silktassel	325	385	0	0	0	0	0	0	0	**711**	0.00
Golden chain tree	0	278	1,975	0	0	0	0	0	0	**2,253**	0.00
Tanoak	0	1,042	0	0	0	0	0	0	0	**1,042**	0.00
Oriental sweetgum	0	0	0	1,554	1,709	0	0	0	0	**3,264**	0.01
Ponderosa pine	0	447	0	3,343	6,450	0	0	0	0	**10,241**	0.02
Hollyleaf cherry	0	0	2,834	0	0	13,416	0	0	0	**16,250**	0.03
Common pear	515	0	0	0	0	0	0	0	0	**515**	0.00
Interior live oak	0	0	1,563	7,268	0	0	0	0	0	**8,831**	0.02

Species	DBH Class (in)									Total	% of Total
	0-3	3-6	6-12	12-18	18-24	24-30	30-36	36-42	>42		
Elderberry	0	370	1,481	0	0	0	0	0	0	**1,851**	0.00
Fir	0	0	1,272	0	0	0	11,557	0	0	**12,829**	0.02
Birch	183	0	0	0	5,710	0	0	0	0	**5,893**	0.01
BEL Other	0	706	0	0	0	0	0	0	0	**706**	0.00
River sheoak	0	0	0	4,153	8,038	0	0	0	0	**12,191**	0.02
Pecan	0	0	594	1,943	0	0	0	0	0	**2,538**	0.00
Sawara false cypress	0	193,714	146,115	0	0	0	0	0	0	**339,829**	0.59
Giant dracaena	0	676	0	0	0	0	0	0	0	**676**	0.00
Kousa dogwood	372	0	0	0	0	0	0	0	0	**372**	0.00
Hawthorn	0	278	0	2,450	0	0	0	0	0	**2,728**	0.00
Japanese red cedar	0	0	1,907	0	0	0	0	0	0	**1,907**	0.00
Leyland cypress	0	0	173	0	799	0	0	0	0	**972**	0.00
Japanese persimmon	175	0	415	0	0	0	0	0	0	**590**	0.00
Christmasberry	0	482	0	0	0	0	0	0	0	**482**	0.00
Holly	0	0	1,215	4,241	0	0	0	0	0	**5,455**	0.01
Catalina ironwood	0	0	1,535	4,095	0	0	0	0	0	**5,629**	0.01
Chinaberry	168	261	0	0	0	0	0	0	0	**428**	0.00
Tarata	206	366	0	0	0	0	0	0	0	**572**	0.00
Scotch pine	139	0	0	3,343	0	0	0	0	0	**3,482**	0.01
Pomegranate	0	555	0	0	0	0	0	0	0	**555**	0.00
Water oak	0	1,220	0	0	0	0	0	0	0	**1,220**	0.00
Shumard oak	367	0	0	0	0	0	0	0	0	**367**	0.00
Sumac	0	0	1,215	4,241	0	0	0	0	0	**5,455**	0.01
Black willow	0	0	415	0	1,140	0	0	0	0	**1,554**	0.00
Pacific yew	0	0	792	1,457	0	0	0	0	0	**2,250**	0.00
Windmill palm	0	0	0	817	0	0	0	0	0	**817**	0.00
Chaste tree	211	0	0	0	0	0	5,486	0	0	**5,697**	0.01
Yucca	0	641	0	0	0	0	0	0	0	**641**	0.00
Bunya bunya	0	0	0	0	0	0	0	0	22,771	**22,771**	0.04
Pacific madrone	183	0	0	0	0	0	0	0	0	**183**	0.00
Blue blossom	46	0	0	0	0	0	0	0	0	**46**	0.00
Silver dollar eucalyptus	0	0	0	2,966	0	0	0	0	0	**2,966**	0.01
Sugargum	0	0	0	0	0	2,653	0	0	0	**2,653**	0.00
Benjamin fig	0	168	0	0	0	0	0	0	0	**168**	0.00
California flannelbush	186	0	0	0	0	0	0	0	0	**186**	0.00
Sweet hakea	0	0	716	0	0	0	0	0	0	**716**	0.00

Species	DBH Class (in)									Total	% of Total
	0-3	3-6	6-12	12-18	18-24	24-30	30-36	36-42	>42		
Butternut	0	0	0	0	3,670	0	0	0	0	**3,670**	0.01
Star magnolia	183	0	0	0	0	0	0	0	0	**183**	0.00
Southern bayberry	0	514	0	0	0	0	0	0	0	**514**	0.00
Paulownia	131	0	0	0	0	0	0	0	0	**131**	0.00
Cheesewood	206	0	0	0	0	0	0	0	0	**206**	0.00
Japanese red pine	0	398	0	0	0	0	0	0	0	**398**	0.00
Cherry laurel	0	0	1,138	0	0	0	0	0	0	**1,138**	0.00
Firethorn	0	0	0	0	8,173	0	0	0	0	**8,173**	0.01
Canyon live oak	0	0	2,575	0	0	0	0	0	0	**2,575**	0.00
Corkscrew willow	175	0	0	0	0	0	0	0	0	**175**	0.00
Western red cedar	0	0	0	0	4,721	0	0	0	0	**4,721**	0.01
All Trees	**671,440**	**3,216,662**	**9,676,593**	**11,550,234**	**12,556,263**	**9,434,735**	**5,611,731**	**3,038,140**	**2,083,866**	**57,839,664**	**100%**