SUMMARY
URBAN FOREST RESOURCE ANALYSIS
OF INVENTORIED TREES

Clark County, Nevada
Area of Interest

June 2013

Revised September 2013

DAVEY RESOURCE GROUP

A Division of The Davey Tree Expert Company

Clark County, Nevada Area of Interest

Summary Resource Analysis

Of Inventoried Trees

June 2013

Revised September 2013

Prepared for

Nevada Division of Forestry

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Executive Summary

Urban trees play a vital role in the communities of Clark County, Nevada. They provide numerous benefits both tangible and intangible, to residents, visitors, and neighboring communities. Throughout this arid region, trees are a valued community resource and an important component of the urban infrastructure.

The Nevada Division of Forestry (NDF) has an interest in supporting urban forest management across the state. In 2012, NDF contracted with Davey Resource Group (DRG) to collect an inventory of public trees within an area designated as the Clark County Area of Interest (AOI). The AOI encompassed multiple entities, including the Cities of Mesquite, North Las Vegas, Las Vegas, Boulder City, unincorporated Clark County, the Clark County School District, and the University of Nevada, Las Vegas (UNLV). The City of Henderson also conducted a similar project and their results hve been incorporated into this document. During the inventory, a certified arborist briefly inspected each tree and recorded information including species, size, condition, geographic location, and current maintenance needs. Arborists collected this information for 117,059 individual trees across the AOI. Upon completion of the inventory for each entity, DRG developed a detailed and quantified analysis of the current structure, function, and value of the tree resource using the inventory data in conjunction with i-Tree benefit-cost modeling software.

For greater context and perspective, the individual inventories were combined for a summary resource analysis. This report provides an overview of urban trees throughout the region and highlights the similarities and differences among the communities. It examines the structure, function, and benefits of trees across the AOI. It is important to keep in mind that the overall benefits will differ greatly, since the number of trees collected in each community varied. Clark County Schools (30,486) has the largest number of inventoried trees and Boulder City (1,375) has the smallest.

Overall, urban trees across the AOI are providing annual benefits of $3,885,428 ($1.97 per capita). 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.

Not all areas were able to provide budget information at the time of publication. If that data is available, this analysis can provide the following values:

- A Benefit Investment Ratio (Value of benefits vs. cost of maintenance)
- The Overall Net Benefit of the tree population
- An Average Net Benefit per Tree

Across the AOI, the urban tree inventory is reducing annual electric energy consumption by 5,988 megawatts (MWh) and annual natural gas consumption by 42,151 therms, for an overall value of $429,005. In addition, this resource is removing 9.3 tons of pollutants from the air each year, including ozone (O_3), nitrogen dioxide (NO_2), sulfur dioxide (SO_2) and particulates (PM_{10}) for an overall air quality benefit of $205,230. Canopy from this population covers 696.8 acres. This canopy reduces annual stormwater runoff by 84 million gallons and protects local water resources by reducing sediment and pollution loading.

Trees are a part of the community infrastructure. However, unlike other public assets, with proper maintenance, trees have the potential to increase in value over time. The inventoried tree resource across the AOI is a relatively young population in overall good condition. With more than 262 differentspecies, the region is well positioned to realize a significant increase in environmental benefits as trees continue to mature. An ongoing commitment to maximizing and maintaining the health of the urban forest will ensure that the region continues to be a healthy, safe, and enjoyable place to live.

Introduction

Clark County is located in Southern Nevada. With an estimated population of 1.97 million, it is the most populous county in the state of Nevada, accounting for nearly three-quarters of its residents. Clark County's arid climate and makes it one of the driest places in the country. Despite the challenges imposed by climate, communities have invested in planting and maintaining 117,059 trees in public areas. These trees constitute the urban forest across the AOI.

Individual trees and a healthy urban forest play important roles in the quality of life and the sustainability of every community. Research demonstrates that healthy urban trees can improve the local environment and lessen the impact resulting from urbanization and industry (Center for Urban Forest Research). Trees improve air quality by manufacturing oxygen and absorbing carbon dioxide (CO_2), as well as filtering and absorbing 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).

A healthy urban forest plays an important role in the quality of life in Clark County

Trees slow and reduce stormwater runoff, helping to protect critical waterways from excess pollutants and particulates. In addition, urban trees provide critical habitat for wildlife and promote a connection to the natural world for the region's residents.

In addition to these direct improvements, healthy urban trees increase the overall attractiveness of a community and the value of local real estate by 7% to 10%. Trees promote 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, making Clark County a more enjoyable place to live, work, and play. The 117,059 inventoried trees within the AOI play a prominent role in the overall urban forest benefits afforded to the community. Clark County residents rely on area managers to protect and maintain this vital resource.

The Nevada Division of Forestry (NDF) sponsored project in 2012 to inventory public trees and analyze their benefits across seven areas in Clark County. Those areas included the cities of Mesquite, North Las Vegas, Las Vegas, Boulder City, unincorporated Clark County, the Clark County School District, and the University of Nevada, Las Vegas (UNLV). The city of Henderson participated in a similar, but separate project in 2012 and their results were incorporated into this overall summary of Clark County tree benefits. The project reflects the NDF and the communities within the AOI's appreciation, concern, and proactive stance on the management of public trees.

A team of International Society of Arboriculture certified arborists from Davey Resource Group (DRG) mapped the location and collected data on publicly owned trees using global positioning system technology. In addition to location, the arborists collected information about the species, size, condition, and current maintenance needs of each tree. An urban forest is a dynamic resource, constantly changing and growing in response to environment and care. It is critical for each entity to update the inventory data, using asset management software, as maintenance needs are addressed and trees mature.

The inventory data was analyzed with i-Tree's *Streets*, a STRATUM Analysis Tool (*Streets* v5.0.1; i-Tree v5.0.6), to develop a resource analysis and report of the current condition of the inventoried urban forest. This report, unique to the AOI effectively quantifies the value of the inventoried public trees in regards to actual benefits derived from the tree resource. In addition, the report provides baseline values that can be used to develop and update an urban forest management plan. Management plans help communities determine where to focus available resources and set benchmarks for measuring progress.

This urban forest resource analysis and report provides information on the structure, function, and value of a specific tree resource, and compares that data among the eight participating entities. With this information, managers and citizens can make informed decisions about tree management strategies. This report provides the following information:

- An overview of the tree resource in each community and in context with the overall AOI,
- A description of the current structure of the inventoried tree resource within the AOI and an established benchmark for future management decisions,
- Quantified value of the benefits of the urban forest, illustrating the relevance and relationship of trees 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 for developing a long-term urban forest management plan.

Chapter 1: Urban Forest Resource Summary

Summary of Urban Forest Resource Structure

The urban forest resource within the AOI includes 117,059 public trees and 1,398 available planting sites.

A structural analysis is the first step towards understanding the benefits provided by these trees as well as their management needs. Considering species composition, diversity, age distribution, condition, canopy coverage, and replacement value, DRG determined that the following information characterizes this urban forest resource:

- Approximately 262 distinct tree species were identified in the inventory. The predominant tree species are Mondale pine (*Pinus eldarica,* 14%), Fan-Tex ash (*Fraxinus velutina* 'Fan-Tex', 9%) and desert willow (Chilopsis linearis, 5%)
- The age structure of the inventoried tree population is young overall, with 65% of trees measuring between 0 to 7 inches DBH (diameter at breast height, measured at 4 feet 6 inches above the ground) and 88% under 13 inches DBH.
- The majority of the inventoried trees (52%) are in good condition, with an additional 41% graded as fair.
- To date, the inventoried tree population has sequestered 21,450 tons of carbon (CO_2), valued at approximately $321,746.
- Replacement of the 117,059 inventoried trees across the AOI with trees of similar size, species, and condition would cost more than $276 million.

Replacement of the 117,059 inventoried trees across the AOI with trees of similar size, species, and condition would cost more than $276 million.

Summary of Urban Forest Benefits

Annually, the AOI's inventoried public trees provide cumulative benefits to the communities at an average value of $33.19 per tree, for a total gross value of $3.9 million per year. These annual benefits include:

- Trees reduce electricity and natural gas use in their neighborhoods through shading and climate effects for an overall benefit of $429,005, an average of $3.66 per tree.
- Trees sequester 2,218 tons of atmospheric CO_2 per year. An additional 2,992 tons is avoided by reducing energy generation, resulting in a net value of $75,148 and an average of $0.64 per tree.
- Net air quality improvements, including removal and avoidance of pollutants, provided by public trees are valued at $205,230 annually, an average of $1.75/tree.
- The inventoried public trees within the AOI intercept an estimated 38.3 million gallons of stormwater annually for a total value of $183,789, an average of $1.57 per tree.
- The benefit to property value increases, aesthetics, and socioeconomics contributed by the inventoried public trees across the AOI is $3 million, an average of $25.56 per tree.

Summary of Entity Comparisons

Communities differ in their population structure and benefits. Understanding these differences can help understand which populations have greater diversity, how the species are distributed within the populations, and which entity's trees are proportionally providing more benefits.

- Boulder City features the largest proportion of large and medium stature trees (50%), and the highest average per-tree benefit ($46.58)
- Mesquite has the highest number of palms including *Washingtonia robusta* (Mexican fan palm, 9.4%), *Washingtonia filifera* (California palm, 9.9%), and *Phoenix dactylifera* (date palm, 2.8% of the population). Including other species, palms represent 23.7% of the population.
- The University of Las Vegas, Nevada has the highest average replacement value ($4,083) and the largest portion of older trees (18% over 13" DBH) as well as the largest percent of trees under 3 inches DBH (45%). The university also has the highest percent of good condition trees (83%)
- Clark County Schools have the largest percent of the population in the 3-7 inch DBH range (53%) indicating a medium to young growing population.
- Henderson has the largest percent of trees (46%) in the youngest age class (0-3" DBH).
- UNLV and Henderson have the highest portions of the populations rated as good, with 83% at UNLV and 73% in Henderson.

Urban Forest Resource Management

The inventoried public tree population across the AOI is a dynamic resource that requires continued investment to maintain and extend its full benefit potential. **Community trees are one of the few assets that have the potential to increase in value with time and proper management.** Appropriate and timely tree care can substantially increase lifespan. When trees live longer, they provide greater benefits. As individual trees continue to mature and aging trees are replaced, the overall value of the community forest and the amount of benefits provided grow as well. This vital, living resource is, however, vulnerable to a host of stressors and requires ecologically sound and sustainable best management practices to ensure a continued flow of benefits for future generations.

Maintaining an appropriate age distribution by planting new trees and focusing on large-stature trees will help maximize future urban forest benefits countywide.

In general, communities within the AOI have the benefit of a relatively young urban forest in good condition. Entities should focus resources on maximizing the flow of benefits from the current tree population and maintaining a forward thinking approach. Based on the resource analysis, DRG recommends the following:

- Continue annual tree planting efforts to stock the available planting sites identified by the inventory.
- Maintain an appropriate age distribution by continuing to plant new trees to improve long-term resource sustainability and greater canopy coverage. To maximize benefits, focus on large-stature trees where planting sites will allow.
- Maximize the condition of the existing tree resource through continuing comprehensive tree maintenance and a cyclical pruning schedule.
- Implement a structural pruning program for young and establishing trees to promote healthy structure, extend life expectancy, and reduce future costs and liability.
- Maintain and update the inventory database.

The value of the tree resource across the AOI will continue to increase as existing trees mature and new trees are planted. As the resource grows, investment in management is critical to ensuring that residents will continue receiving a high return on investment in the future. It is not as simple as planting more trees to increase canopy cover and benefits. Planning and funding for tree care and tree management must complement planting efforts in order to ensure the long-term success and health of the 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. Area residents can take pride in knowing that trees improve the quality of life across the region.

Chapter 2: The Urban Forest Resource Across the AOI

The tree resource across the AOI is more thoroughly understood through examination of the composition and species richness (diversity). Inferences based on this data can help managers understand the importance of individual tree species to the overall forest as it exists today. Consideration of stocking level (trees per available space), canopy cover, age distribution, condition and performance helps to project the potential of the forest resource.

Population Distribution by Entity

The AOI included cities, schools, and unincorporated county areas with varying acreage, population, and composition. As a result, the number of trees collected within each of these entities differed, with the largest portion of trees collected at Clark County Schools (32.1%), and the smallest portion collected in Boulder City (1.9%). It is important to keep this distribution in mind when interpreting the overall trends within the AIO (Figure 1 and Table 1).

Table 1. Number of Trees Inventoried in Each Entity

Entity	# of Trees
Clark County Schools	30,486
Clark County	24,549
Henderson	22,005
Las Vegas	22,731
North Las Vegas	10,910
UNLV	3,220
Mesquite	1,779
Boulder City	1,375
AOI Total	**117,059**

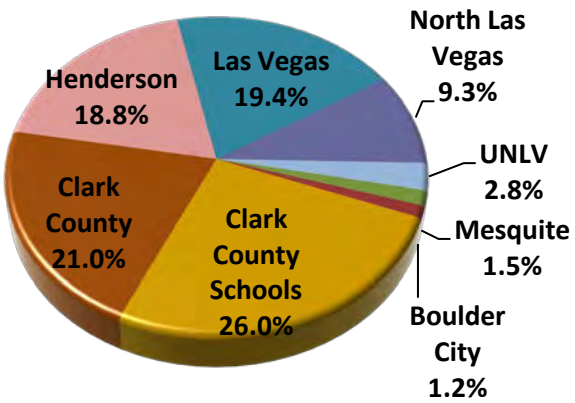


Figure 1. Percent of Total Inventory Collected in Each Entity

Population Composition

Broadleaf hardwood species are the most common tree type within the AOI's inventoried public tree population, comprising 76% of the total inventory. Broadleaf trees typically have larger canopies than coniferous trees of the same size DBH. 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 59% of Clark County's inventoried public tree population, including 3% large-stature, 30% medium-stature, and 26% small-stature trees. Evergreen broadleaf trees comprise 17% of the population. Conifers represent 19% of the overall population, and they are primarily large stature trees. Approximately 6% of the population is comprised of palms (Figure 2 and Table 2).

The inventoried communities vary in their distribution of species (Figure 2 & Table 2). For example, Mesquite features the largest proportion of the population in palms (24%), while Boulder City has a large proportion of medium stature broadleaf deciduous trees. These distributions will impact the way

tree benefits accrue over time. Palms are relatively static in their provision of benefits, while a medium stature broadleaf tree that is actively growing will provide more annual benefits to the community. Across most of the United States, a recommended distribution generally includes mostly large and medium hardwoods. In consideration of the arid environment, medium stature trees may be ideal, and drought-tolerant conifers are a key component of the inventory.

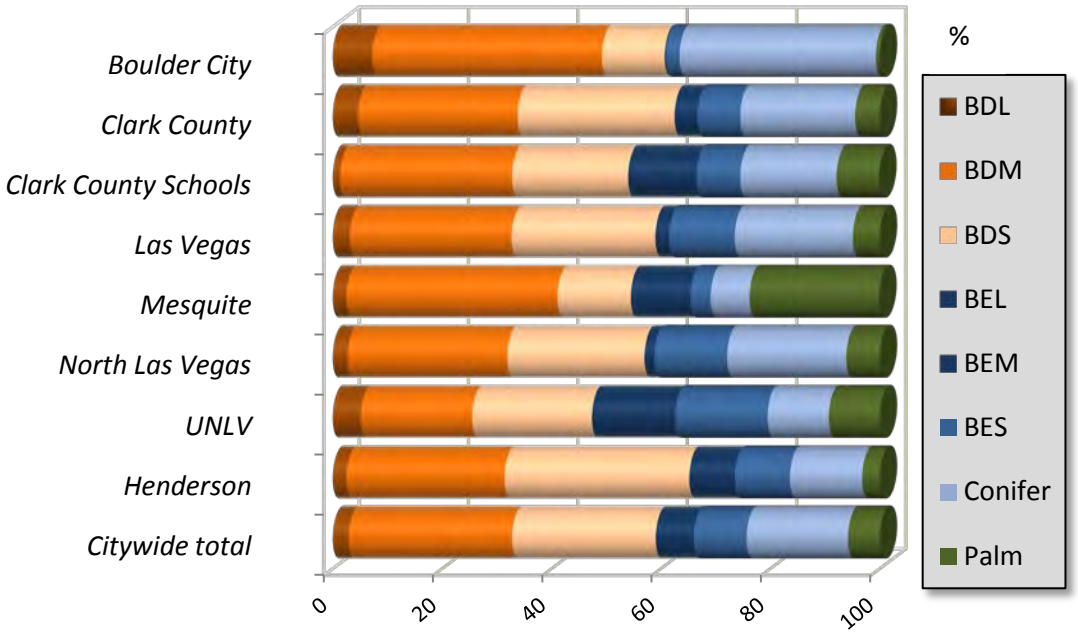


Figure 2. Tree Type Composition Comparison

Table 2. Tree Type Composition Comparison %

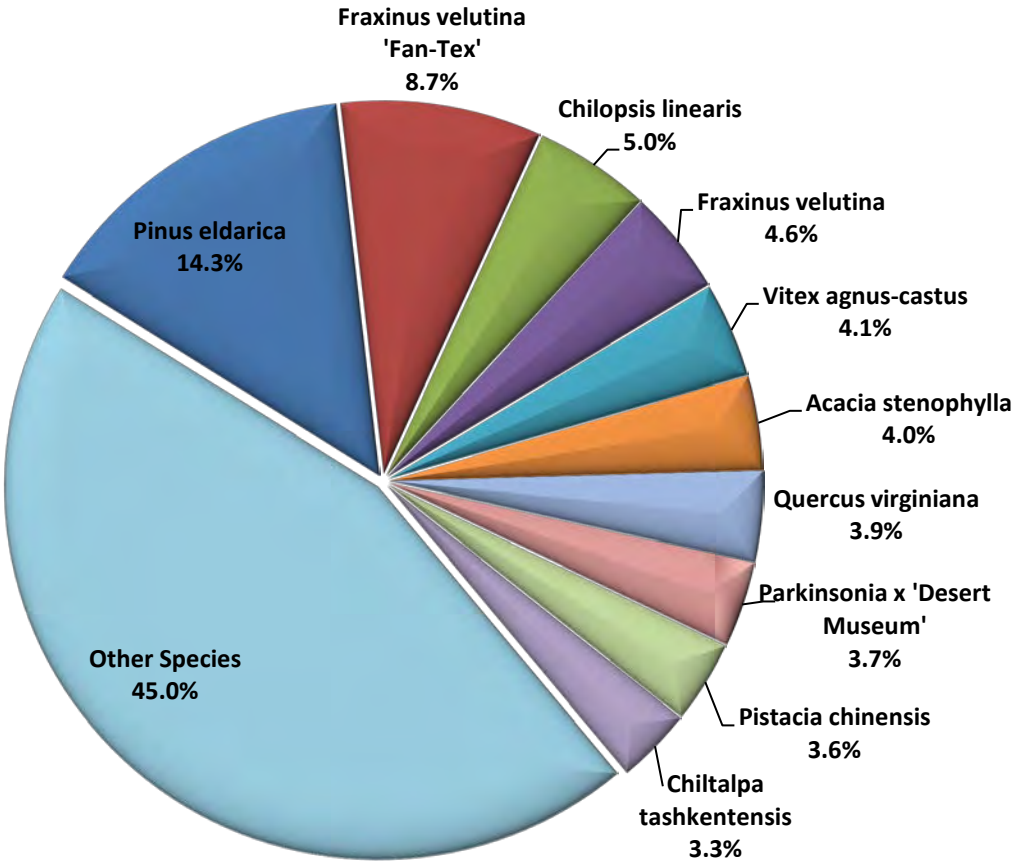
Area	BDL	BDM	BDS	BEL	BEM	BES	Conifer	Palm
Boulder City	7.2	42.0	11.5	0.0	0.2	2.5	35.9	0.7
Clark County	4.6	29.2	28.7	0.4	3.8	7.8	21.0	4.5
Clark County Schools	1.3	31.5	21.2	2.0	10.5	8.0	17.6	7.8
Las Vegas	3.1	29.6	26.3	1.0	1.5	12.0	21.6	4.9
Mesquite	2.5	38.6	13.4	1.1	9.8	3.7	7.1	23.7
North Las Vegas	2.7	29.2	25.1	0.5	1.3	13.3	21.8	6.2
UNLV	5.1	20.4	21.9	3.1	12.1	16.9	11.2	9.3
Henderson	2.5	28.9	33.8	0.5	7.8	10.1	13.2	3.2
AOI Total	**2.9**	**29.9**	**26.3**	**1.0**	**5.9**	**9.7**	**18.5**	**5.8**

The inventoried public tree population across the AOI includes a mix of 262 unique species (Table 4). The average city across the U.S. has 53 species, according to McPherson and Rowntree (1989) in their nationwide survey of street tree populations in 22 U. S. cities. Among the participating entities, only Mesquite and Boulder City had less than the average 53 species. However, their inventoried tree populations are significantly smaller thanthe communities in McPherson's study (1989).

Across AOI, the top 10 species represent 55% of the total population (Figure 3). The predominant tree species are *Pinus eldarica* (Mondale pine, 15.3%), *Fraxinus velutina* 'Fan-Tex' (Fan-Tex ash, 8.6%) and *Chilopsis linearis* (desert willow 5.0%)

There is a widely accepted rule that no single species should represent greater than 10% of the total population, and no single genus more than 20% (Clark Et al, 1997). Within the AOI, the species *Pinus eldarica* (14%) is over-represented as is *Fraxinus velutina* when the Fan-Tex variety is taken into account(13%).

Figure 3. Frequency of Top 10 Species Across the AOI's Inventoried Public Tree Population



It is important to maintain a diverse population within an urban forest. Dominance of any single species or genus can have detrimental consequences in the event of storms, drought, disease, pests, or other stressors that 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 Longhorned 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.

Comparison of Species Distribution

Species diversity is an important element in an urban forest's ability to survive pest and climate events. A community with a very diverse urban forest is less likely to suffer catastrophic tree loss should a new pest emerge, or a storm cause damage to certain species due to their growth form or structure. Boulder City has the least diverse population of inventoried trees, with 62% of the population represented by just 5 species and one species, *Pinus eldarica* (Mondale pine) accounting for 28%. In contrast, the inventoried population at UNLV is the most diverse, has no over represented species, and the most common species *Quercus virginiana*, (Southern live oak) representing just 7% of the population.

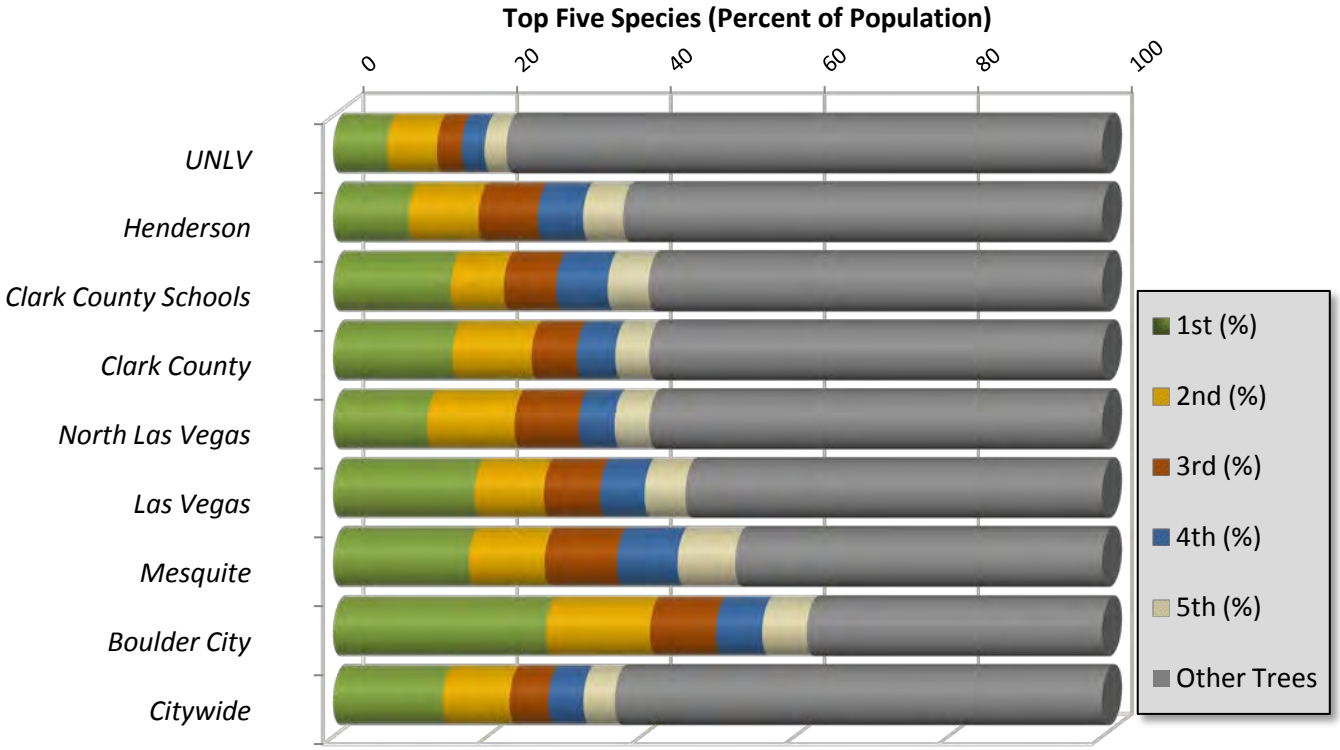


Figure 4. Comparison of Top Five Species

Table 3. Comparison of Top Five Species

Entity	Pinus eldarica	Fraxinus velutina	Quercus virginiana	Ulmus parvifolia	Fraxinus velutina 'Fan-Tex'	Washingtonia filifera	Pinus halepensis	Prosopis chilensis	Washingtonia robusta	Vitex agnus-castus	Fraxinus uhdei	Chilopsis linearis	Acacia stenophylla	Pistacia chinensis	Parkinsonia x 'Desert Museum'	Fraxinus angustifolia
Boulder City	28			13	8.6						6			5.8		
Clark County	16	5.9			10							5			4.4	
Clark County Schools	15	6.9	6.8		7.9									5.3		
Las Vegas	18				9			7.3		5.3						
Mesquite		18	7.5			9.9			9.4							
North Las Vegas	12				11		8.3		4.7							
UNLV			7				6.5			3.2		3				2.8
Henderson	9.8				9.1							7.7	5.2		5.9	

Over represented by 5 or more percentage points
Over represented by up to 5 percentage points
Represent 5% to 10% of the total population
Represent less than 5% of the total population

The top five species in each entity are listed in Table 3. Species displayed in red and orange are overrepresented while those displayed in green and yellow are within the acceptable range of representation (less than 10% of the total population). It is safe to include more of the green species in future planting palettes to increase area wide species diversity. However, as *Fraxinus velutina* and *F. velutina* 'Fan-Tex' (Velvet ash and Fan-Tex ash) are overrepresented, *Fraxinus uhdei* or *Fraxinus angustifolia* (Texas and Raywood ash) may be more appropriate choices in future plantings where the benefits of ash trees are desired.

Maintaining a diverse population within an urban forest is important.

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Table 4. Population Summary of the AOI's Inventoried Public Trees

Species	DBH Class (in)									Total	% of Pop.
	0-3	3-7	7-13	13-19	19-25	25-31	31-37	37-42	> 42		
Broadleaf Deciduous Large (BDL)											
BDL Other	556	752	1,089	565	266	100	35	9	2	**3,374**	2.9%
Total	**556**	**752**	**1,089**	**565**	**266**	**100**	**35**	**9**	**2**	**3,374**	**2.9%**
Broadleaf Deciduous Medium (BDM)											
Fraxinus velutina 'Fan-Tex'	3,112	4,697	2,064	285	16	3	0	0	0	**10,177**	8.7%
Fraxinus velutina	1,176	1,994	1,619	450	70	20	5	1	6	**5,341**	4.6%
Pistacia chinensis	1,027	2,308	785	53	0	0	0	0	0	**4,173**	3.6%
Fraxinus angustifolia	680	2,172	670	101	2	0	0	0	0	**3,625**	3.1%
Ulmus parvifolia	933	1,658	467	68	2	0	0	0	0	**3,129**	2.7%
Prosopis chilensis	1,397	1,027	482	123	15	6	0	0	0	**3,050**	2.6%
Morus alba	68	67	243	644	326	120	42	12	6	**1,528**	1.3%
Parkinsonia florida	435	607	352	46	1	0	0	0	0	**1,442**	1.2%
BDM Other	827	918	648	116	28	3	1	0	0	**2,541**	2.2%
Total	**9,655**	**15,448**	**7,330**	**1,886**	**460**	**152**	**48**	**13**	**12**	**35,006**	**29.9%**
Broadleaf Deciduous Small (BDS)											
Chilopsis linearis	3,913	1,629	325	24	0	0	0	0	0	**5,891**	5.0%
Vitex agnus-castus	3,829	889	77	10	0	1	0	0	0	**4,806**	4.1%
Parkinsonia x 'Desert Museum'	2,479	1,430	361	11	1	0	0	0	0	**4,282**	3.7%
Chiltalpa tashkentensis	651	1,983	1,169	28	1	0	0	0	0	**3,833**	3.3%
Prosopis velutina	1,427	1,063	698	114	10	0	0	0	0	**3,312**	2.8%
Prosopis glandulosa	1,249	741	375	22	0	0	0	0	0	**2,387**	2.0%
Acacia farnesiana	1,365	606	189	45	5	0	0	0	0	**2,210**	1.9%
Prosopis torreyana	510	430	171	26	1	0	0	0	0	**1,138**	1.0%
Prunus cerasifera	278	143	14	0	0	0	0	0	0	**435**	0.4%
BDS Other	1,202	822	321	44	14	1	0	0	0	**2,404**	2.1%
Total	**16,946**	**9,753**	**3,702**	**324**	**32**	**2**	**0**	**0**	**0**	**30,760**	**26.3%**
Broadleaf Evergreen Large (BEL)											
BEL Other	416	555	166	52	17	2	0	0	0	**1,208**	1.0%
Total	**416**	**555**	**166**	**52**	**17**	**2**	**0**	**0**	**0**	**1,208**	**1.0%**
Broadleaf Evergreen Medium (BEM)											
Quercus virginiana	941	2,469	1,040	85	3	0	0	0	0	**4,538**	3.9%
Prosopis alba	946	518	326	83	13	1	0	0	0	**1,887**	1.6%
BEM Other	162	217	92	10	2	1	1	0	0	**485**	0.4%
Total	**2,049**	**3,204**	**1,458**	**178**	**18**	**2**	**1**	**0**	**0**	**6,910**	**5.9%**

Species	DBH Class (in) 0-3	3-7	7-13	13-19	19-25	25-31	31-37	37-42	> 42	Total	% of Pop.
Broadleaf Evergreen Small (BES)											
Acacia stenophylla	1,502	2,340	769	86	6	0	0	0	0	**4,703**	4.0%
Rhus lancea	517	688	243	16	2	1	0	0	0	**1,467**	1.3%
BES Other	2,798	1,787	501	58	11	1	0	0	0	**5,156**	4.4%
Total	**4,817**	**4,815**	**1,513**	**160**	**19**	**2**	**0**	**0**	**0**	**11,326**	**9.7%**
Conifer Evergreen Large (CEL)											
Pinus eldarica	857	4,794	7,876	2,688	425	39	6	3	0	**16,688**	14.3%
Pinus halepensis	52	276	1,186	1,523	443	72	20	1	1	**3,574**	3.1%
CEL Other	67	237	545	270	34	7	0	1	0	**1,161**	1.0%
Total	**976**	**5,307**	**9,607**	**4,481**	**902**	**118**	**26**	**5**	**1**	**21,423**	**18.3%**
Conifer Evergreen Medium (CEM)											
CEM Other	31	24	43	32	13	0	0	1	0	**144**	0.1%
Total	**31**	**24**	**43**	**32**	**13**	**0**	**0**	**1**	**0**	**144**	**0.1%**
Conifer Evergreen Small (CES)											
CES Other	14	51	42	17	1	0	0	0	0	**125**	0.1%
Total	**14**	**51**	**42**	**17**	**1**	**0**	**0**	**0**	**0**	**125**	**0.1%**
Palm Large (PEL)											**0.0%**
PEL Other	2	6	9	48	18	15	16	1	2	**117**	0.1%
Total	**2**	**6**	**9**	**48**	**18**	**15**	**16**	**1**	**2**	**117**	**0.1%**
Palm Medium (PEM)											
PEM Other	1	5	23	470	338	5	1	0	0	**843**	0.7%
Total	**1**	**5**	**23**	**470**	**338**	**5**	**1**	**0**	**0**	**843**	**0.7%**
Palm Small (PES)											
Washingtonia robusta	64	86	1,512	1,793	244	60	35	5	1	**3,801**	3.2%
Washingtonia filifera	6	5	187	295	488	129	46	21	17	**1,194**	1.0%
PES Other	227	424	149	28	0	0	0	0	0	**828**	0.7%
Total	**297**	**515**	**1,848**	**2,116**	**732**	**189**	**81**	**26**	**18**	**5,823**	**5.0%**
Grand Total	**35,760**	**40,435**	**26,830**	**10,329**	**2,816**	**587**	**208**	**55**	**35**	**117,055**	**100%**

Species Importance

To quantify the significance of any one particular species within the AOI, 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 a 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 of an urban forest population. Since 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 10 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 shorter lifespans and increased long-term management costs.

The 31 most abundant species represent 89% of the total population, 84% of the total leaf area, and 87% of the total canopy cover for a combined importance value of 86.5 (Table 5). Of these species, the entities within the AOI rely most on *Pinus eldarica* (Mondale pine, IV=16.8), followed by *Fraxinus velutina* 'Fan-Tex' (Fan-Tex ash, IV=8.9) and *Pinus halepensis* (Aleppo pine, IV=7.2).

Across the AOI, *Morus alba* (White mulberry, IV=4.0) provides the greatest per-tree functional capacity, accounting for only 1.3% of the population and 5.4% of the total leaf area. *Pinus halepensis* (Aleppo pine, IV=7.2), also has a high functional capacity, accounting for 3.1% of the population and 11.3% of the total leaf area.

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. Consideration of tree type along with age distribution can provide additional significance to the importance value. For instance, *Vitex agnus-castus* (chaste tree) represents 4.1% of the total population yet has an importance value of only 2.1. This small stature tree will never achieve a more significant importance value in the overall population due to its genetically determined growth pattern.

Table 5. Importance Value (IV) of the Most Abundant Public Tree Species Across the AOI

Species	Number of Trees	% of Total Trees	Leaf Area (ft2)	% of Total Leaf Area	Canopy Cover (ft2)	% of Total Canopy Cover	Importance Value	% of Pop.
Pinus eldarica	16,688	14.3	15,865,343	18.8	5,231,337	17.2	**16.8**	14.3%
Fraxinus velutina 'Fan-Tex'	10,177	8.7	6,747,779	8.0	3,044,281	10.0	**8.9**	8.7%
Chilopsis linearis	5,891	5.0	952,986	1.1	477,579	1.6	**2.6**	5.0%
Fraxinus velutina	5,341	4.6	5,434,405	6.4	1,729,333	5.7	**5.6**	4.6%
Vitex agnus-castus	4,806	4.1	627,445	0.7	405,030	1.3	**2.1**	4.1%
Acacia stenophylla	4,703	4.0	2,068,370	2.4	813,736	2.7	**3.0**	4.0%
Quercus virginiana	4,538	3.9	2,543,113	3.0	1,121,307	3.7	**3.5**	3.9%
Parkinsonia x 'Desert Museum'	4,282	3.7	933,747	1.1	542,434	1.8	**2.2**	3.7%
Pistacia chinensis	4,173	3.6	2,207,452	2.6	974,979	3.2	**3.1**	3.6%
Chiltalpa tashkentensis	3,833	3.3	1,662,137	2.0	874,347	2.9	**2.7**	3.3%
Washingtonia robusta	3,801	3.2	1,105,755	1.3	301,613	1.0	**1.9**	3.2%
Fraxinus angustifolia	3,625	3.1	2,486,408	2.9	1,147,373	3.8	**3.3**	3.1%
Pinus halepensis	3,574	3.1	9,544,907	11.3	2,215,721	7.3	**7.2**	3.1%
Prosopis velutina	3,312	2.8	2,127,361	2.5	931,896	3.1	**2.8**	2.8%
Ulmus parvifolia	3,129	2.7	2,859,373	3.4	1,407,098	4.6	**3.6**	2.7%
Prosopis chilensis	3,050	2.6	1,892,808	2.2	808,368	2.7	**2.5**	2.6%
Prosopis glandulosa	2,387	2.0	1,120,353	1.3	501,677	1.7	**1.7**	2.0%
Acacia farnesiana	2,210	1.9	514,164	0.6	288,581	1.0	**1.1**	1.9%
Prosopis alba	1,887	1.6	734,987	0.9	182,200	0.6	**1.0**	1.6%
Morus alba	1,528	1.3	4,577,781	5.4	1,550,895	5.1	**3.9**	1.3%
Rhus lancea	1,467	1.3	620,864	0.7	243,434	0.8	**0.9**	1.3%
Parkinsonia florida	1,442	1.2	901,722	1.1	542,068	1.8	**1.4**	1.2%
Washingtonia filifera	1,194	1.0	357,747	0.4	34,464	0.1	**0.5**	1.0%
Prosopis torreyana	1,138	1.0	349,889	0.4	189,382	0.6	**0.7**	1.0%
Olea europaea	1,018	0.9	342,729	0.4	137,688	0.5	**0.6**	0.9%
Sophora secundiflora	919	0.8	121,672	0.1	40,530	0.1	**0.4**	0.8%
Gleditsia triacanthos	911	0.8	854,557	1.0	234,736	0.8	**0.9**	0.8%
Phoenix dactylifera	841	0.7	253,054	0.3	183,563	0.6	**0.5**	0.7%
Quercus ilex	757	0.6	399,738	0.5	105,184	0.3	**0.5**	0.6%
Chamaerops humilis	696	0.6	68,226	0.1	16,697	0.1	**0.2**	0.6%
Parkinsonia aculeata	619	0.5	353,146	0.4	174,459	0.6	**0.5**	0.5%
Other Species	13,122	11.2	13,797,701	16.3	3,899,861	12.8	**13.5**	11.2%
AOI Total	**117,059**	**100%**	**84,427,717**	**100%**	**30,351,853**	**100%**	**100%**	**100%**

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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. Overall, the inventoried trees provide 696.8 acres of tree canopy cover. *Pinus eldarica* (Mondale pine) and *Fraxinus velutina 'Fan-Tex'* (Fan-Tex ash) provide the largest proportion of canopy, accounting for 17% and 10% of the total canopy respectively.

Clark County Schools have the greatest canopy area with 178.7 acres, 25.6% of the total canopy, while Mesquite has the smallest canopy area (11.1 acres, 1.6% of canopy), due mainly to the small stature tree population. Clark County, North Las Vegas and UNLV have more canopy acres than their population numbers would suggest, indicating that these entities may have more large stature or older trees providing greater per-tree canopy.

Table 6. Comparison of Canopy Cover

Entity	Acres	% of Total Canopy	% of Pop.
Clark County Schools	178.7	**25.6**	26.0
Clark County	161.6	**23.2**	21.0
Las Vegas	125.1	**18.0**	19.4
Henderson	117.2	**16.8**	18.8
North Las Vegas	67.4	**9.7**	9.3
UNLV	23.4	**3.4**	2,8
Boulder City	12.4	**1.8**	1.2
Mesquite	11.1	**1.6**	1.5
AOI Total	696.8	**100%**	**100%**

Relative Age Distribution

Age distribution can be approximated by considering the DBH range of the overall population and of individual species. Trees with smaller diameters tend to be younger. It is important to note that palms do not increase in DBH over time, so they are not considered in the species analysis. In palms, height more accurately correlates to age.

The distribution of individual tree ages within a tree population influences present and future costs as well as the flow of benefits. An ideal-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%) should be young, with DBH less than eight inches, while only 10% should be in the large diameter classes (>24 inches).

Overall, the age distribution of the inventoried public trees within the AOI is weighted in young trees, with 65.1% of the population consisting of trees with a DBH of seven inches or smaller and 31.7% established trees (7-19 inches DBH). Trees greater than 18 inches DBH make up 3.2% of the overall population (Figure 5).

Considering age distribution between individual entities, Clark County Schools are most well represented in the 3-7 inch DBH range, with few older trees. With a balanced distribution among small, medium, and large-stature trees, this population, with adequate maintenance, will mature into

the larger classes. Henderson and The University of Las Vegas, Nevada have the largest population of trees in the 0-3 inch DBH range (45% of the UNLV population, and 46% of Henderson), indicating that many trees were recently planted. Across the AOI, all communities have very few trees in the large diameter classes (>24”). This may be, at least in part, a result of the arid environment rather than the overall age of the tree population. Trees in the older age classes provide greater benefits due to their high leaf surface area. Emphasis should be placed on preserving older trees.

With a relatively young urban forest and continued proactive management, the communities within the AOI can expect additional benefits as this vital resource matures. New installations should carefully consider species selection, increasing the use of underused and well-performing species. Due to their over-representation in the population, new plantings should avoid Mondale pine and Fan-Tex ash. In addition to planting, it is critical that long-term resources are dedicated to ensuring proper maintenance as trees mature. A long-term, sustainable management plan, including regular inspection and pruning cycles, can ensure trees remains healthy and well-structured, thereby maximizing environmental services to the community, reducing risk, and promoting a consistent flow of benefits for many generations to come.

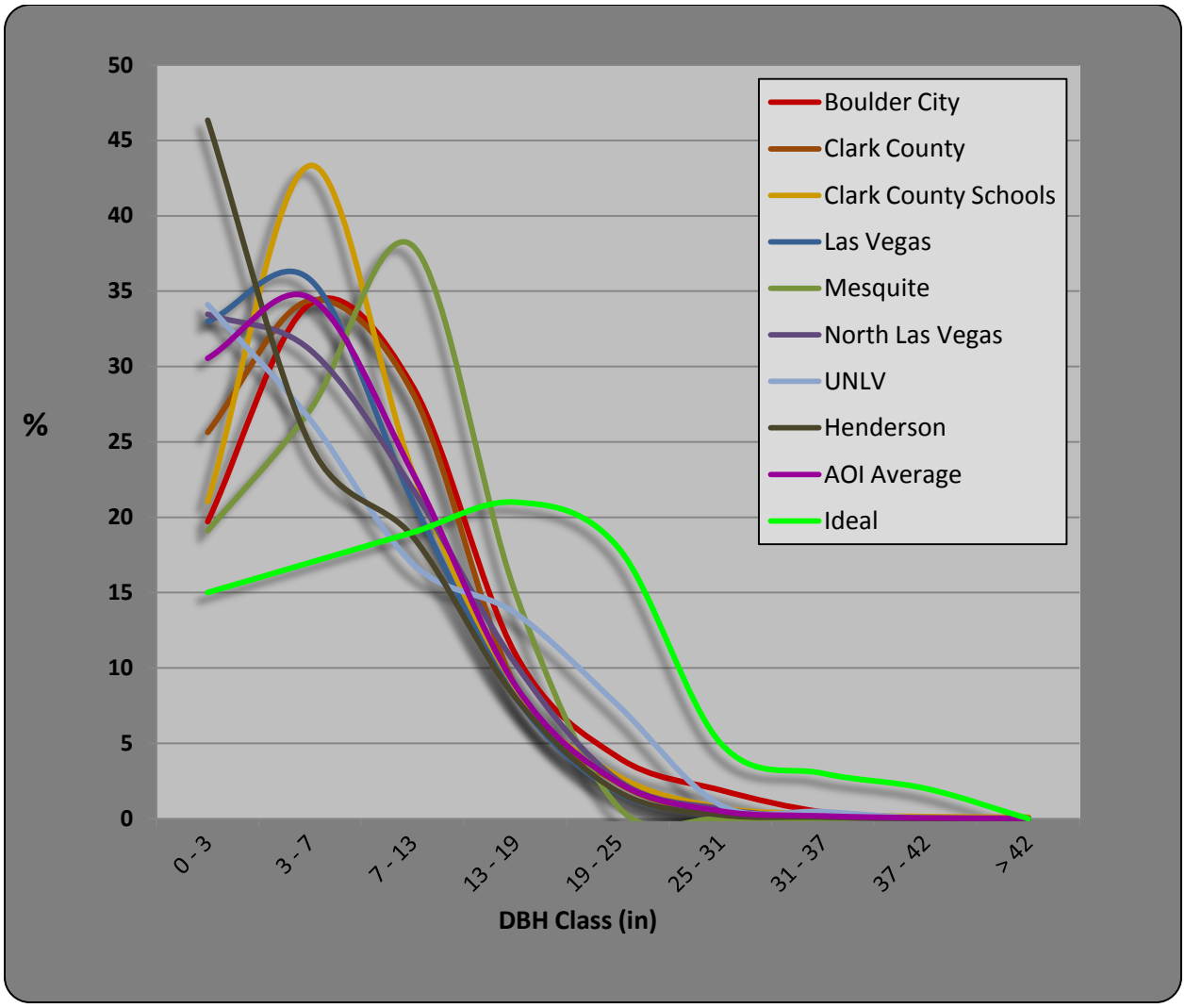
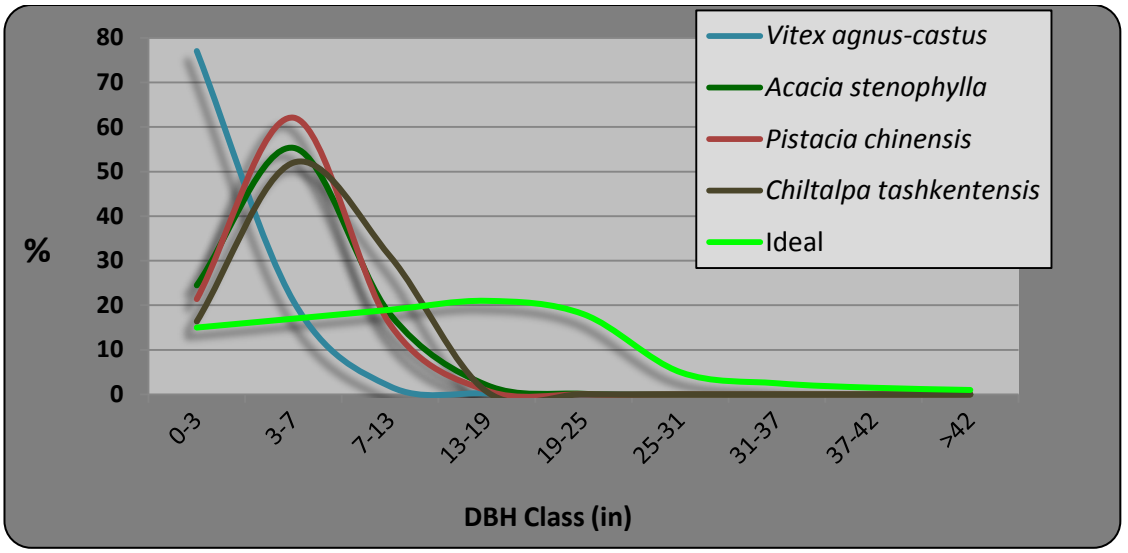


Figure 5. Overall Relative Age Distribution of Tree Inventories Across the AOI

Considering species populations within the AOI, there are area wide trends among the most common species (Figure 6). *Pinus eldarica* (Mondale pine) is most represented in the medium age classes, indicating they have been planted with less frequency in recent years. This is a good strategy since this species is over-represented (15%) and the genus *Pinus* is well-represented (20.8%) in the overall resource.

The most common species of ash (*Fraxinus velutina* and *F. Velutina* 'Fan-Tex') are each well represented in the medium age classes and recent planting levels fall close to ideal values. If ash trees are performing well in the area, more diverse species and cultivars may be considered for addition to the planting palette, based on the success of these two species. Selection criteria should reflect local climate and soil conditions.

It is important to keep in mind that, as young populations mature and eventually grow old, their maintenance needs are likely to become more frequent. Future plantings should adequately represent long-standing, desirable, and high-performing species. Sufficient replacements should be planted to ensure the functional capacity and benefit streams from these populations as individuals decline with age.



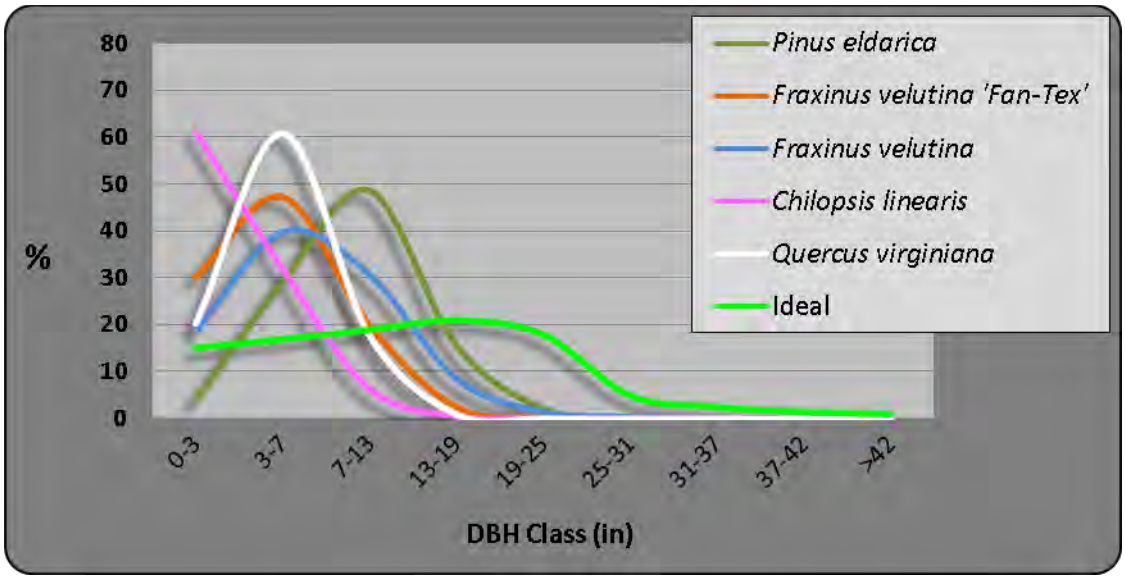


Figure 6. Relative Age Distribution of the Top Nine Inventoried Tree Species within the AOI

Urban Forest Condition and Relative Performance

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 inventoried tree was rated for overall condition, including consideration for structure, foliage, and the root collar. When trees are performing at their peak, the benefits they provide are maximized.

The inventory found over 44% of the trees in good condition, 47% in fair condition, and 8% in poor or dead condition. Removal or mitigation of dead and failing trees is recommended as soon as possible to reduce liability exposure.

There are two ways to consider condition in the urban forest. Figure 7 shows condition as a percent of the population, and Figure 8 shows the number of trees in each community that exist in each condition class. Figure 7 gives a sense of the scale of the condition distribution while Figure 8 illustrates the quantity of trees in each condition class.

The University of Las Vegas, Nevada has the highest percentage of trees in good condition (83%), followed by Henderson (73%) and Boulder City (64%). North Las Vegas has the highest percentage of dead and dying trees (1.9%) followed by Las Vegas (1.5%). These trees should be inspected and removed immediately if hazardous or as schedules permit for small or young dead trees. Clark County Schools have the greatest number of good condition trees (14,572), followed by Las Vegas (12,691) (Table 7).

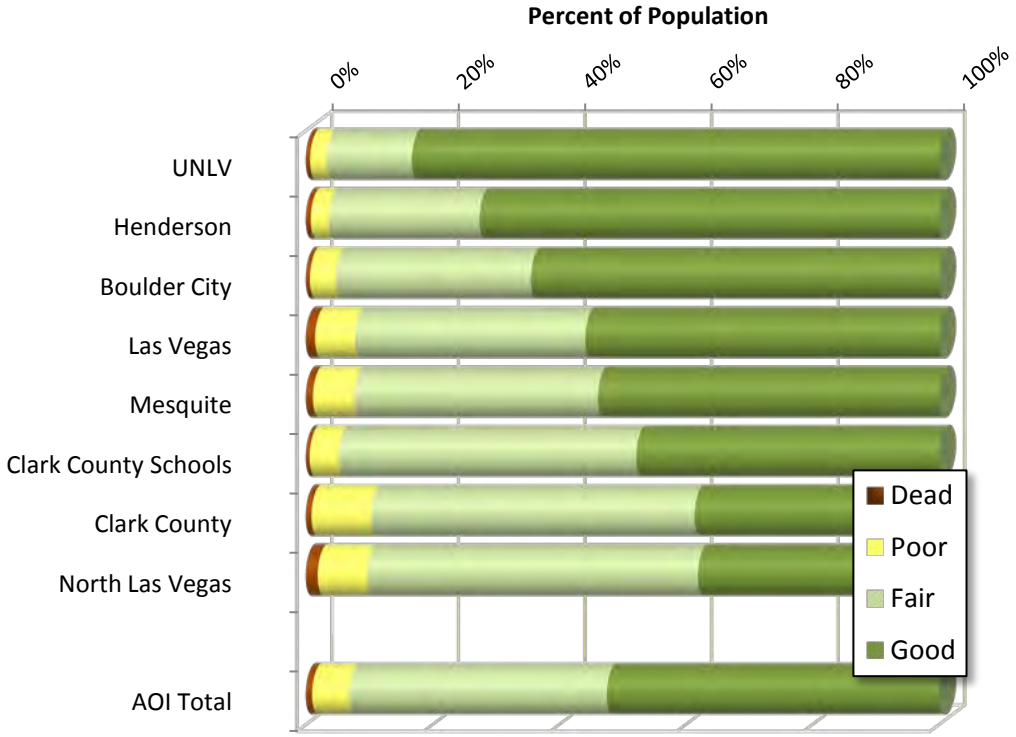


Figure 7. Condition of Inventoried Trees across the AOI (%)

Table 7. Comparison of Tree Condition (% of Population)

Entity	Dead	Poor	Fair	Good	# of Trees	% of Pop
Clark County Schools	0.6%	4.6%	47.0%	47.8%	30,487	26.0%
Clark County	0.9%	9.4%	51.1%	38.6%	24,552	21.0%
Las Vegas	1.5%	6.3%	36.4%	55.8%	22,731	19.4%
Henderson	0.8%	2.8%	23.8%	72.6%	22,005	18.8%
North Las Vegas	1.9%	7.8%	52.2%	38.0%	10,910	9.3%
UNLV	0.7%	2.6%	13.5%	83.2%	3,220	2.8%
Mesquite	1.1%	6.5%	38.5%	53.9%	1,779	1.5%
Boulder City	0.7%	4.1%	30.8%	64.4%	1,375	1.2%
AOI Total	**1.0%**	**5.9%**	**40.7%**	**52.4%**	**117,059**	**100%**

* Four trees did not receive condition ratings and are not included in the total.

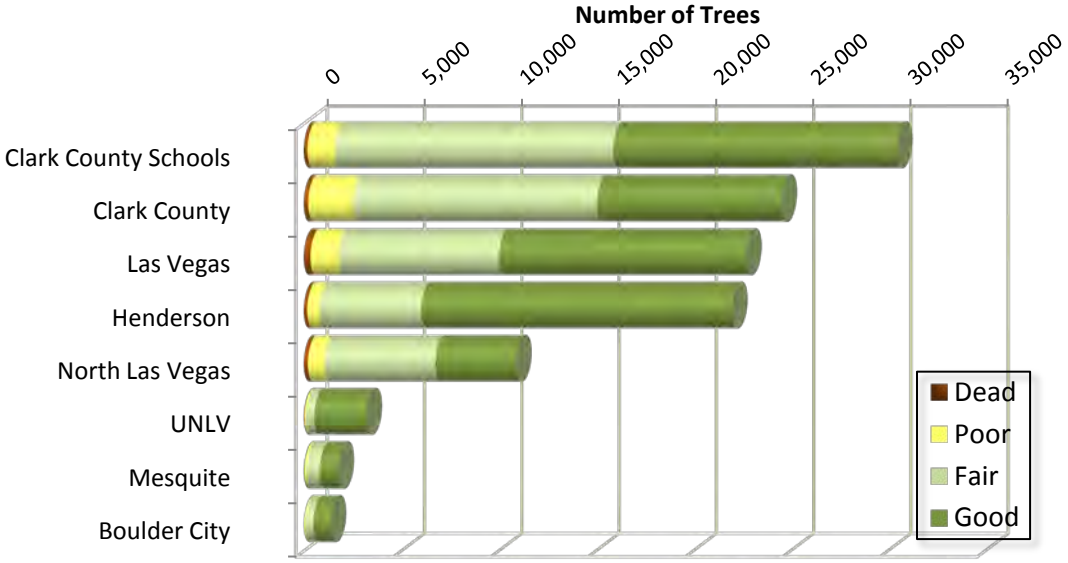


Figure 8. Condition of Inventoried Trees across the AOI (# of Trees)

Table 8. Comparison of Tree Condition (# of Trees)

Entity	Dead	Poor	Fair	Good	# of Trees	% of Pop
Clark County Schools	183	1,402	14,328	14,572	30,487	26.0%
Clark County	221	2,308	12,545	9,476	24,552	21.0%
Las Vegas	336	1,434	8,267	12,691	22,731	19.4%
Henderson	171	619	5,244	15,971	22,005	18.8%
North Las Vegas	206	853	5,700	4,145	10,910	9.3%
UNLV	22	84	434	2,680	3,220	2.8%
Mesquite	20	116	685	959	1,779	1.5%
Boulder City	9	56	424	886	1,375	1.2%
AOI Total	**1,168**	**6,872**	**47,627**	**61,380**	**117,059**	**100%**

The *relative performance index* (RPI) is one way to further analyze the condition and suitability of specific 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 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 23 most common species within the AOI, 13 have an RPI of 1.0 or greater (Table 9). Of these, California fan palm (*Washingtonia filifera*, RPI=1.15), Mexican fan palm (*Washingtonia robusta*, RPI=1.09), and shoestring acacia (*Acacia stenophylla*, RPI=1.07) have the highest RPI, while Chitalpa (*Chitalpa tashkentenssis,* RPI=0.85) and Raywood ash (*Fraxinus angustifolia 'Raywood'*, RPI=0.91) have the lowest.

The RPI can be a useful tool for urban forest managers. For example, if a community has been planting two or more new species, the RPI can be used to compare their relative performance. If the RPI indicates that one is performing relatively poorly, managers 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. Established species with an RPI of 1.00 or greater have performed well when compared to the population as a whole. These top performers should be retained, and planted, as a healthy proportion of the overall population. It is important to keep in mind that, because RPI is based on condition at the time of the inventory, 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 based on 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 simply be exhibiting signs of population senescence. The individuals of this species may have produced substantial benefits over the years and the species should continue to be considered when making determinations for future planting. A complete table, with RPI values for all species, is included in Appendix C.

Table 9. Relative Performance Index (RPI) for the Most Prevalent Species within the AOI

Species	Dead or Dying	Poor	Fair	Good	RPI	# of Trees	% of All Trees
Pinus eldarica	0.05	3.92	36.15	59.88	**1.04**	16,688	14.26
Fraxinus velutina 'Fan-Tex'	0.07	8.09	45.95	45.85	**0.97**	10,177	8.69
Chilopsis linearis	0.08	4.94	38.43	56.54	**1.03**	5,891	5.03
Fraxinus velutina	0.39	6.57	54.09	38.94	**0.95**	5,341	4.56
Vitex agnus-castus	0.10	3.56	47.19	49.15	**1.00**	4,806	4.11
Acacia stenophylla	0.02	1.21	35.00	63.77	**1.07**	4,703	4.02
Quercus virginiana	0.29	4.85	43.19	51.67	**1.01**	4,538	3.88
Parkinsonia x 'Desert Museum'	0.05	3.95	56.56	39.44	**0.97**	4,282	3.66
Pistacia chinensis	0.02	4.60	37.48	57.90	**1.03**	4,173	3.56
Chiltalpa tashkentensis	0.03	15.50	66.40	18.08	**0.85**	3,833	3.27
Washingtonia robusta	0.05	1.89	27.20	70.85	**1.09**	3,801	3.25
Fraxinus angustifolia	0.11	13.99	51.03	34.87	**0.91**	3,625	3.10
Pinus halepensis	0.00	3.25	45.16	51.59	**1.01**	3,574	3.05
Prosopis velutina	0.75	6.88	51.84	40.52	**0.96**	3,312	2.83
Ulmus parvifolia	0.13	8.95	50.18	40.75	**0.96**	3,129	2.67
Prosopis chilensis	0.00	5.31	34.07	60.62	**1.04**	3,050	2.61
Prosopis glandulosa	0.00	4.90	39.34	55.76	**1.02**	2,387	2.04
Acacia farnesiana	0.09	2.85	40.36	56.70	**1.03**	2,210	1.89
Prosopis alba	0.21	1.48	47.27	51.03	**1.02**	1,887	1.61
Morus alba	0.00	7.66	53.73	38.61	**0.95**	1,528	1.31
Rhus lancea	0.07	4.70	53.78	41.45	**0.97**	1,467	1.25
Parkinsonia florida	0.14	4.37	55.41	40.08	**0.97**	1,442	1.23
Washingtonia filifera	0.00	0.25	11.73	88.02	**1.15**	1,194	1.02
Other Species	0.00	0.25	11.73	88.02	**0.99**	20,021	17.10
AOI total	**0.15**	**5.97**	**43.27**	**50.62**	**1.00**	**117,059**	**100%**

The RPI value can also help to identify underused species that are demonstrating good performance. Trees with an RPI value greater than 1.00 and an established age distribution may be indicating their suitability in the local environment and should receive consideration for additional planting (Table 10). When considering new species, it helps to base the decision on established populations. The greater number of trees of a particular species, the more relevant the RPI becomes. The following species appear to be performing well and should be considered for future tree plantings.

Table 10. Tree Species Which May be Underused, Based on RPI

Species	RPI	# of Trees	% of Pop.
Pistacia X atlantica	**1.18**	88	0.09
Brachychiton populneus	**1.12**	108	0.11
Prosopis juliflora	**1.10**	58	0.06
Olea europaea 'Swan Hill'	**1.08**	347	0.37
Pinus roxburghii	**1.07**	288	0.30
Cupressus sempervirens	**1.07**	174	0.18
Eucalyptus microtheca	**1.07**	122	0.13
Acacia stenophylla	**1.06**	3,559	3.74
Quercus shumardii	**1.06**	117	0.12
Platanus racemosa	**1.03**	72	0.08
Fraxinus uhdei	**1.02**	166	0.17
Pinus halepensis	**1.01**	2,982	3.14
Parkinsonia microphylla	**1.01**	83	0.09
Platycladus orientalis	**1.01**	78	0.08

Replacement Value

Replacement of the AOI's inventoried trees would cost more than $276 million.

The community forest is a public asset that, 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. Replacement value is also a way of describing the value of a tree population (and/or average value per tree) at a given time. The replacement value reflects 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 the 117,059 inventoried trees within the AOI with trees of similar size, species, and condition would cost over $276 million (Table 11 and Table 12). The average replacement value per tree is $2,358.

Pinus eldarica (Mondale pine) account for 24% of the total replacement value and 14% of the population, while *Pinus halepensis* (Aleppo pine) account for 14% of the replacement value but just 3% of the population, meaning the average *Pinus halepensis* has a higher value. The high value of each of these species reinforces their importance to the urban forest within the AOI. Many of the highest valued species are large and medium-stature trees with large canopies and are therefore likely to have high importance values as well.

The inventoried public trees within the AOI represent a vital component of the regions infrastructure and are a public asset valued at over $276 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 these trees is very important. Annual benefits are examined in Chapter 3.

Table 11. Replacement Value of the Most Prevalent Species Across the AOI ($)

Species	DBH Class (in)							Total	% of Total $
	0-3	3-7	7-13	13-19	19-25	25-31	24+		
Pinus eldarica	161,269	4,430,465	28,903,645	25,406,834	7,316,357	1,028,787	353,983	**67,601,341**	24.49
Pinus halepensis	10,878	324,443	5,761,886	18,759,235	10,216,679	2,593,270	1,148,051	**38,814,442**	14.06
Fraxinus velutina 'Fan-Tex'	602,473	4,302,247	7,389,848	2,634,665	252,684	79,058	0	**15,260,975**	5.53
Fraxinus velutina	181,083	1,432,751	4,411,469	3,074,322	784,481	336,191	365,096	**10,585,392**	3.84
Pistacia chinensis	248,088	3,804,053	5,039,568	916,224	0	0	0	**10,007,933**	3.63
Quercus virginiana	197,441	3,161,549	5,246,900	1,102,044	65,176	0	0	**9,773,110**	3.54
Chiltalpa tashkentensis	137,274	2,691,491	6,098,009	374,721	24,493	0	0	**9,325,987**	3.38
Morus alba	9,326	35,628	450,716	3,149,907	2,739,690	1,612,771	1,266,842	**9,264,881**	3.36
Acacia stenophylla	357,472	3,080,103	3,943,541	1,120,622	138,300	0	0	**8,640,037**	3.13
Prosopis velutina	328,039	1,583,983	4,337,217	1,843,279	295,957	0	0	**8,388,475**	3.04
Ulmus parvifolia	196,176	1,991,765	2,255,698	857,990	46,100	0	0	**5,347,729**	1.94
Fraxinus angustifolia	128,733	1,831,422	2,332,084	907,105	38,699	0	0	**5,238,044**	1.90
Parkinsonia x 'Desert Museum'	582,421	2,155,484	2,185,280	164,617	24,493	0	0	**5,112,295**	1.85
Chilopsis linearis	893,814	2,040,543	1,530,904	289,656	0	0	0	**4,754,917**	1.72
Prosopis chilensis	298,250	981,324	1,628,059	1,024,659	199,187	132,377	0	**4,263,856**	1.54
Prosopis glandulosa	322,400	1,148,618	2,154,074	340,064	0	0	0	**3,965,156**	1.44
Parkinsonia florida	102,257	922,511	2,102,777	689,876	24,493	0	0	**3,841,913**	1.39
Pinus pinea	1,651	56,028	1,401,404	1,605,353	314,751	149,068	79,906	**3,608,161**	1.31
Acacia farnesiana	348,439	935,765	1,149,068	709,370	132,671	0	0	**3,275,312**	1.19
Olea europaea	70,038	651,026	1,443,174	612,982	191,862	39,621	0	**3,008,703**	1.09
Phoenix dactylifera	133	2,174	73,945	1,579,981	1,113,337	14,828	3,601	**2,787,999**	1.01
Other Species	2,573,254	8,698,945	14,943,845	9,568,518	4,641,718	1,659,118	1,048,104	**43,133,503**	15.63
AOI Total	**$7,750,909**	**$46,262,317**	**$104,783,111**	**$76,732,023**	**$28,561,128**	**$7,645,088**	**$4,265,584**	**$276,000,160**	**100%**

Table 12. Replacement Value of Inventoried Trees by Entity

Species	DBH Class (in)							Total	% of Total $	% of All Trees	# of Trees	Average Value per Tree ($)
	0-3	3-7	7-13	13-19	19-25	25-31	24+					
Boulder City	62,227	567,042	1,669,078	1,392,493	792,916	381,273	152,351	**5,017,380**	1.82	1.17	1,375	**3,649**
Clark County	1,316,613	9,292,321	25,519,717	15,297,511	5,632,021	1,584,507	734,698	**59,377,386**	21.51	20.97	24,549	**2,419**
Clark County Schools	1,280,666	15,346,866	27,926,260	16,880,320	6,046,958	2,330,935	1,952,404	**71,764,408**	26.00	26.04	30,486	**2,354**
Las Vegas	1,585,029	8,689,331	18,085,500	13,547,387	2,979,770	601,608	355,874	**45,844,500**	16.61	19.42	22,731	**2,017**
Mesquite	68,707	521,163	1,688,006	1,258,016	101,742	0	0	**3,637,635**	1.32	1.52	1,779	**2,045**
North Las Vegas	755,340	3,893,113	8,777,134	8,492,530	4,133,404	1,180,178	252,010	**27,483,708**	9.96	9.32	10,910	**2,519**
UNLV	268,098	1,117,087	2,336,447	4,254,931	3,876,956	793,567	501,652	**13,148,738**	4.76	2.75	3,220	**4,083**
Henderson	2,414,230	6,835,395	18,780,968	15,608,836	4,997,360	773,021	316,595	**49,726,404**	18.02	18.80	22,005	**2,260**
AOI total	**$7,750,909**	**$46,262,317**	**$104,783,111**	**$76,732,023**	**$28,561,128**	**$7,645,088**	**$4,265,584**	**$276,000,160**	**100%**	**100%**	**117,059**	**$2,358**

Chapter 3: Urban Forest Resource Benefits

Trees are important to the communities within the AOI. Environmentally, they help conserve and reduce energy use, reduce 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 cost of management? In other words, are trees a good investment? To answer this question, the benefits must be quantified in financial terms.

The i-Tree *Streets* analysis model allows benefits to be quantified based on regional reference cities and local community attributes, such as median home values and local energy prices. This analysis provides a snapshot of the annual benefits (along with the value of those benefits) produced by the inventoried urban forest across the AOI. While the annual benefits produced by the urban forest can be substantial, it is important to recognize that the greatest benefits from the urban forest are derived from the benefit stream that results over time, from a mature forest where trees are well managed, healthy, and long-lived.

This analysis used the current inventory data of all trees within the AOI and i-Tree's *Streets* model to assess and quantify the beneficial functions of this inventoried tree resource and to place a dollar value on the annual environmental benefits these trees provide. The benefits calculated by i-Tree *Streets* are estimations 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 of the methods used to calculate and assign a monetary value to these benefits is included 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).

The *heat island effect* describes the increase in urban temperatures in relation to surrounding suburban and rural areas. Heat islands are associated with an increase in 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.

Trees reduce conductive heat loss from buildings by reducing air movement into buildings and against conductive surfaces (e.g., glass, metal siding). Trees can reduce wind speed and the resulting air infiltration by up to 50%, translating into potential annual heating savings of 25% (Heisler, 1986).

Energy Benefits by Species

Electricity and natural gas saved annually in Clark County from both the shading and climate effects of inventoried trees is equal to 5,988 MWh (valued at $401,797) and 42,151 therms ($27,208), for a total retail savings of approximately $429,005 and an average of $3.66 per tree (Table 10). *Morus alba* (white mulberry) which represents 1.3% of the population is providing the largest pre-tree benefit ($12.46). While the population of *Pinus eldarica* (Mondale pine) is providing 18% of the energy benefits while representing 14% of the population.

Chilopsis linearis, (desert willow) is the fourth most common species but while it represents 5% of the population, it contributes just 1.1% of the energy benefits, due to its smaller stature. This population never matures with a substantial canopy, consequently its contribution to energy savings will not increase substantially as they age.

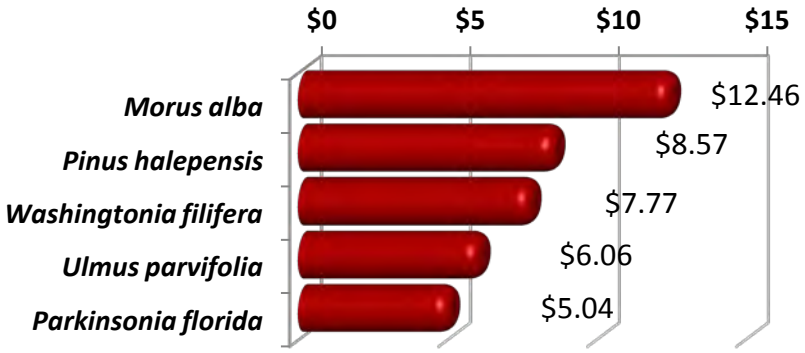


Figure 9. Annual Electricity and Natural Gas Benefits - Top 5 Species

Table 10. Annual Energy Benefits from Clark County's Inventoried Public Trees

Species	Total Electricity (MWh)	Electricity ($)	Total Natural Gas (Therms)	Natural Gas ($)	Total ($)	% of Pop.	% of Total $	Avg. $/tree
Pinus eldarica	1,100	73,828	6,881	4,442	78,269	14.26	18.24	**4.69**
Fraxinus velutina 'Fan-Tex'	575	38,597	4,181	2,699	41,296	8.69	9.63	**4.06**
Chilopsis linearis	89	5,966	750	484	6,450	5.03	1.50	**1.09**
Fraxinus velutina	338	22,709	2,450	1,582	24,291	4.56	5.66	**4.55**
Vitex agnus-castus	74	4,934	651	420	5,354	4.11	1.25	**1.11**
Acacia stenophylla	154	10,337	1,187	766	11,103	4.02	2.59	**2.36**
Quercus virginiana	220	14,777	1,553	1,002	15,779	3.88	3.68	**3.48**
Parkinsonia x 'Desert Museum'	101	6,807	838	541	7,348	3.66	1.71	**1.72**
Pistacia chinensis	189	12,661	1,409	910	13,571	3.56	3.16	**3.25**
Chiltalpa tashkentensis	168	11,269	1,295	836	12,104	3.27	2.82	**3.16**
Washingtonia robusta	59	3,949	495	320	4,268	3.25	0.99	**1.12**
Fraxinus angustifolia	217	14,541	1,593	1,028	15,570	3.10	3.63	**4.30**
Pinus halepensis	431	28,931	2,645	1,707	30,639	3.05	7.14	**8.57**
Prosopis velutina	176	11,801	1,261	814	12,615	2.83	2.94	**3.81**
Ulmus parvifolia	266	17,823	1,775	1,146	18,968	2.67	4.42	**6.06**
Prosopis chilensis	151	10,165	1,088	702	10,867	2.61	2.53	**3.56**
Prosopis glandulosa	95	6,357	702	453	6,811	2.04	1.59	**2.85**
Acacia farnesiana	54	3,606	440	284	3,889	1.89	0.91	**1.76**
Prosopis alba	38	2,545	257	166	2,711	1.61	0.63	**1.44**
Morus alba	266	17,828	1,869	1,206	19,035	1.31	4.44	**12.46**
Rhus lancea	46	3,093	356	230	3,322	1.25	0.77	**2.26**
Parkinsonia florida	101	6,806	713	460	7,266	1.23	1.69	**5.04**
Washingtonia filifera	129	8,631	1,001	646	9,278	1.02	2.16	**7.77**
Other Species	951	63,836	6,761	4,364	68,200	17.10	15.90	**3.41**
Total	**5,988**	**401,797**	**42,151**	**27,208**	**429,005**	**100%**	**100%**	**3.66**

Community Comparison of Energy Benefits

Communities across Clark County are receiving different benefits from their tree populations. Table 11 shows that Boulder City receives the highest per-tree benefit, with an average value of $5.37, while Henderson receives the lowest ($3.22). This is primarily due to tree species and age, and will shift over time as populations age and new species are added to the planting palette. Emphasizing large to medium stature evergreen broadleaf trees can increase a community's energy benefits.

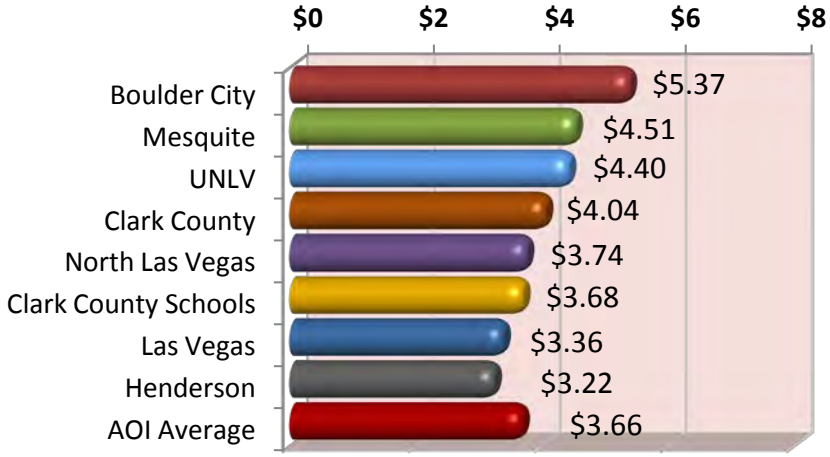


Figure 10. Community Comparison of Average Energy Benefit per Tree

Table 11. Energy Benefit Community Comparison

Entity	Total Electricity (MWh)	Electricity ($)	Total Natural Gas (Therms)	Natural Gas ($)	Total ($)	% of Pop.	% of Total $	Avg. $/Tree
Boulder City	103.3	6,932	693.1	447	7,379	1.17	1.72	5.37
Mesquite	111.9	7,510	797.3	515	8,025	1.52	1.87	4.51
UNLV	198.2	13,302	1,356.0	875	14,178	2.75	3.30	4.40
Clark County	1,384.4	92,892	9,685.7	6,252	99,144	20.97	23.11	4.04
North Las Vegas	569.4	38,204	3,963.1	2,558	40,762	9.32	9.50	3.74
Clark County Schools	1,563.7	104,927	11,146.6	7,195	112,123	26.04	26.14	3.68
Las Vegas	1,067.4	71,621	7,536.1	4,865	76,486	19.42	17.83	3.36
Henderson	989.7	66,408	6,972.8	4,501	70,909	18.80	16.53	3.22
AOI Total	**5,988**	**$401,797**	**42,151**	**$27,208**	**$429,005**	**100%**	**100%**	**$3.66**

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, 2007).

The idea that carbon credits are a commodity that can be exchanged for financial gain is based on the growth of emerging carbon markets. The Center for Urban Forest Research 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 United States.

While the urban forest resource within the AOI may or may not qualify for carbon-offset credits or be traded in the open market, the county's inventoried 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:

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

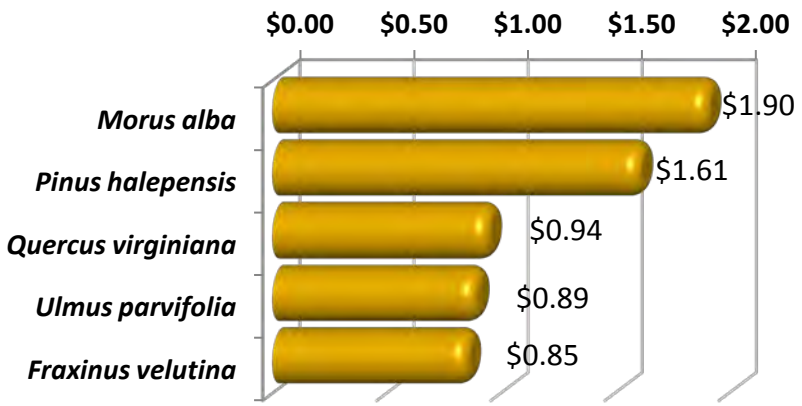
At the same time, vehicles and other combustion engines used to plant and care for trees release CO_2 during operation. Additionally, when a tree dies, most of the CO_2 that accumulated as woody biomass is released back into the atmosphere during decomposition, except in cases where the wood is recycled.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

Sequestered Carbon Dioxide

To date, the inventoried urban forest across the AOI has sequestered a total of 21,450 tons of carbon dioxide (CO_2) valued at $321,746[1]. Annually, this tree resource directly sequesters 2,218 tons of CO_2, valued at $33,275, into woody and foliar biomass. Accounting for estimated CO_2 emissions from tree decomposition (-172 tons), tree related maintenance activity (-29 tons), and avoided CO_2 (2,992 tons), Clark County's inventoried trees provide an annual net reduction in atmospheric CO_2 of 5,010 tons, valued at $75,148, an average of $0.64 per tree annually.

Morus alba (white mulberry, $1.90) and *Pinus halepensis* (Aleppo pine, $1.61) are currently providing the highest per tree benefits (Figure 11). *Pinus eldarica* (Mondale pine) are providing the greatest percentage of overall benefits at 16.1% due to their large stature and relative age distribution as well as their prevalence in the population (14%).

Figure 11. Annual Reduction of CO_2 - Top Five species



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

Table 15. Annual CO_2 Reduction Benefits Provided by the Inventoried Public Trees Across the AOI

Species	Sequestered (lb)	Sequestered ($)	Decomposition Release(lb)	Maintenance Release (lb)	Total Release ($)	Avoided (lb)	Avoided ($)	Net Total (lb)	Total ($)	% of Pop.	% of Total $	Avg. $/tree
Pinus eldarica	590,059	4,425	-64,988	-12,305	-92.3	1,099,702	8,248	1,612,468	12,094	14.26	16.09	0.72
Fraxinus velutina 'Fan-Tex'	369,799	2,773	-16,134	-4,217	-31.6	574,922	4,312	924,371	6,933	8.69	9.23	0.68
Chilopsis linearis	43,709	328	-248	-1,384	-10.4	88,863	666	130,939	982	5.03	1.31	0.17
Fraxinus velutina	290,416	2,178	-19,025	-2,949	-22.1	338,264	2,537	606,706	4,550	4.56	6.06	0.85
Vitex agnus-castus	74,690	560	-2,613	-872	-6.5	73,492	551	144,697	1,085	4.11	1.44	0.23
Acacia stenophylla	58,294	437	-3,181	-1,815	-13.6	153,973	1,155	207,271	1,555	4.02	2.07	0.33
Quercus virginiana	369,323	2,770	-16,691	-2,005	-15.0	220,109	1,651	570,736	4,281	3.88	5.70	0.94
Parkinsonia x 'Desert Museum'	114,176	856	-5,765	-1,149	-8.6	101,399	760	208,660	1,565	3.66	2.08	0.37
Pistacia chinensis	86,909	652	-5,051	-1,707	-12.8	188,600	1,414	268,750	2,016	3.56	2.68	0.48
Chiltalpa tashkentensis	207,286	1,555	-13,582	-1,804	-13.5	167,853	1,259	359,753	2,698	3.27	3.59	0.70
Washingtonia robusta	91,955	690	-21,258	-3,741	-28.1	58,816	441	125,772	943	3.25	1.26	0.25
Fraxinus angustifolia	139,284	1,045	-5,728	-1,587	-11.9	216,597	1,624	348,567	2,614	3.10	3.48	0.72
Pinus halepensis	371,517	2,786	-33,038	-3,936	-29.5	430,949	3,232	765,492	5,741	3.05	7.64	1.61
Prosopis velutina	113,359	850	-5,330	-1,292	-9.7	175,784	1,318	282,521	2,119	2.83	2.82	0.64
Ulmus parvifolia	112,465	843	-6,015	-1,214	-9.1	265,480	1,991	370,716	2,780	2.67	3.70	0.89
Prosopis chilensis	98,872	742	-4,875	-1,138	-8.5	151,414	1,136	244,274	1,832	2.61	2.44	0.60
Prosopis glandulosa	63,762	478	-2,418	-759	-5.7	94,694	710	155,279	1,165	2.04	1.55	0.49
Acacia farnesiana	60,757	456	-3,683	-605	-4.5	53,708	403	110,178	826	1.89	1.10	0.37
Prosopis alba	37,566	282	-4,268	-699	-5.2	37,915	284	70,514	529	1.61	0.70	0.28
Morus alba	156,752	1,176	-32,187	-2,029	-15.2	265,560	1,992	388,096	2,911	1.31	3.87	1.90
Rhus lancea	17,328	130	-937	-547	-4.1	46,066	345	61,911	464	1.25	0.62	0.32
Parkinsonia florida	55,334	415	-2,612	-624	-4.7	101,379	760	153,475	1,151	1.23	1.53	0.80
Washingtonia filifera	151	1	-4,927	-837	-6.3	128,571	964	122,957	922	1.02	1.23	0.77
Other species	912,928	6,847	-68,641	-9,554	-71.7	950,873	7,132	1,785,606	13,392	17.10	17.82	0.67
AOI Total	**4,436,691**	**$33,275**	**-343196**	**-$58,769**	**-$441**	**5,984,984**	**$44,887**	**10,019,711**	**$75,148**	**100%**	**100%**	**$0.64**

Comparison of Carbon Benefits

Boulder City and UNLV have the greatest population of large-stature and older trees and are receiving the highest per-tree carbon benefit ($0.93 and $0.79). Henderson has a large population of young trees (46% in the 0-3" DBH class), and the lowest per-tree carbon benefits ($0.57/tree). These trees may mature and provide greater benefits in the future. Annual carbon benefits include sequestered and avoided carbon, which is offset by carbon release in maintenance and decomposition. Annual carbon benefits do not take into account the accumulated biomass of the tree. These values reflect the net carbon benefits of one year of growth (Figure 12).

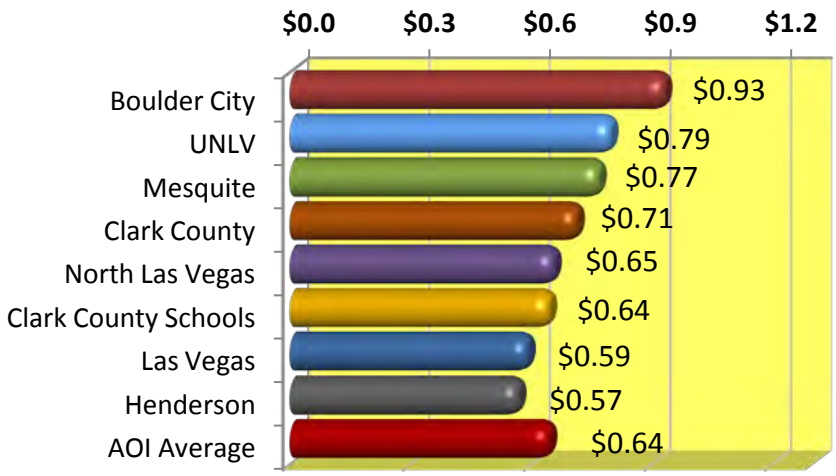


Figure 12. Comparison of Average Carbon Benefit per Tree

Table 16. Carbon Benefit Comparison

Entity	Sequestered (lb)	Sequestered ($)	Decomposition Release(lb)	Maintenance Release (lb)	Total Release ($)	Avoided (lb)	Avoided ($)	Net Total (lb)	Total ($)	% of Pop.	% of Total $	Avg. $/tree
Las Vegas	783,478	5,876	-55,992	-10,677	-80.1	1,066,838	8,001	1,783,647	13,377	19.42	17.80	0.59
UNLV	160,634	1,205	-15,820	-1,855	-13.9	198,147	1,486	341,106	2,558	2.75	3.40	0.79
Clark County	1,033,131	7,748	-77,281	-13,179	-98.8	1,383,672	10,378	2,326,343	17,448	20.97	23.22	0.71
Clark County Schools	1,157,515	8,681	-95,989	-16,228	-121.7	1,562,951	11,722	2,608,249	19,562	26.04	26.03	0.64
Mesquite	77,045	578	-6,397	-1,052	-7.9	111,864	839	181,460	1,361	1.52	1.81	0.77
North Las Vegas	420,395	3,153	-33,680	-5,612	-42.1	569,070	4,268	950,173	7,126	9.32	9.48	0.65
Boulder City	75,128	563	-7,308	-885	-6.6	103,255	774	170,190	1,276	1.17	1.70	0.93
Henderson	729,365	5,470	-50,728	-9,280	-69.6	989,187	7,419	1,658,544	12,439	18.80	16.55	0.57
AOI Total	**4,436,691**	**$33,275**	**-343196**	**-$58,769**	**-$441**	**5,984,984**	**$44,887**	**10,019,711**	**$75,148**	**100%**	**100%**	**$0.64**

Air Quality Improvement

Urban trees improve air quality in five fundamental ways:

- Absorption of gaseous pollutants such as ozone (O_3), sulfur dioxide (SO_2) , 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

The Clark County Department of Air Quality (CCDAQ) measures air pollution and provides data on the number of days per year that federal pollution standards are exceeded.

PM_{10} is particulate matter in the air that measures less than 10 micrometers, smaller than the width of a single human hair. PM_{10} pollution can cause respiratory problems for local residents. CCDAQ reports that air quality in Clark County exceeded the state 8-hour PM_{10} standard of 150 µg/m^3 for only 1 day in 2012.

Ozone (O_3) is another air pollutant that is harmful to human health. Between 2003 and 2012, the Federal 8-hour standard (0.075 ppm) for ground level (O_3) was exceeded 91 days, an average of 9.1 days per year (Table 17) (CCDAQ, 2013).

In the absence of cooling effects provided by trees, higher temperatures contribute to ozone (O_3) formation. Additionally, short-term increases in ozone concentrations are statistically associated with increased tree mortality for 95 large US cities (Bell and others, 2004).

Table 17. Number of Days Exceeding Federal Ground-Level Ozone

Year	Ozone > Federal 2012 8-hour Standard
2012	19
2011	9
2010	1
2009	5
2008	10
2007	17
2006	8
2005	8
2004	4
2003	10
Average	**9.1**

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 isoprene's and monoterpenes, which contribute to ozone formation. i-Tree *Streets* analysis accounts for these BVOC emissions in the air quality net benefit.

Deposition and Interception

Each year, approximately 18,664 pounds of nitrogen dioxide (NO_2), small particulate matter (PM_{10}), sulfur dioxide (SO_2) and ozone (O_3) are intercepted or absorbed by the inventoried trees in Clark County, for a value of $97,357 (Table 18). As a population, *Pinus eldarica* (Mondale pine, 51,788 lbs.) is the greatest contributor to air quality improvements, accounting for approximately 25% of total benefits.

Avoided Pollutants

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, 20,459 pounds of pollutants, valued at $189,770, are avoided annually through the shading effects of the inventoried trees across the AOI.

BVOC Emissions

Biogenic volatile organic compound (BVOC) emissions from trees, which negatively affect air quality, must also be considered. Approximately 20,474 lbs of BVOCs are emitted annually from the inventoried trees within the AOI, offsetting the total air quality benefit by -$81,896. *Quercus virginiana* (Southern live oak) are the heaviest per tree emitters of BVOCs (2.5 lbs./tree), accounting for 22% of all BVOC emissions while comprising just 4% of the population. For this species, the benefits from interception, deposition, and avoidance of air pollutants (NO_2, PM_{10}, SO_2, and VOCs) are not enough to offset their BVOC emissions, and their net per tree benefits are negative (valued at -$2.58/tree).

Net Air Quality Improvement

The net value of air pollutants removed, avoided, and released by the inventoried public tree population within the AOI are valued at $205,230 annually. The average net benefit per tree is $1.75. Trees vary dramatically in their ability to produce net air quality benefits. 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, *Morus alba* (white mulberry, $6.89) produces the greatest per tree net air quality improvement (Figure 13). However, due to its high prevalence in the population, *Pinus eldarica* (Mondale pine) accounts for the greatest air quality improvements (25%) in terms of total benefits by species, collectively removing 26 tons of pollutants at a net value of $51,788 (Table 18).

Figure 13. Annual Improvement to Air Quality - Top Five Species

Table 18. Annual Air Quality Improvements Provided by the Inventoried Public Trees Across the AOI

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 Pop.	Avg. $/tree
Pinus eldarica	1,693.4	923.6	1,717.4	186.3	23,697	1,975.9	100.7	17.6	1,692	35,148	-1,764.3	-7,057	6,542.9	51,788	14.26	3.10
Fraxinus velutina 'Fan-Tex'	541.9	260.5	584.7	53.9	7,564	1,027.0	52.4	9.3	877.2	18,231	-957.2	-3,829	2,449.7	21,967	8.69	2.16
Chilopsis linearis	57.1	15.6	49.8	3.5	644	159.3	8.1	1.5	135.6	2,821	-634.7	-2,539	-204.3	926	5.03	0.16
Fraxinus velutina	349.9	135.4	322.5	28.1	4,317	606.8	31.0	5.5	518.0	10,768	0.0	0	1,997.2	15,085	4.56	2.82
Vitex agnus-castus	60.7	29.2	68.7	6.1	867	131.7	6.7	1.2	112.2	2,333	-260.1	-1,041	156.2	2,159	4.11	0.45
Acacia stenophylla	142.2	77.6	166.1	15.6	2,121	275.4	14.1	2.5	235.0	4,886	0.0	0	928.5	7,008	4.02	1.49
Quercus virginiana	156.7	85.5	196.5	17.3	2,419	395.1	20.2	3.6	337.8	7,019	-5,288.1	-21,152	-4,075.6	-11,715	3.88	-2.58
Parkinsonia x 'Desert Museum'	124.5	59.8	125.3	12.4	1,684	181.9	9.3	1.7	155.1	3,224	-387.1	-1,549	282.8	3,360	3.66	0.78
Pistacia chinensis	256.9	99.3	222.5	20.6	3,083	338.8	17.3	3.1	289.2	6,011	-2,028.1	-8,112	-780.4	982	3.56	0.24
Chiltalpa tashkentensis	281.3	135.3	263.9	28.0	3,689	301.3	15.4	2.7	257.2	5,347	-689.1	-2,756	596.0	6,279	3.27	1.64
Washingtonia robusta	165.3	90.1	155.6	18.2	2,241	105.6	5.4	1.0	90.0	1,872	-1,142.7	-4,571	-511.5	-458	3.25	-0.12
Fraxinus angustifolia	190.5	91.5	209.7	19.0	2,684	387.0	19.8	3.5	330.5	6,870	-352.7	-1,411	898.8	8,143	3.10	2.25
Pinus halepensis	351.5	191.7	424.9	38.7	5,329	761.6	38.8	6.8	652.3	13,547	-1,207.6	-4,831	1,258.5	14,046	3.05	3.93
Prosopis velutina	181.2	87.1	190.7	18.0	2,501	313.7	16.0	2.8	268.0	5,570	-301.8	-1,207	775.8	6,863	2.83	2.07
Ulmus parvifolia	257.0	99.4	242.4	20.6	3,203	474.2	24.2	4.3	405.4	8,424	0.0	0	1,527.4	11,627	2.67	3.72
Prosopis chilensis	165.1	79.4	171.4	16.4	2,264	269.9	13.8	2.4	230.5	4,791	-268.5	-1,074	680.4	5,981	2.61	1.96
Prosopis glandulosa	80.3	38.6	89.4	8.0	1,138	169.4	8.6	1.5	144.6	3,006	-158.9	-636	381.6	3,508	2.04	1.47
Acacia farnesiana	76.4	36.7	74.5	7.6	1,019	97.0	5.0	0.9	82.7	1,720	-213.2	-853	167.6	1,886	1.89	0.85
Prosopis alba	41.4	22.6	45.2	4.6	599	68.2	3.5	0.6	58.4	1,213	-206.4	-825	38.1	987	1.61	0.52
Morus alba	550.2	150.2	359.1	33.4	5,481	463.2	23.6	4.2	395.6	8,222	-794.9	-3,180	1,184.5	10,523	1.31	6.89
Rhus lancea	41.6	22.7	48.9	4.6	622	82.4	4.2	0.7	70.3	1,462	0.0	0	275.5	2,085	1.25	1.42
Parkinsonia florida	127.3	61.2	127.8	12.6	1,719	180.9	9.2	1.6	154.6	3,213	-262.3	-1,049	413.0	3,883	1.23	2.69
Washingtonia filifera	21.0	11.5	19.6	2.3	284	225.2	11.5	2.0	192.0	3,992	-370.7	-1,483	114.4	2,793	1.02	2.34
Prosopis torreyana	55.9	26.9	53.3	5.6	739	64.5	3.3	0.6	55.0	1,143	-145.1	-580	120.0	1,302	0.97	1.14
Olea europaea	28.6	15.6	32.0	3.1	418	47.4	2.4	0.4	40.4	840	-21.6	-86	148.4	1,172	0.87	1.15
Sophora secundiflora	1.6	0.9	3.6	0.2	34	12.8	0.7	0.1	10.9	228	0.0	0	30.8	262	0.79	0.29
Gleditsia triacanthos	46.7	20.4	46.3	4.0	609	83.8	4.3	0.8	71.6	1,488	0.0	0	277.8	2,097	0.78	2.30
Phoenix dactylifera	103.9	56.6	97.5	11.4	1,407	57.5	2.9	0.5	48.9	1,018	-671.1	-2,684	-291.8	-260	0.72	-0.31
Quercus ilex	13.8	7.5	17.6	1.5	215	41.0	2.1	0.4	35.1	729	-252.0	-1,008	-133.0	-64	0.65	-0.08
Chamaerops humilis	5.1	2.8	5.2	0.6	71	6.0	0.3	0.1	5.1	107	-70.5	-282	-45.3	-104	0.59	-0.15
Parkinsonia aculeata	39.1	18.8	39.6	3.9	530	57.7	2.9	0.5	49.2	1,024	-331.2	-1,325	-119.4	229	0.53	0.37
Other species	1,068.6	505.1	1,027.0	101.5	14,050	1,312.9	67.0	11.8	1,122.0	23,317	-1,669.4	-6,678	3,546.5	30,689	10.60	1.53
AOI Total	**7,285**	**3,463**	**7,207**	**708**	**$97,357**	**10,685**	**545.2**	**96.2**	**9,132**	**$189,770**	**-20,474**	**-$81,896**	**18,648**	**$205,230**	**100%**	**$1.75**

Comparison of Air Quality Benefits

Boulder City is receiving the greatest per-tree air quality benefit ($3.11). Clark County Schools have a low average per-tree air quality benefit ($1.60), due in part to a large number of prevalent species emitting relatively high BVOCs including *Quercus virginiana* (Southern live oak, 6.7% of population), *Pistacia chinensis* (Chinese pistache, 5.3%), and *Washingtonia robusta* (Mexican fan palm, 4.8%). Henderson has the lowest per tree air quality benefit ($1.39) due in part to the prevalence of very young trees with low leaf surface area. This may improve as the trees mature.

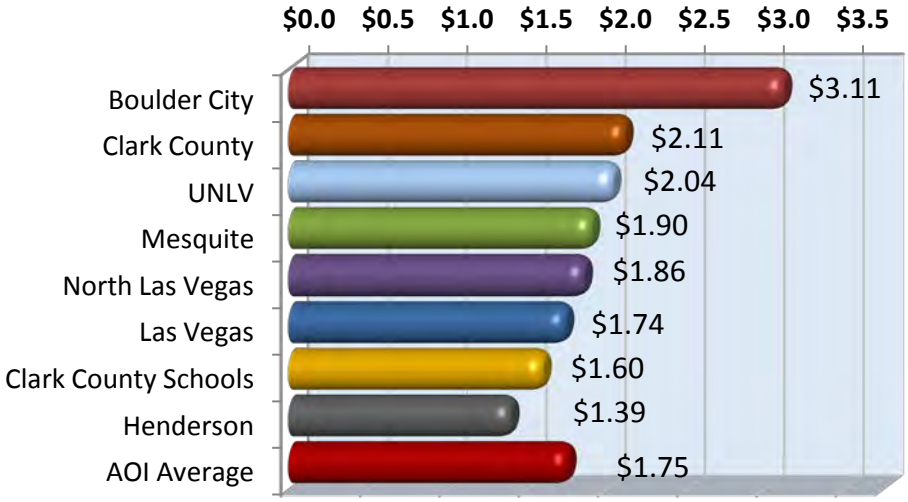


Figure 14. Comparison of Average per Tree Air Quality Benefits

Table 19. Comparison of Air Quality Benefits for Entities within the AOI

Entity	Total Deposition (lb)	Total Avoided (lb)	BVOC Emissions (lb)	Total (lb)	Total Deposition ($)	Total Avoided ($)	BVOC Emissions ($)	Total ($)	% of Pop.	Avg. $/tree
Las Vegas	3,377	3,653	-3,003	**4,027**	17,651	33,885	-12,012	**39,524**	19.42	1.74
UNLV	733	671	-870	**534**	3,816	6,222	-3,480	**6,557**	2.75	2.04
Clark County	4,331	4,734	-3,657	**5,408**	22,598	43,914	-14,629	**51,883**	20.97	2.11
Clark County Schools	4,755	5,344	-6,415	**3,684**	24,766	49,567	-25,662	**48,672**	26.04	1.60
Mesquite	285	383	-410	**258**	1,478	3,550	-1,640	**3,387**	1.52	1.90
North Las Vegas	1,729	1,941	-1,696	**1,974**	9,032	18,006	-6,784	**20,255**	9.32	1.86
Boulder City	360	352	-210	**501**	1,860	3,263	-841	**4,283**	1.17	3.11
Henderson	3,093	3,381	-4,212	**2,262**	16,156	31,362	-16,848	**30,670**	18.80	1.39
AOI Total	**18,664**	**20,459**	**-20,474**	**18,648**	**$97,357**	**$189,770**	**-$81,896**	**$205,230**	100%	**$1.75**

Stormwater Runoff Reductions

Rainfall interception by trees reduces 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. Healthy urban trees 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 bare soil.

The inventoried trees within the AOI intercept 38.3 million gallons of stormwater annually for an average of 327 gallons per tree (Table 20). The value of this benefit is $183,789, an average of $1.57 per tree. Among the 23 most common species, *Pinus halepensis* (Aleppo pine) are currently providing the greatest per tree benefit of $5.83 (Figure 15). *Pinus eldarica* (Mondale pine) provides the greatest benefits as a population, valued at $39,510 (22% of total benefits) although they represent just 14% of the population.

As trees grow, their stormwater benefits often improve, but some species will realize more substantial benefits than others will. Many of the tree species currently demonstrating very low benefits, including *Chilopsis linearis* (desert willow, $0.23/tree) and *Vitex agnus-castus* (chaste tree, $0.38) are small-stature trees. As such, their benefits will not increase much over time. However other species with currently low benefits, such as *Pistacia chinensis* (Chinese pistache, $0.95/tree), a young population of medium-stature trees, will realize increasing benefits as their canopies mature.

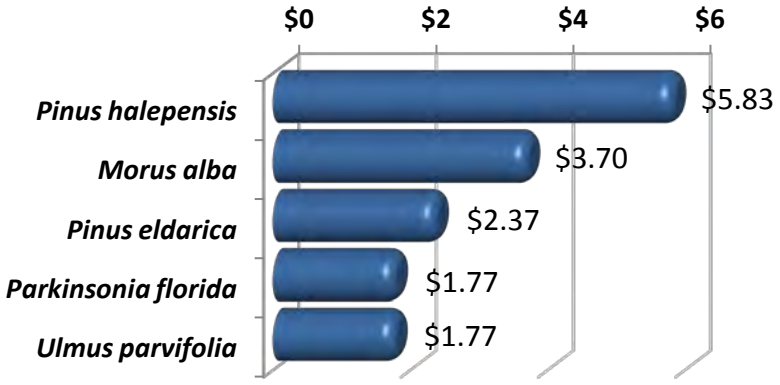


Figure 15. Annual Reduction in Stormwater Runoff - Top Five Species

Table 20. Annual Stormwater Runoff Reduction Benefits Provided by the Inventoried Public Trees Across the AOI

Species	Total Rainfall Interception (Gal)	Total ($)	% of Total Tree Numbers	% of Total $	Avg. $/tree
Pinus eldarica	8,231,176	39,510	14.26	21.50	**2.37**
Fraxinus velutina 'Fan-Tex'	3,408,957	16,363	8.69	8.90	**1.61**
Chilopsis linearis	281,136	1,349	5.03	0.73	**0.23**
Fraxinus velutina	1,626,300	7,806	4.56	4.25	**1.46**
Vitex agnus-castus	384,776	1,847	4.11	1.00	**0.38**
Acacia stenophylla	1,140,598	5,475	4.02	2.98	**1.16**
Quercus virginiana	1,478,325	7,096	3.88	3.86	**1.56**
Parkinsonia x 'Desert Museum'	540,098	2,592	3.66	1.41	**0.61**
Pistacia chinensis	822,128	3,946	3.56	2.15	**0.95**
Chiltalpa tashkentensis	911,596	4,376	3.27	2.38	**1.14**
Washingtonia robusta	520,442	2,498	3.25	1.36	**0.66**
Fraxinus angustifolia	1,271,535	6,103	3.10	3.32	**1.68**
Pinus halepensis	4,338,359	20,824	3.05	11.33	**5.83**
Prosopis velutina	1,058,155	5,079	2.83	2.76	**1.53**
Ulmus parvifolia	1,152,078	5,530	2.67	3.01	**1.77**
Prosopis chilensis	928,593	4,457	2.61	2.43	**1.46**
Prosopis glandulosa	563,390	2,704	2.04	1.47	**1.13**
Acacia farnesiana	291,596	1,400	1.89	0.76	**0.63**
Prosopis alba	337,522	1,620	1.61	0.88	**0.86**
Morus alba	1,177,570	5,652	1.31	3.08	**3.70**
Rhus lancea	341,864	1,641	1.25	0.89	**1.12**
Parkinsonia florida	532,252	2,555	1.23	1.39	**1.77**
Washingtonia filifera	83,456	401	1.02	0.22	**0.34**
Other Species	6,867,400	32,964	17.10	17.94	**1.65**
AOI Total	**38,289,302**	**$183,789**	**100%**	**100%**	**$1.57**

Comparison of Stormwater Benefits

Boulder City and UNLV receive the greatest per-tree stormwater benefits ($2.32 and $2.11 respectively). Mesquite receives low storm water benefits ($1.42) likely due to the prevalence of palms and other species with low leaf surface area. Henderson has the lowest stormwater benefit per tree ($1.38), but this may improve as the very young trees in the population mature.

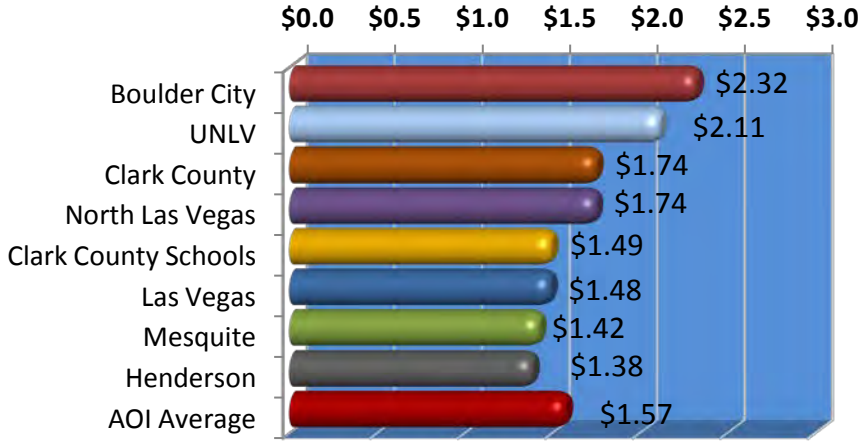


Figure 16. Comparison of Average per Tree Stormwater Benefits

Table 21. Comparison of Stormwater Benefits

Entity	Total rainfall interception(Gal)	Total ($)	% of Total Tree Numbers	% of Total $	Avg. $/tree
Las Vegas	7,024,584	33,718	19.42	18.35	**1.48**
UNLV	1,415,213	6,793	2.75	3.70	**2.11**
Clark County	8,924,322	42,837	20.97	23.31	**1.74**
Clark County Schools	9,447,504	45,348	26.04	24.67	**1.49**
Mesquite	525,734	2,524	1.52	1.37	**1.42**
North Las Vegas	3,960,647	19,011	9.32	10.34	**1.74**
Boulder City	664,109	3,188	1.17	1.73	**2.32**
Henderson	6,327,189	30,371	18.80	16.52	**1.38**
AOI Total	**38,289,302**	**$183,789**	**100%**	**100%**	**$1.57**

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. Research shows 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 are 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.

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 inventoried tree population, **aesthetic benefits reflect the increase in leaf area for each species population over the course of a single year.**

The total annual benefit associated with property value increases and other less tangible benefits is $2,992,257, an average of $25.56 per tree (Table 22). Tree species that produce the highest average per tree aesthetic benefits include *Pinus halepensis* (Aleppo pine, $66.88) and *Ulmus parvifolia* (Chinese elm, $44.01) (Figure 17).

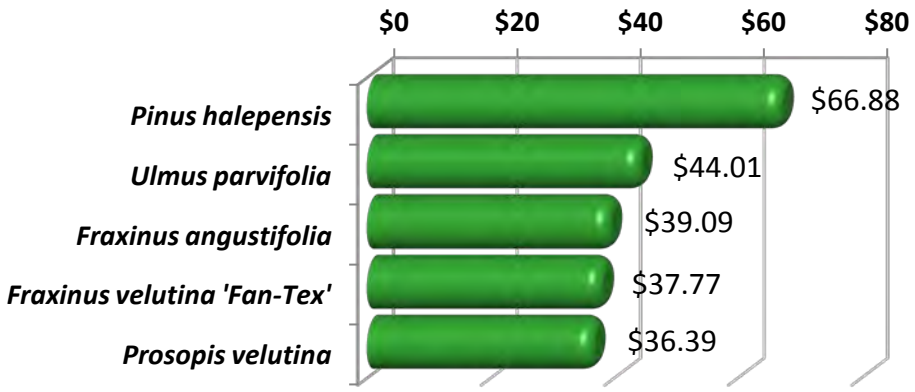


Figure 17. Annual Increase in Property and Socioeconomic Values - Top Five Species

Table 22. Annual Property Value, Aesthetic, and Socioeconomic Benefits of the Inventoried Public Trees Across the AOI

Species	Total ($)	% of Pop.	% of Total $	Avg. $/tree
Pinus eldarica	331,296	14.26	11.07	19.85
Fraxinus velutina 'Fan-Tex'	384,342	8.69	12.84	37.77
Chilopsis linearis	50,940	5.03	1.70	8.65
Fraxinus velutina	158,393	4.56	5.29	29.66
Vitex agnus-castus	47,018	4.11	1.57	9.78
Acacia stenophylla	84,974	4.02	2.84	18.07
Quercus virginiana	123,470	3.88	4.13	27.21
Parkinsonia x 'Desert Museum'	47,475	3.66	1.59	11.09
Pistacia chinensis	98,049	3.56	3.28	23.50
Chiltalpa tashkentensis	54,202	3.27	1.81	14.14
Washingtonia robusta	29,557	3.25	0.99	7.78
Fraxinus angustifolia	141,717	3.10	4.74	39.09
Pinus halepensis	239,014	3.05	7.99	66.88
Prosopis velutina	120,519	2.83	4.03	36.39
Ulmus parvifolia	137,721	2.67	4.60	44.01
Prosopis chilensis	108,074	2.61	3.61	35.43
Prosopis glandulosa	78,465	2.04	2.62	32.87
Acacia farnesiana	24,439	1.89	0.82	11.06
Prosopis alba	23,101	1.61	0.77	12.24
Morus alba	45,236	1.31	1.51	29.60
Rhus lancea	26,305	1.25	0.88	17.93
Parkinsonia florida	43,676	1.23	1.46	30.29
Washingtonia filifera	93	1.02	0.00	0.08
Other Species	594,180	17.10	19.86	29.68
AOI Total	**$2,992,257**	**100%**	**100%**	**$25.56**

Comparison of Aesthetic Benefits

Boulder City receives the highest per-tree aesthetic benefit ($34.85). Clark County Schools receives the lowest aesthetic benefit ($23.31) due in part to the large proportion of young trees. These trees are not yet established enough to provide substantial annual growth, which tends to correlate with annual increases in leaf surface area and greater aesthetic benefit.

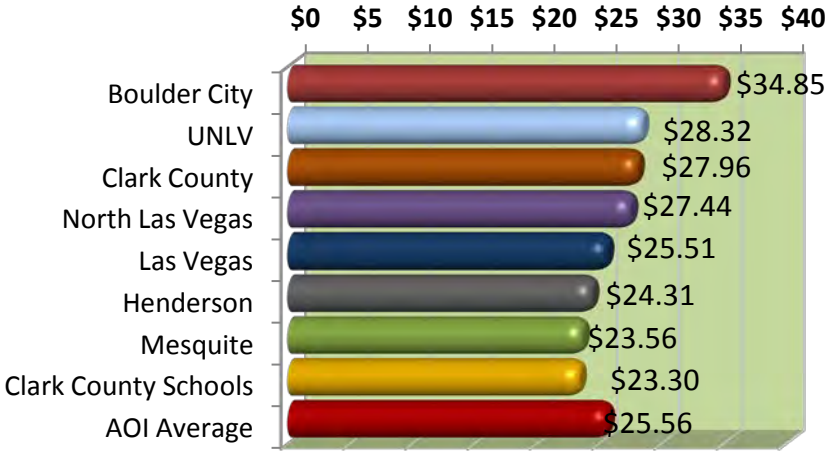


Figure 18. Comparison of Average Aesthetic Benefit per Tree

Table 23. Comparison of Aesthetic Benefits

Entity	Total ($)	% of Pop.	% of Total ($)	Avg $/tree
Las Vegas	579,858	19.42	19.38	25.51
UNLV	91,199	2.75	3.05	28.32
Clark County	686,582	20.97	22.95	27.96
Clark County Schools	710,457	26.04	23.74	23.30
Mesquite	41,907	1.52	1.40	23.56
North Las Vegas	299,349	9.32	10.00	27.44
Boulder City	47,921	1.17	1.60	34.85
Henderson	534,985	18.80	17.88	24.31
AOI Total	**$2,992,257**	**100%**	**100%**	**$25.56**

Benefit Summary

The public urban forest across the AOI provides substantial environmental and aesthetic benefits. Annual increases in property value, socioeconomic, and other aesthetic values are substantial benefits, account for 77% of the total benefits.

Approximately 23% ($893,172) of the total annual benefits quantified in this study are environmental services (Table 24). Energy savings ($429,005) account for 48% of the annual environmental benefits and 11% of all annual benefits. Air quality benefits ($205,230) account for 23% of annual environmental benefits and 5% of all annual benefits. Stormwater benefits ($183,789) account for 21% of the annual environmental benefits and 5% of all benefits. Carbon reduction benefits, valued at $75,148, account for 8% of environmental benefits and 2% of all benefits.

The estimated sum of benefits provided by the public tree resource within the AOI is $3.9 million, an average of $33.73 per tree and $1.97 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 tree 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 AOI, as well as variability in tree growth. In other words, **trees are worth far more than what one can ever quantify!**

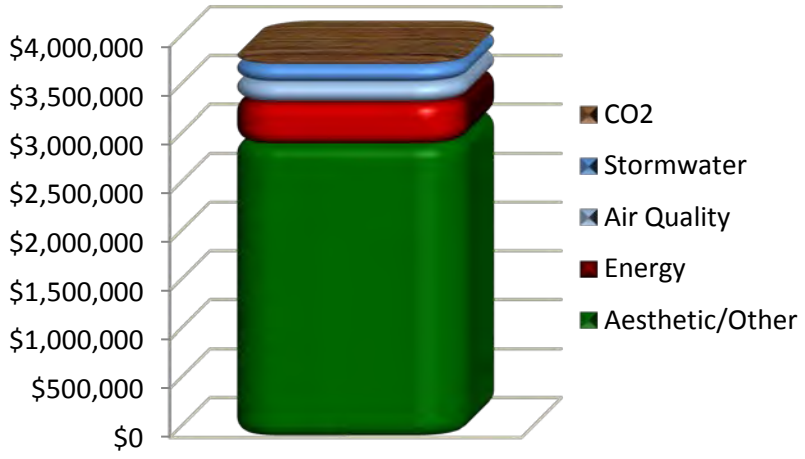


Figure 19. Benefit Summary for the Overall Tree Resource within the AOI

Total Annual Benefits: $3,885,428

Average Annual per Tree Benefits: $33.19 Annual Value of Benefits Per Capita: $1.97

Table 24. Annual Benefit Summary for the Inventoried Tree Resource Across the AOI

Benefits	Total ($)	$/tree	$/capita
Energy	429,005	3.66	0.22
CO2	75,148	0.64	0.04
Air Quality	205,230	1.75	0.10
Stormwater	183,789	1.57	0.09
Aesthetic/Other	2,992,257	25.56	1.52
Total Benefits	**$3,885,428**	**$33.19**	**$1.97**

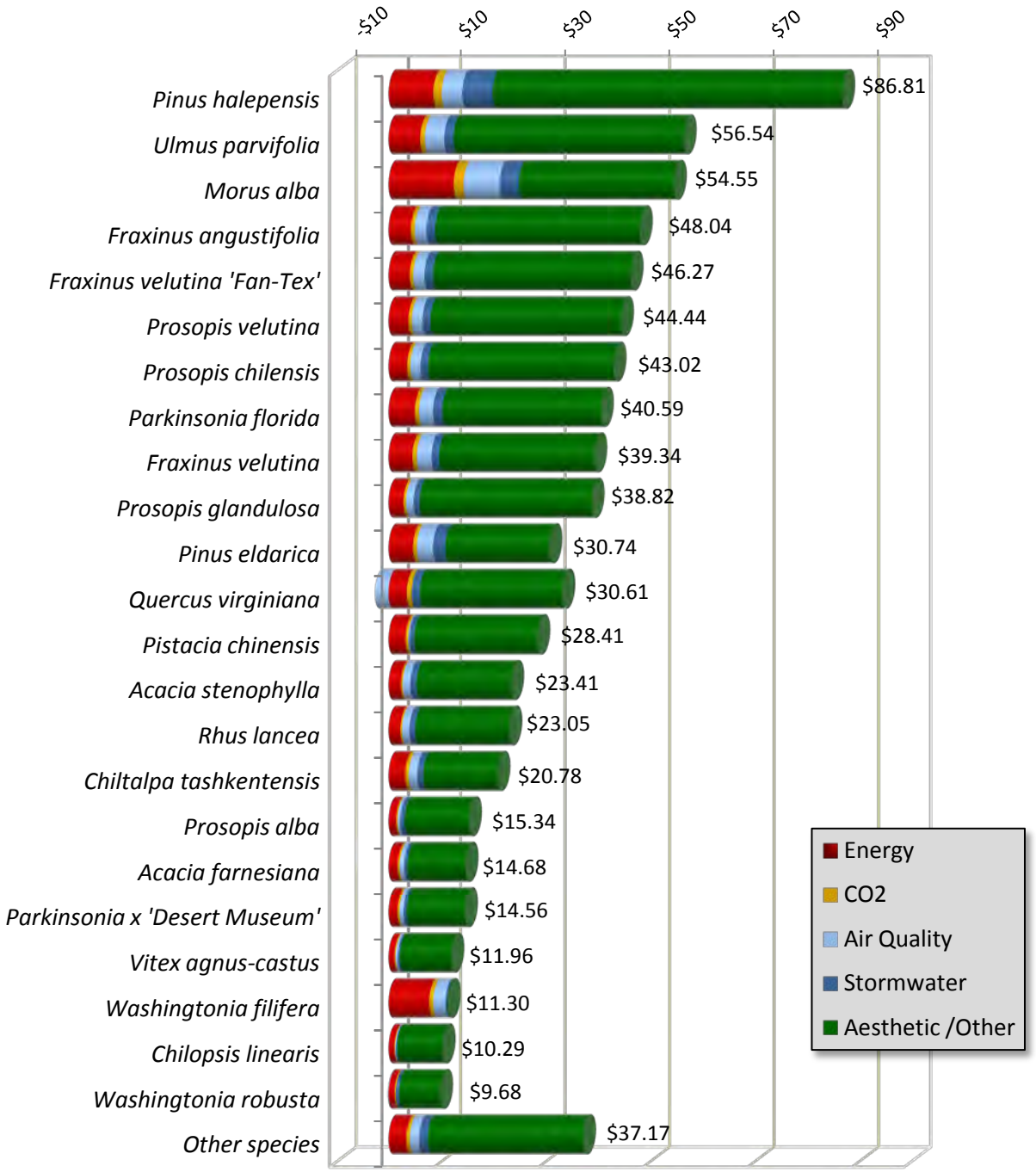


Figure 20. Summary of Annual per Tree Benefits from the Most Prevalent Species Across the AOI

Table 25. Summary of Current Annual Average per Tree Benefits ($/Tree/yr.)

Species	Energy	CO2	Air Quality	Stormwater	Aesthetic /Other	Total
Pinus eldarica	4.69	0.72	3.10	2.37	19.85	30.74
Fraxinus velutina 'Fan-Tex'	4.06	0.68	2.16	1.61	37.77	46.27
Chilopsis linearis	1.09	0.17	0.16	0.23	8.65	10.29
Fraxinus velutina	4.55	0.85	2.82	1.46	29.66	39.34
Vitex agnus-castus	1.11	0.23	0.45	0.38	9.78	11.96
Acacia stenophylla	2.36	0.33	1.49	1.16	18.07	23.41
Quercus virginiana	3.48	0.94	-2.58	1.56	27.21	30.61
Parkinsonia x 'Desert Museum'	1.72	0.37	0.78	0.61	11.09	14.56
Pistacia chinensis	3.25	0.48	0.24	0.95	23.50	28.41
Chiltalpa tashkentensis	3.16	0.70	1.64	1.14	14.14	20.78
Washingtonia robusta	1.12	0.25	-0.12	0.66	7.78	9.68
Fraxinus angustifolia	4.30	0.72	2.25	1.68	39.09	48.04
Pinus halepensis	8.57	1.61	3.93	5.83	66.88	86.81
Prosopis velutina	3.81	0.64	2.07	1.53	36.39	44.44
Ulmus parvifolia	6.06	0.89	3.72	1.77	44.01	56.45
Prosopis chilensis	3.56	0.60	1.96	1.46	35.43	43.02
Prosopis glandulosa	2.85	0.49	1.47	1.13	32.87	38.82
Acacia farnesiana	1.76	0.37	0.85	0.63	11.06	14.68
Prosopis alba	1.44	0.28	0.52	0.86	12.24	15.34
Morus alba	12.46	1.90	6.89	3.70	29.60	54.55
Rhus lancea	2.26	0.32	1.42	1.12	17.93	23.05
Parkinsonia florida	5.04	0.80	2.69	1.77	30.29	40.59
Washingtonia filifera	7.77	0.77	2.34	0.34	0.08	11.30
Other Species	3.41	0.67	1.77	1.65	29.68	37.17
AOI Total	**$3.66**	**$0.64**	**$1.75**	**$1.57**	**$25.56**	**$33.19**

Comparison of Benefit Summary

Because communities differ in their population structure and species composition, they receive benefits from the urban forest differently as well.

- Boulder City receives the greatest per-tree benefit in every benefit category, and thus the highest average total benefit ($46.59)
- Clark County Schools and Henderson are consistently receiving lower benefits, ranking in the lowest 4 positions for each benefit type.

Table 26. Comparison of Benefit Summary

Entity	Energy	CO2	Air Quality	Storm water	Aesthetic/Other	Total ($)	% of Total $
UNLV	14,178	2,558	6,557	6,793	91,199	**121,285**	3.12
Clark County	99,144	17,448	51,883	42,837	686,582	**897,893**	23.11
Clark County Schools	112,123	19,562	48,672	45,348	710,457	**936,161**	24.09
Mesquite	8,025	1,361	3,387	2,524	41,907	**57,203**	1.47
North Las Vegas	40,762	7,126	20,255	19,011	299,349	**386,503**	9.95
Boulder City	7,379	1,276	4,283	3,188	47,921	**64,047**	1.65
Henderson	70,909	12,439	30,670	30,371	534,985	**679,374**	17.49
AOI Total	**$429,005**	**$75,148**	**$205,230**	**$183,789**	**$2,992,257**	**$3,885,428**	**100%**

Conclusion

This analysis describes the current structural characteristics of the inventoried public tree resource within the AOI using established tree sampling, numerical modeling, and statistical methods to provide a general accounting of the benefits produced by this inventoried tree 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.

The inventoried public trees within the AOI are providing quantifiable benefits including energy savings, stormwater runoff reduction, reduction in atmospheric CO_2, and aesthetic benefits. The 117,059 inventoried trees across the AOI are providing $3.9 million in annual gross benefits. That is an average of $33 per tree and $1.97 per capita.

The urban forests inventoried in these communities are relatively young and in good condition with more than 262 differentspecies. It is critical to maintain an adequate level of resources to protect and nurture this resource. With adequate maintenance, the public trees within the AOI can be expected to provide even greater benefits in the future and for many generations to come. The region can focus resources on maximizing the flow of benefits from the current tree population and maintaining a forward-thinking approach. Based on the resource analysis, Davey Resource Group recommends the following:

- Continue annual tree planting efforts to stock the available planting sites identified by the inventory.
- Maintain an appropriate age distribution by continuing to plant new trees to improve long-term resource sustainability and greater canopy coverage. To maximize benefits, focus on large-stature trees where planting sites allow.
- Maximize the condition of the existing tree resource through continuing comprehensive tree maintenance and a cyclical pruning schedule.
- Implement a structural pruning program for young and establishing trees to promote healthy structure, extend life expectancy, and reduce future costs and liability.
- Maintain and update the inventory database.

Clark County’s trees are of vital importance to the environmental, social, and economic well-being of the community.

Urban forest managers can better anticipate future trends with an understanding of the current status of their tree population. Managers can also anticipate challenges and devise plans to 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 referenced in development of 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.

The trees within the AOI are of vital importance to the environmental, social, and economic well-being of the communities. The region has demonstrated that public trees are a valued community resource, a vital component of the urban infrastructure, and an important part of their history and identity. Each entity may use their inventory to take a proactive and forward-looking approach to caring for the community's trees in the future. Updates should be incorporated into the inventory as work is performed. Current and complete 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. With additional tree planting and proactive management, the regions urban forest can be expected to produce an even greater flow of benefits as this resource continues to mature. A commitment to planting, maintaining and preserving these trees, will help the region continue to be a healthy, safe, and enjoyable place to live.

Appendix A: Methods and Procedures

Certified arborists collected the inventories of public trees across the AOI, using ArcPad software to locate the sample plots on the ground and inputting tree 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 5.0.1; i-Tree v 5.0.6). 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 the trees across the AOI, 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 county's 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 (Clark County is located in the Southwest Desert Climate Zone).

An annual resource unit was determined on a per tree basis for each of the modeled benefits. 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, pounds of SO_2, pounds of O_3, 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.

Price values assigned to each resource unit (tree) were generated based on economic indicators of society's willingness to pay for the environmental benefits trees provide. Not all communities studied provided tree care costs, so a cost-benefit ratio cannot be determined.

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 27. Clark County Benefit Prices Used In This Analysis

Benefits	Price	Unit	Source
Electricity	**$0.0671**	$/Kwh	Residential rates from NV Energy
Natural Gas	**$0.6455**	$/Therm	Residential rates from NV Energy
CO_2	**$0.0075**	$/lb	*Streets* default – Southwest Desert
PM_{10}	**$6**	$/lb	*Streets* default – Southwest Desert
NO_2	**$4**	$/lb	*Streets* default – Southwest Desert
SO_2	**$15.70**	$/lb	*Streets* default – Southwest Desert
VOC	**$4**	$/lb	*Streets* default – Southwest Desert
Stormwater Interception	**$0.0048**	$/gallon	*Streets* default – Southwest Desert
Median Home Value	**$125,000**	$	City-data.com

i-Tree *Streets* default values (Table 27) from the Southwest Desert Climate Zone were used for all benefit prices except for median home values and electric and natural gas rates. Electric rates, natural gas rates were taken from area residential rates from NV Energy. Median home value for Clark County was based on values from city-data.com. Using these rates, the magnitude of the benefits provided by the inventoried public tree resource was calculated using i-Tree *Streets***.** Program budget values used in benefit versus investment ratio calculations were not supplied by all of the participating communities in Clark County.

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Appendix C: Reports

Table 28. Relative Age Distribution for All Inventoried Trees

Species	DBH Class (in)									Total	% of Pop.
	0-3	3-7	7-13	13-19	19-25	25-31	31-37	37-42	> 42		
Broadleaf Deciduous Large (BDL)											
Gleditsia triacanthos	286	300	277	42	6	0	0	0	0	**911**	0.8%
Populus fremontii	31	57	96	165	105	48	17	5	1	**525**	0.4%
Ulmus pumila	78	83	68	72	66	23	9	3	1	**403**	0.3%
Populus species	16	83	99	99	58	24	9	1	0	**389**	0.3%
Fraxinus uhdei	20	58	119	39	7	4	0	0	0	**247**	0.2%
Plantanus occidentalis	12	17	106	48	0	0	0	0	0	**183**	0.2%
Platanus wrightii	33	18	62	30	13	1	0	0	0	**157**	0.1%
Quecus shumardii	23	46	70	1	0	0	0	0	0	**140**	0.1%
Platanus x acerfolia	1	1	94	13	2	0	0	0	0	**111**	0.1%
Platanus racemosa	1	7	19	38	7	0	0	0	0	**72**	0.1%
Quercus muehlenbergii	20	30	9	0	0	0	0	0	0	**59**	0.1%
Quercus lobata	8	16	12	6	0	0	0	0	0	**42**	0.0%
Zelkova serrata	2	5	17	3	0	0	0	0	0	**27**	0.0%
Sophora japonica	1	3	18	0	0	0	0	0	0	**22**	0.0%
Celtis sinensis	5	10	4	0	0	0	0	0	0	**19**	0.0%
Quercus macrocarpa	0	9	8	0	0	0	0	0	0	**17**	0.0%
Quercus texana	7	2	3	0	0	0	0	0	0	**12**	0.0%
Salix matsudana	0	1	1	6	2	0	0	0	0	**10**	0.0%
Carya illinoinensis	4	2	1	0	0	0	0	0	0	**7**	0.0%
Platanus mexicana	0	1	1	2	0	0	0	0	0	**4**	0.0%
Quercus palustris	3	0	0	0	0	0	0	0	0	**3**	0.0%
Ailanthus altissima	2	0	0	0	0	0	0	0	0	**2**	0.0%
Quercus texana Buckley	0	1	1	0	0	0	0	0	0	**2**	0.0%
Populus alba	0	0	2	0	0	0	0	0	0	**2**	0.0%
Ulmus glabra 'Camperdownii'	0	1	1	0	0	0	0	0	0	**2**	0.0%
Ulmus crassifolia	0	1	1	0	0	0	0	0	0	**2**	0.0%
Quercus rubra	2	0	0	0	0	0	0	0	0	**2**	0.0%
Populus balsamifera ssp. Balsamifera	0	0	0	1	0	0	0	0	0	**1**	0.0%
Fraxinus americana junjinger	1	0	0	0	0	0	0	0	0	**1**	0.0%
Total	**556**	**752**	**1,089**	**565**	**266**	**100**	**35**	**9**	**2**	**3,374**	**2.9%**
Broadleaf Deciduous Medium (BDM)											
Fraxinus velutina 'Fan-Tex'	3,112	4,697	2,064	285	16	3	0	0	0	**10,177**	8.7%
Fraxinus velutina	1,176	1,994	1,619	450	70	20	5	1	6	**5,341**	4.6%
Pistacia chinensis	1,027	2,308	785	53	0	0	0	0	0	**4,173**	3.6%

Species	DBH Class (in)									Total	% of Pop.
	0-3	3-7	7-13	13-19	19-25	25-31	31-37	37-42	> 42		
Fraxinus angustifolia	680	2,172	670	101	2	0	0	0	0	**3,625**	3.1%
Ulmus parvifolia	933	1,658	467	68	2	0	0	0	0	**3,129**	2.7%
Prosopis chilensis	1,397	1,027	482	123	15	6	0	0	0	**3,050**	2.6%
Morus alba	68	67	243	644	326	120	42	12	6	**1,528**	1.3%
Parkinsonia florida	435	607	352	46	1	0	0	0	0	**1,442**	1.2%
Parkinsonia aculeata	287	174	126	26	6	0	0	0	0	**619**	0.5%
Robinia pseudoacacia	114	332	121	10	0	0	0	0	0	**577**	0.5%
Robinia ambigua 'Purple Rose'	208	148	54	0	0	0	0	0	0	**410**	0.4%
Fraxinus velutina 'Glabra'	37	70	165	48	11	2	0	0	0	**333**	0.3%
Celtis occidentalis	23	69	45	5	0	0	0	0	0	**142**	0.1%
Pistacia X atlantica	5	14	69	0	0	0	0	0	0	**88**	0.1%
Albizia julibrissin	34	25	13	7	0	0	0	0	0	**79**	0.1%
Koelreuteria paniculata	25	31	16	1	2	0	0	0	0	**75**	0.1%
Melia azedarach	12	10	12	11	2	0	0	0	0	**47**	0.0%
Celtis reticulata	31	13	2	1	0	0	0	0	0	**47**	0.0%
Salix gooddingii	3	4	4	2	7	1	0	0	0	**21**	0.0%
Pistacia X atlantica 'Red Push'	1	6	5	1	0	0	0	0	0	**13**	0.0%
Pistacia vera	2	3	8	0	0	0	0	0	0	**13**	0.0%
Koelreuteria bipinnata	6	7	0	0	0	0	0	0	0	**13**	0.0%
Pyrus communis	8	1	1	0	0	0	0	0	0	**10**	0.0%
Jacaranda mimosifolia	1	7	1	0	0	0	0	0	0	**9**	0.0%
Ungnadia speciosa	7	0	0	0	0	0	0	0	0	**7**	0.0%
Acer negundo 'Flamingo'	4	2	0	0	0	0	0	0	0	**6**	0.0%
Quercus douglasii	5	0	0	0	0	0	0	0	0	**5**	0.0%
Crataegus phaenopyrum	4	0	0	0	0	0	0	0	0	**4**	0.0%
Gleditsia triacanthos v. inermis	0	0	2	1	0	0	0	0	0	**3**	0.0%
Salix x sepulcralis Simonkai	0	0	1	1	0	0	0	0	0	**2**	0.0%
Geoffroea decorticans	0	0	1	1	0	0	0	0	0	**2**	0.0%
Machaerium tipu	0	0	0	1	0	0	1	0	0	**2**	0.0%
Acer ginnala	2	0	0	0	0	0	0	0	0	**2**	0.0%
Acacia willardiana	2	0	0	0	0	0	0	0	0	**2**	0.0%
Ginkgo biloba 'Autumn Gold'	1	1	0	0	0	0	0	0	0	**2**	0.0%
Sambucus nigra ssp. Cerulea	2	0	0	0	0	0	0	0	0	**2**	0.0%
Maclura pomifera	1	0	0	0	0	0	0	0	0	**1**	0.0%
Betula papyrifera	0	1	0	0	0	0	0	0	0	**1**	0.0%
Juglans major	1	0	0	0	0	0	0	0	0	**1**	0.0%
Fraxinus velutina 'Bonita'	0	0	1	0	0	0	0	0	0	**1**	0.0%
Salix matsudana 'Tortuosa'	0	0	1	0	0	0	0	0	0	**1**	0.0%

Species	DBH Class (in)									Total	% of Pop.
	0-3	3-7	7-13	13-19	19-25	25-31	31-37	37-42	> 42		
Fraxinus angustifolia ssp. Oxycarpa	1	0	0	0	0	0	0	0	0	**1**	0.0%
Total	**9,655**	**15,448**	**7,330**	**1,886**	**460**	**152**	**48**	**13**	**12**	**35,006**	**29.9%**

Broadleaf Deciduous Small (BDS)											
Chilopsis linearis	3,913	1,629	325	24	0	0	0	0	0	**5,891**	5.0%
Vitex agnus-castus	3,829	889	77	10	0	1	0	0	0	**4,806**	4.1%
Parkinsonia x 'Desert Museum'	2,479	1,430	361	11	1	0	0	0	0	**4,282**	3.7%
Chiltalpa tashkentensis	651	1,983	1,169	28	1	0	0	0	0	**3,833**	3.3%
Prosopis velutina	1,427	1,063	698	114	10	0	0	0	0	**3,312**	2.8%
Prosopis glandulosa	1,249	741	375	22	0	0	0	0	0	**2,387**	2.0%
Acacia farnesiana	1,365	606	189	45	5	0	0	0	0	**2,210**	1.9%
Prosopis torreyana	510	430	171	26	1	0	0	0	0	**1,138**	1.0%
Prunus cerasifera	278	143	14	0	0	0	0	0	0	**435**	0.4%
Pyrus calleryana	58	244	124	1	5	0	0	0	0	**432**	0.4%
Cercidium praecox	182	125	22	3	0	0	0	0	0	**332**	0.3%
Parkonsonia hybrid	107	77	33	1	0	0	0	0	0	**218**	0.2%
Prosopis spp.	49	98	31	7	0	0	0	0	0	**185**	0.2%
Lagerstroemia indica	132	28	1	0	0	0	0	0	0	**161**	0.1%
Cercis canadensis	122	12	4	0	0	0	0	0	0	**138**	0.1%
Parkinsonia microphylla	72	34	28	0	1	0	0	0	0	**135**	0.1%
Prosopis pubescens	74	42	15	0	0	0	0	0	0	**131**	0.1%
Tamarix chinensis	84	29	9	1	0	0	0	0	0	**123**	0.1%
Prosopis juliflora	18	18	21	15	1	0	0	0	0	**73**	0.1%
Elaeocarpus decipiens	18	37	4	0	0	0	0	0	0	**59**	0.1%
Eysenhardtia orthocarpa	38	2	0	0	0	0	0	0	0	**40**	0.0%
Prunus mexicana	38	0	0	0	0	0	0	0	0	**38**	0.0%
Punica granatum	32	6	0	0	0	0	0	0	0	**38**	0.0%
Cercis occidentalis 'Oklahoma'	33	1	0	0	0	0	0	0	0	**34**	0.0%
Fraxinus sieboldiana	16	13	0	0	0	0	0	0	0	**29**	0.0%
Morus alba 'Chaparral'	0	1	4	12	7	1	0	0	0	**25**	0.0%
Prunus dulcis	8	7	3	2	0	0	0	0	0	**20**	0.0%
Cercis occidentalis	13	6	1	0	0	0	0	0	0	**20**	0.0%
Fraxinus cuspidata	17	2	0	0	0	0	0	0	0	**19**	0.0%
Prunus persica	14	4	1	0	0	0	0	0	0	**19**	0.0%
Bauhinia variegata	13	5	0	0	0	0	0	0	0	**18**	0.0%
Fraxinus anomala	6	8	0	0	0	0	0	0	0	**14**	0.0%
Parkinsonia x 'Sonoran Emerald'	1	7	6	0	0	0	0	0	0	**14**	0.0%
Cotinus coggygria	12	1	1	0	0	0	0	0	0	**14**	0.0%
Forestiera pubescens	12	0	0	0	0	0	0	0	0	**12**	0.0%
Prunus armeniaca	7	2	1	0	0	0	0	0	0	**10**	0.0%

Species	DBH Class (in)									Total	% of Pop.
	0-3	3-7	7-13	13-19	19-25	25-31	31-37	37-42	> 42		
Malus sylvestris	1	6	1	0	0	0	0	0	0	**8**	0.0%
Ficus carica	4	1	3	0	0	0	0	0	0	**8**	0.0%
Ziziphus jujuba	2	1	3	1	0	0	0	0	0	**7**	0.0%
Quercus gambelii	2	0	2	1	0	0	0	0	0	**5**	0.0%
Rhus lanceolata	4	0	0	0	0	0	0	0	0	**4**	0.0%
Amelanchier laevis	1	3	0	0	0	0	0	0	0	**4**	0.0%
Bauhinia lunarioides	3	0	0	0	0	0	0	0	0	**3**	0.0%
Caesalpinia palmeri	2	0	0	0	0	0	0	0	0	**2**	0.0%
Cercis canadensis texensis	2	0	0	0	0	0	0	0	0	**2**	0.0%
Salix laevigata	1	0	0	0	0	0	0	0	0	**1**	0.0%
Sapium sebiferum	0	0	1	0	0	0	0	0	0	**1**	0.0%
Cercis reniformis	1	0	0	0	0	0	0	0	0	**1**	0.0%
Syringa vulgaris	1	0	0	0	0	0	0	0	0	**1**	0.0%
Prunus spp.	0	1	0	0	0	0	0	0	0	**1**	0.0%
Mimosa dysocarpa	1	0	0	0	0	0	0	0	0	**1**	0.0%
Chionanthus retusus	0	0	1	0	0	0	0	0	0	**1**	0.0%
Salix spp.	0	1	0	0	0	0	0	0	0	**1**	0.0%
Havardia mexicana	0	0	1	0	0	0	0	0	0	**1**	0.0%
Malus spp.	1	0	0	0	0	0	0	0	0	**1**	0.0%
Total	**16,946**	**9,753**	**3,702**	**324**	**32**	**2**	**0**	**0**	**0**	**30,760**	**26.3%**
Broadleaf Evergreen Large (BEL)											
Quercus ilex	290	387	66	13	1	0	0	0	0	**757**	0.6%
Eucalyptus camaldulensis	74	76	27	11	10	1	0	0	0	**199**	0.2%
Eucalyptus microtheca	20	30	49	20	5	0	0	0	0	**124**	0.1%
Eucalyptus polyanthemos	4	30	9	1	0	1	0	0	0	**45**	0.0%
Eucalyptus papuana	14	1	1	0	0	0	0	0	0	**16**	0.0%
Quercus suber	4	9	2	1	0	0	0	0	0	**16**	0.0%
Eucalyptus melliodora	2	12	0	0	0	0	0	0	0	**14**	0.0%
Eucalyptus rudis	3	2	4	1	1	0	0	0	0	**11**	0.0%
Eucalyptus sideroxylon	1	0	6	4	0	0	0	0	0	**11**	0.0%
Quercus agrifolia	0	4	0	0	0	0	0	0	0	**4**	0.0%
Eucalyptus microcarpa	0	2	0	0	0	0	0	0	0	**2**	0.0%
Eucalyptus spp.	1	0	1	0	0	0	0	0	0	**2**	0.0%
Dalbergia sissoo	0	0	1	1	0	0	0	0	0	**2**	0.0%
Grevillea robusta	0	1	0	0	0	0	0	0	0	**1**	0.0%
Quercus polymorpha	0	1	0	0	0	0	0	0	0	**1**	0.0%
Total	**416**	**555**	**166**	**52**	**17**	**2**	**0**	**0**	**0**	**1,208**	**1.0%**
Broadleaf Evergreen Medium (BEM)											
Quercus virginiana	941	2,469	1,040	85	3	0	0	0	0	**4,538**	3.9%

Species	DBH Class (in)									Total	% of Pop.
	0-3	3-7	7-13	13-19	19-25	25-31	31-37	37-42	> 42		
Prosopis alba	946	518	326	83	13	1	0	0	0	**1,887**	1.6%
Quercus fusiformis	63	86	14	1	0	0	0	0	0	**164**	0.1%
Brachychiton populneum	32	82	31	0	0	0	0	0	0	**145**	0.1%
Schinus molle	4	21	43	8	2	0	1	0	0	**79**	0.1%
Laurus nobillis	30	11	0	0	0	0	0	0	0	**41**	0.0%
Magnolia grandiflora	8	4	0	0	0	0	0	0	0	**12**	0.0%
Ceratonia siliqua	8	0	2	1	0	0	0	0	0	**11**	0.0%
Ilex attenuata	7	0	0	0	0	0	0	0	0	**7**	0.0%
Cocculus laurifolius	0	5	1	0	0	0	0	0	0	**6**	0.0%
Acacia salicina	1	3	0	0	0	1	0	0	0	**5**	0.0%
Acacia gerrardii	0	2	1	0	0	0	0	0	0	**3**	0.0%
Eriobotyra japonica	3	0	0	0	0	0	0	0	0	**3**	0.0%
Eriobotyra deflexa	1	2	0	0	0	0	0	0	0	**3**	0.0%
Acacia estrophiolata	2	0	0	0	0	0	0	0	0	**2**	0.0%
Quercus engelmannii	1	0	0	0	0	0	0	0	0	**1**	0.0%
Acacia brachystachya	1	0	0	0	0	0	0	0	0	**1**	0.0%
Acacia erioloba	1	0	0	0	0	0	0	0	0	**1**	0.0%
Acacia karroo	0	1	0	0	0	0	0	0	0	**1**	0.0%
Total	**2,049**	**3,204**	**1,458**	**178**	**18**	**2**	**1**	**0**	**0**	**6,910**	**5.9%**

Broadleaf Evergreen Small (BES)											
Acacia stenophylla	1,502	2,340	769	86	6	0	0	0	0	**4,703**	4.0%
Rhus lancea	517	688	243	16	2	1	0	0	0	**1,467**	1.3%
Olea europaea	312	428	232	38	7	1	0	0	0	**1,018**	0.9%
Sophora secundiflora	864	53	2	0	0	0	0	0	0	**919**	0.8%
Acacia aneura	429	84	2	0	0	0	0	0	0	**515**	0.4%
Olea europaea 'Swan Hill'	138	207	67	1	0	0	0	0	0	**413**	0.4%
Acacia greggii	265	117	10	4	0	0	0	0	0	**396**	0.3%
Pyrus kawakamii	27	231	74	8	0	0	0	0	0	**340**	0.3%
Yucca brevifolia	19	258	40	2	0	0	0	0	0	**319**	0.3%
Ligustrum lucidum	106	154	21	1	0	0	0	0	0	**282**	0.2%
Acacia constricta	57	43	5	0	0	0	0	0	0	**105**	0.1%
Nerium oleander	89	14	0	0	0	0	0	0	0	**103**	0.1%
Xylosma congestum	65	14	9	1	0	0	0	0	0	**89**	0.1%
Podocarpus macrophyllus	61	22	0	0	0	0	0	0	0	**83**	0.1%
Acacia pendula	8	49	7	1	1	0	0	0	0	**66**	0.1%
Ebenopsis ebano	46	12	2	0	0	0	0	0	0	**60**	0.1%
Other	43	11	4	0	1	0	0	0	0	**59**	0.1%
Arbutus unedo	37	15	1	0	0	0	0	0	0	**53**	0.0%
Caesalpinia mexicana	44	6	1	0	0	0	0	0	0	**51**	0.0%
Prunus caroliniana	23	20	3	0	0	0	0	0	0	**46**	0.0%
Cordia boissieri	31	3	1	0	0	0	0	0	0	**35**	0.0%
Citrus species	26	4	3	0	0	0	0	0	0	**33**	0.0%

Species	DBH Class (in)									Total	% of Pop.
	0-3	3-7	7-13	13-19	19-25	25-31	31-37	37-42	> 42		
Myrtus communis	30	0	0	0	1	0	0	0	0	**31**	0.0%
Pittosporum angustifolium	1	7	3	0	0	0	0	0	0	**11**	0.0%
Callistemon viminalis	9	0	1	0	0	0	0	0	0	**10**	0.0%
Acacia rigidula	7	2	0	0	0	0	0	0	0	**9**	0.0%
Celtis pallida	9	0	0	0	0	0	0	0	0	**9**	0.0%
Fraxinus greggii	8	0	0	0	0	0	0	0	0	**8**	0.0%
Acacia species	2	6	0	0	0	0	0	0	0	**8**	0.0%
Eucalyptus spathulata	0	7	0	1	0	0	0	0	0	**8**	0.0%
Leucaena retusa	6	0	1	0	0	0	0	0	0	**7**	0.0%
Olea europaea 'Wilson'	1	5	0	0	0	0	0	0	0	**6**	0.0%
Geijera parviflora	1	1	3	0	1	0	0	0	0	**6**	0.0%
Vauquelinia californica	4	0	1	0	0	0	0	0	0	**5**	0.0%
Lysiloma microphyllum	2	1	2	0	0	0	0	0	0	**5**	0.0%
Quercus berberidifolia	2	2	0	0	0	0	0	0	0	**4**	0.0%
Ilex altaclarensis 'Wilsonii'	3	0	0	0	0	0	0	0	0	**3**	0.0%
Eucalyptus latens moon lagoon	3	0	0	0	0	0	0	0	0	**3**	0.0%
Schinus terebinthifolius	1	1	1	0	0	0	0	0	0	**3**	0.0%
Quercus rugosa	2	1	0	0	0	0	0	0	0	**3**	0.0%
Rhaphiolepis indica	1	2	0	0	0	0	0	0	0	**3**	0.0%
Acacia jennerae	2	1	0	0	0	0	0	0	0	**3**	0.0%
Acacia saligna	0	1	2	0	0	0	0	0	0	**3**	0.0%
Acacia schaffneri	1	1	1	0	0	0	0	0	0	**3**	0.0%
Ligustrum japonicum	2	1	0	0	0	0	0	0	0	**3**	0.0%
Quercus wislizenii	2	0	0	0	0	0	0	0	0	**2**	0.0%
Eucalyptus formannii	0	0	1	1	0	0	0	0	0	**2**	0.0%
Acacia millefolia	1	1	0	0	0	0	0	0	0	**2**	0.0%
Caesalpinia cascalaco	1	0	0	0	0	0	0	0	0	**1**	0.0%
Nicotiana glauca	0	1	0	0	0	0	0	0	0	**1**	0.0%
Olneya tesota	1	0	0	0	0	0	0	0	0	**1**	0.0%
Eucalyptus latens	1	0	0	0	0	0	0	0	0	**1**	0.0%
Havardia pallens tenaza	1	0	0	0	0	0	0	0	0	**1**	0.0%
Acacia tetragonophylla	1	0	0	0	0	0	0	0	0	**1**	0.0%
Acacia papyrocarpa	0	1	0	0	0	0	0	0	0	**1**	0.0%
Acacia coriacea	0	0	1	0	0	0	0	0	0	**1**	0.0%
Acacia constricta var. paucispina	1	0	0	0	0	0	0	0	0	**1**	0.0%
Condalia hookeri	1	0	0	0	0	0	0	0	0	**1**	0.0%
Ilex vomitoria	1	0	0	0	0	0	0	0	0	**1**	0.0%
Total	**4,817**	**4,815**	**1,513**	**160**	**19**	**2**	**0**	**0**	**0**	**11,326**	**9.7%**

Conifer Evergreen Large (CEL)

Species	DBH Class (in)									Total	% of Pop.
	0-3	3-7	7-13	13-19	19-25	25-31	31-37	37-42	> 42		
Pinus eldarica	857	4,794	7,876	2,688	425	39	6	3	0	**16,688**	14.3%
Pinus halepensis	52	276	1,186	1,523	443	72	20	1	1	**3,574**	3.1%
Pinus pinea	7	47	300	137	14	4	0	1	0	**510**	0.4%
Pinus roxburghii	10	119	163	122	14	0	0	0	0	**428**	0.4%
Cupressus sempervirens	46	62	66	4	1	1	0	0	0	**180**	0.2%
Pinus ponderosa var. scopulorum	0	0	7	5	4	2	0	0	0	**18**	0.0%
Casuarina equisetifolia	1	4	7	0	0	0	0	0	0	**12**	0.0%
Pinus sabiniana	1	1	2	2	1	0	0	0	0	**7**	0.0%
Cedrus deodara	2	3	0	0	0	0	0	0	0	**5**	0.0%
Pinus canariensis	0	1	0	0	0	0	0	0	0	**1**	0.0%
Total	**976**	**5,307**	**9,607**	**4,481**	**902**	**118**	**26**	**5**	**1**	**21,423**	**18.3%**
Conifer Evergreen Medium (CEM)											
Pinus brutia	0	0	2	19	11	0	0	1	0	**33**	0.0%
Ilex cornuta Burfordii	21	7	4	0	0	0	0	0	0	**32**	0.0%
Cupressus glabra	7	7	12	3	0	0	0	0	0	**29**	0.0%
Cupressus leylandii	2	1	5	10	2	0	0	0	0	**20**	0.0%
Pinus thunbergiana	0	0	19	0	0	0	0	0	0	**19**	0.0%
Thuja occidentalis	1	8	1	0	0	0	0	0	0	**10**	0.0%
Thuja occidentalis var. filiform	0	1	0	0	0	0	0	0	0	**1**	0.0%
Total	**31**	**24**	**43**	**32**	**13**	**0**	**0**	**1**	**0**	**144**	**0.1%**
Conifer Evergreen Small (CES)											
Platycladus orientalis	11	33	26	7	1	0	0	0	0	**78**	0.1%
Juniperus chinensis	0	6	5	0	0	0	0	0	0	**11**	0.0%
Juniperus chinensis 'Torulosa'	0	0	3	6	0	0	0	0	0	**9**	0.0%
Pinus contorta 'bolanderi'	0	0	2	0	0	0	0	0	0	**2**	0.0%
Juniperus spp.	0	0	1	0	0	0	0	0	0	**1**	0.0%
Total	**14**	**51**	**42**	**17**	**1**	**0**	**0**	**0**	**0**	**125**	**0.1%**
Palm Large (PEL)											**0.0%**
Phoenix canariensis	1	5	3	46	18	15	16	1	2	**107**	0.1%
Phoenix sylvestris	0	0	4	1	0	0	0	0	0	**5**	0.0%
Sabal palmetto	0	0	2	1	0	0	0	0	0	**3**	0.0%
Trachycarpus fortunei	1	1	0	0	0	0	0	0	0	**2**	0.0%
Total	**2**	**6**	**9**	**48**	**18**	**15**	**16**	**1**	**2**	**117**	**0.1%**
Palm Medium											

Species	DBH Class (in)									Total	% of Pop.
	0-3	3-7	7-13	13-19	19-25	25-31	31-37	37-42	> 42		
(PEM)											
Phoenix dactylifera	1	3	23	470	338	5	1	0	0	**841**	0.7%
Nannorrhops ritchiana	0	2	0	0	0	0	0	0	0	**2**	0.0%
Total	**1**	**5**	**23**	**470**	**338**	**5**	**1**	**0**	**0**	**843**	**0.7%**
Palm Small (PES)											
Washingtonia robusta	64	86	1,512	1,793	244	60	35	5	1	**3,801**	3.2%
Washingtonia filifera	6	5	187	295	488	129	46	21	17	**1,194**	1.0%
Chamaerops humilis	220	344	126	6	0	0	0	0	0	**696**	0.6%
Brahea armata	4	60	14	15	0	0	0	0	0	**93**	0.1%
Cycas revoluta	2	17	6	0	0	0	0	0	0	**25**	0.0%
Arecastrum romanzoffianum	0	1	3	0	0	0	0	0	0	**4**	0.0%
Carnegiea gigantea	0	0	0	4	0	0	0	0	0	**4**	0.0%
Butia capitata	0	2	0	2	0	0	0	0	0	**4**	0.0%
Bismarckia nobilis	0	0	0	1	0	0	0	0	0	**1**	0.0%
Phoenix roebelenii	1	0	0	0	0	0	0	0	0	**1**	0.0%
Total	**297**	**515**	**1,848**	**2,116**	**732**	**189**	**81**	**26**	**18**	**5,823**	**5.0%**
Grand Total	**35,760**	**40,435**	**26,830**	**10,329**	**2,816**	**587**	**208**	**55**	**35**	**117,055**	**100%**

Table 29. Relative Performance Index (RPI) of Inventoried Trees Across the AOI

Species	Dead or Dying	Poor	Fair	Good	RPI	# of Trees	% of Pop.
Pinus eldarica	0.05	3.92	36.15	59.88	1.04	16,688	14.26
Fraxinus velutina 'Fan-Tex'	0.07	8.09	45.95	45.85	0.97	10,177	8.69
Chilopsis linearis	0.08	4.94	38.43	56.54	1.03	5,891	5.03
Fraxinus velutina	0.39	6.57	54.09	38.94	0.95	5,341	4.56
Vitex agnus-castus	0.10	3.56	47.19	49.15	1.00	4,806	4.11
Acacia stenophylla	0.02	1.21	35.00	63.77	1.07	4,703	4.02
Quercus virginiana	0.29	4.85	43.19	51.67	1.01	4,538	3.88
Parkinsonia x 'Desert Museum'	0.05	3.95	56.56	39.44	0.97	4,282	3.66
Pistacia chinensis	0.02	4.60	37.48	57.90	1.03	4,173	3.56
Chiltalpa tashkentensis	0.03	15.50	66.40	18.08	0.85	3,833	3.27
Washingtonia robusta	0.05	1.89	27.20	70.85	1.09	3,801	3.25
Fraxinus angustifolia	0.11	13.99	51.03	34.87	0.91	3,625	3.10
Pinus halepensis	0.00	3.25	45.16	51.59	1.01	3,574	3.05
Prosopis velutina	0.75	6.88	51.84	40.52	0.96	3,312	2.83
Ulmus parvifolia	0.13	8.95	50.18	40.75	0.96	3,129	2.67
Prosopis chilensis	0.00	5.31	34.07	60.62	1.04	3,050	2.61
Prosopis glandulosa	0.00	4.90	39.34	55.76	1.02	2,387	2.04
Acacia farnesiana	0.09	2.85	40.36	56.70	1.03	2,210	1.89
Prosopis alba	0.21	1.48	47.27	51.03	1.02	1,887	1.61
Morus alba	0.00	7.66	53.73	38.61	0.95	1,528	1.31
Rhus lancea	0.07	4.70	53.78	41.45	0.97	1,467	1.25
Parkinsonia florida	0.14	4.37	55.41	40.08	0.97	1,442	1.23
Washingtonia filifera	0.00	0.25	11.73	88.02	1.15	1,194	1.02
Prosopis torreyana	0.00	6.85	39.98	53.16	1.01	1,138	0.97
Olea europaea	0.00	1.67	61.00	37.33	0.97	1,018	0.87
Sophora secundiflora	0.00	2.50	33.51	63.98	1.06	919	0.79
Gleditsia triacanthos	1.21	16.36	45.44	36.99	0.91	911	0.78
Phoenix dactylifera	0.00	1.78	22.12	76.10	1.11	841	0.72
Quercus ilex	0.13	13.87	54.16	31.84	0.90	757	0.65
Chamaerops humilis	0.00	0.72	19.83	79.45	1.12	696	0.59
Parkinsonia aculeata	0.97	7.27	50.73	41.03	0.96	619	0.53
Robinia pseudoacacia	0.69	17.85	41.77	39.69	0.91	577	0.49
Populus fremontii	0.00	7.62	47.05	45.33	0.97	525	0.45
Acacia aneura	0.58	10.29	35.15	53.98	0.99	515	0.44
Pinus pinea	0.00	6.27	48.43	45.29	0.98	510	0.44
Prunus cerasifera	0.23	22.07	55.40	22.30	0.83	435	0.37
Pyrus calleryana	0.00	9.72	41.20	49.07	0.98	432	0.37
Pinus roxburghii	0.00	2.80	24.07	73.13	1.09	428	0.37
Olea europaea 'Swan Hill'	0.00	1.21	30.75	68.04	1.08	413	0.35
Robinia ambigua 'Purple Rose'	0.00	12.68	45.37	41.95	0.93	410	0.35
Ulmus pumila	0.00	9.18	49.63	41.19	0.95	403	0.34
Acacia greggii	0.00	2.02	55.56	42.42	0.99	396	0.34
Populus species	0.00	22.37	60.93	16.71	0.82	389	0.33

Species	Dead or Dying	Poor	Fair	Good	RPI	# of Trees	% of Pop.
Pyrus kawakamii	0.29	8.24	48.24	43.24	0.97	340	0.29
Fraxinus velutina 'Glabra'	0.90	14.11	29.43	55.56	0.98	333	0.28
Cercidium praecox	0.00	7.23	51.81	40.96	0.96	332	0.28
Yucca brevifolia	0.00	20.38	26.65	52.98	0.95	319	0.27
Ligustrum lucidum	0.00	11.35	50.71	37.94	0.94	282	0.24
Fraxinus uhdei	0.40	4.45	34.82	60.32	1.04	247	0.21
Parkonsonia hybrid	0.00	4.13	62.84	33.03	0.95	218	0.19
Eucalyptus camaldulensis	0.00	2.51	43.72	53.77	1.03	199	0.17
Prosopis spp.	2.70	7.57	42.16	47.57	0.97	185	0.16
Plantanus occidentalis	0.55	9.29	54.10	36.07	0.93	183	0.16
Cupressus sempervirens	0.56	6.67	20.00	72.78	1.07	180	0.15
Quercus fusiformis	0.00	2.44	95.12	2.44	0.84	164	0.14
Lagerstroemia indica	0.00	8.07	31.68	60.25	1.02	161	0.14
Platanus wrightii	0.64	14.65	65.61	19.11	0.86	157	0.13
Brachychiton populneum	0.00	0.69	19.31	80.00	1.12	145	0.12
Celtis occidentalis	0.00	20.42	37.32	42.25	0.92	142	0.12
Quecus shumardii	0.71	8.57	21.43	69.29	1.05	140	0.12
Cercis canadensis	3.62	6.52	77.54	12.32	0.84	138	0.12
Parkinsonia microphylla	1.48	5.93	57.04	35.56	0.94	135	0.12
Prosopis pubescens	1.53	6.87	58.02	33.59	0.93	131	0.11
Eucalyptus microtheca	0.00	5.65	20.16	74.19	1.08	124	0.11
Tamarix chinensis	0.00	0.81	34.15	65.04	1.07	123	0.11
Platanus x acerfolia	0.00	7.21	92.79	0.00	0.82	111	0.09
Phoenix canariensis	0.00	0.00	13.08	86.92	1.15	107	0.09
Acacia constricta	0.00	5.71	53.33	40.95	0.97	105	0.09
Nerium oleander	0.00	33.98	53.40	12.62	0.76	103	0.09
Brahea armata	0.00	2.15	17.20	80.65	1.12	93	0.08
Xylosma congestum	0.00	3.37	41.57	55.06	1.03	89	0.08
Pistacia X atlantica	0.00	0.00	3.41	96.59	1.19	88	0.08
Podocarpus macrophyllus	0.00	0.00	6.02	93.98	1.18	83	0.07
Albizia julibrissin	0.00	12.66	44.30	43.04	0.94	79	0.07
Schinus molle	0.00	7.59	49.37	43.04	0.97	79	0.07
Platycladus orientalis	0.00	7.69	30.77	61.54	1.02	78	0.07
Koelreuteria paniculata	1.33	12.00	41.33	45.33	0.95	75	0.06
Prosopis juliflora	0.00	1.37	15.07	83.56	1.13	73	0.06
Platanus racemosa	0.00	16.67	20.83	62.50	1.01	72	0.06
Acacia pendula	0.00	1.52	60.61	37.88	0.97	66	0.06
Ebenopsis ebano	0.00	6.67	58.33	35.00	0.94	60	0.05
Other	8.47	3.39	13.56	74.58	1.04	59	0.05
Elaeocarpus decipiens	0.00	10.17	44.07	45.76	0.96	59	0.05
Quercus muehlenbergii	1.69	0.00	33.90	64.41	1.06	59	0.05
Arbutus unedo	0.00	5.66	15.09	79.25	1.10	53	0.05
Caesalpinia mexicana	0.00	0.00	3.92	96.08	1.18	51	0.04
Melia azedarach	0.00	14.89	36.17	48.94	0.97	47	0.04
Celtis reticulata	8.51	0.00	40.43	51.06	0.97	47	0.04

Species	Dead or Dying	Poor	Fair	Good	RPI	# of Trees	% of Pop.
Prunus caroliniana	0.00	8.70	56.52	34.78	0.94	46	0.04
Eucalyptus polyanthemos	0.00	2.22	71.11	26.67	0.93	45	0.04
Quercus lobata	0.00	19.05	42.86	38.10	0.91	42	0.04
Laurus nobillis	0.00	39.02	29.27	31.71	0.81	41	0.04
Eysenhardtia orthocarpa	0.00	0.00	0.00	100.00	1.19	40	0.03
Punica granatum	0.00	0.00	18.42	81.58	1.13	38	0.03
Prunus mexicana	0.00	2.63	2.63	94.74	1.16	38	0.03
Cordia boissieri	0.00	0.00	2.86	97.14	1.19	35	0.03
Cercis occidentalis 'Oklahoma'	0.00	2.94	0.00	97.06	1.18	34	0.03
Pinus brutia	0.00	0.00	30.30	69.70	1.09	33	0.03
Citrus species	0.00	6.06	72.73	21.21	0.90	33	0.03
Ilex cornuta Burfordii	0.00	0.00	12.50	87.50	1.15	32	0.03
Myrtus communis	0.00	35.48	35.48	29.03	0.81	31	0.03
Prunus spp.	0.00	17.24	34.48	48.28	0.93	29	0.02
Cupressus glabra	0.00	0.00	48.28	51.72	1.03	29	0.02
Fraxinus sieboldiana	0.00	37.93	10.34	51.72	0.89	29	0.02
Zelkova serrata	0.00	0.00	55.56	44.44	1.00	27	0.02
Cycas revoluta	0.00	4.00	0.00	96.00	1.17	25	0.02
Morus alba 'Chaparral'	0.00	0.00	8.00	92.00	1.17	25	0.02
Juniperus spp.	0.00	0.00	66.67	33.33	0.95	24	0.02
Sophora japonica	4.55	4.55	13.64	77.27	1.07	22	0.02
Prosopis spp.	0.00	4.76	61.90	33.33	0.94	21	0.02
Salix gooddingii	0.00	19.05	38.10	42.86	0.93	21	0.02
Prunus dulcis	0.00	0.00	35.00	65.00	1.07	20	0.02
Cercis occidentalis	0.00	5.00	15.00	80.00	1.11	20	0.02
Cupressus leylandii	0.00	30.00	60.00	10.00	0.78	20	0.02
Prunus persica	0.00	0.00	31.58	68.42	1.09	19	0.02
Celtis sinensis	0.00	15.79	42.11	42.11	0.94	19	0.02
Fraxinus cuspidata	0.00	42.11	26.32	31.58	0.75	19	0.02
Pinus thunbergiana	0.00	0.00	52.63	47.37	1.01	19	0.02
Bauhinia variegata	0.00	33.33	11.11	55.56	0.91	18	0.02
Pinus ponderosa var. scopulorum	0.00	0.00	22.22	77.78	1.12	18	0.02
Quercus macrocarpa	0.00	5.88	41.18	52.94	1.01	17	0.01
Quercus suber	0.00	12.50	31.25	56.25	1.00	16	0.01
Eucalyptus papuana	6.25	6.25	18.75	68.75	1.02	16	0.01
Cotinus coggygria	0.00	0.00	14.29	85.71	1.15	14	0.01
Parkinsonia x 'Sonoran Emerald'	0.00	0.00	14.29	85.71	1.13	14	0.01
Fraxinus anomala	0.00	0.00	35.71	64.29	1.06	14	0.01
Eucalyptus melliodora	0.00	0.00	100.00	0.00	0.85	14	0.01
Pistacia vera	0.00	15.38	46.15	38.46	0.93	13	0.01
Koelreuteria bipinnata	0.00	7.69	0.00	92.31	1.14	13	0.01
Pistacia X atlantica 'Red Push'	0.00	0.00	0.00	100.00	1.20	13	0.01
Malus spp.	0.00	8.33	41.67	50.00	0.99	12	0.01
Casuarina equisetifolia	0.00	0.00	0.00	100.00	1.20	12	0.01
Forestiera pubescens	0.00	0.00	8.33	91.67	1.17	12	0.01

Species	Dead or Dying	Poor	Fair	Good	RPI	# of Trees	% of Pop.
Quercus texana	0.00	25.00	25.00	50.00	0.92	12	0.01
Magnolia grandiflora	0.00	33.33	33.33	33.33	0.85	12	0.01
Eucalyptus rudis	0.00	0.00	90.91	9.09	0.88	11	0.01
Eucalyptus sideroxylon	0.00	0.00	45.45	54.55	1.04	11	0.01
Ceratonia siliqua	0.00	0.00	9.09	90.91	1.17	11	0.01
Pittosporum angustifolium	0.00	0.00	0.00	100.00	1.20	11	0.01
Juniperus chinensis	0.00	0.00	36.36	63.64	1.07	11	0.01
Salix matsudana	0.00	10.00	20.00	70.00	1.04	10	0.01
Pyrus communis	0.00	0.00	70.00	30.00	0.95	10	0.01
Prunus armeniaca	0.00	0.00	10.00	90.00	1.16	10	0.01
Thuja occidentalis	0.00	0.00	50.00	50.00	1.02	10	0.01
Callistemon viminalis	0.00	0.00	40.00	60.00	1.06	10	0.01
Acacia rigidula	0.00	0.00	22.22	77.78	1.12	9	0.01
Celtis pallida	0.00	0.00	55.56	44.44	1.00	9	0.01
Jacaranda mimosifolia	0.00	22.22	44.44	33.33	0.86	9	0.01
Juniperus chinensis 'Torulosa'	0.00	0.00	0.00	100.00	1.20	9	0.01
Ficus carica	0.00	0.00	25.00	75.00	1.11	8	0.01
Eucalyptus spathulata	0.00	0.00	75.00	25.00	0.93	8	0.01
Fraxinus greggii	0.00	0.00	37.50	62.50	1.04	8	0.01
Malus sylvestris	0.00	12.50	87.50	0.00	0.80	8	0.01
Acacia species	12.50	0.00	0.00	87.50	1.07	8	0.01
Carya illinoinensis	0.00	28.57	14.29	57.14	0.95	7	0.01
Pinus sabiniana	0.00	0.00	42.86	57.14	1.05	7	0.01
Ziziphus jujuba	0.00	0.00	14.29	85.71	1.15	7	0.01
Ungnadia speciosa	0.00	0.00	0.00	100.00	1.20	7	0.01
Leucaena retusa	0.00	0.00	42.86	57.14	1.05	7	0.01
Ilex attenuata	0.00	0.00	0.00	100.00	1.20	7	0.01
Geijera parviflora	0.00	16.67	33.33	50.00	0.96	6	0.01
Olea europaea 'Wilson'	0.00	0.00	16.67	83.33	1.14	6	0.01
Cocculus laurifolius	0.00	0.00	0.00	100.00	1.20	6	0.01
Acer negundo 'Flamingo'	0.00	0.00	33.33	66.67	1.08	6	0.01
Lysiloma microphyllum	0.00	0.00	80.00	20.00	0.92	5	0.00
Phoenix sylvestris	0.00	0.00	0.00	100.00	1.20	5	0.00
Quercus gambelii	0.00	0.00	40.00	60.00	1.06	5	0.00
Quercus douglasii	0.00	0.00	20.00	80.00	1.13	5	0.00
Cedrus deodara	0.00	0.00	40.00	60.00	1.01	5	0.00
Acacia salicina	0.00	0.00	60.00	40.00	0.99	5	0.00
Vauquelinia californica	0.00	0.00	20.00	80.00	1.13	5	0.00
Amelanchier laevis	0.00	50.00	25.00	25.00	0.76	4	0.00
Carnegiea gigantea	0.00	0.00	0.00	100.00	1.20	4	0.00
Platanus mexicana	0.00	0.00	25.00	75.00	1.11	4	0.00
Butia capitata	0.00	25.00	50.00	25.00	0.85	4	0.00
Rhus lanceolata	0.00	0.00	0.00	100.00	1.20	4	0.00
Crataegus phaenopyrum	0.00	75.00	0.00	25.00	0.62	4	0.00
Arecastrum romanzoffianum	0.00	0.00	0.00	100.00	1.20	4	0.00

Species	Dead or Dying	Poor	Fair	Good	RPI	# of Trees	% of Pop.
Quercus agrifolia	0.00	75.00	0.00	25.00	0.62	4	0.00
Quercus berberidifolia	0.00	0.00	100.00	0.00	0.85	4	0.00
Eriobotyra japonica	0.00	66.67	0.00	33.33	0.73	3	0.00
Eriobotyra deflexa	0.00	0.00	0.00	100.00	1.20	3	0.00
Bauhinia lunarioides	0.00	0.00	0.00	100.00	1.20	3	0.00
Acacia saligna	0.00	0.00	66.67	33.33	0.96	3	0.00
Gleditsia triacanthos v. inermis	0.00	0.00	0.00	100.00	1.20	3	0.00
Acacia jennerae	0.00	0.00	33.33	66.67	1.08	3	0.00
Acacia gerrardii	0.00	0.00	33.33	66.67	1.08	3	0.00
Acacia schaffneri	0.00	33.33	33.33	33.33	0.85	3	0.00
Quercus palustris	0.00	66.67	33.33	0.00	0.61	3	0.00
Ilex altaclarensis 'Wilsonii'	0.00	0.00	0.00	100.00	1.20	3	0.00
Eucalyptus latens moon lagoon	0.00	0.00	0.00	100.00	1.13	3	0.00
Ligustrum japonicum	0.00	0.00	0.00	100.00	1.20	3	0.00
Sabal palmetto	0.00	0.00	0.00	100.00	1.20	3	0.00
Schinus terebinthifolius	0.00	0.00	0.00	100.00	1.20	3	0.00
Rhaphiolepis indica	0.00	0.00	100.00	0.00	0.85	3	0.00
Quercus rugosa	0.00	0.00	100.00	0.00	0.85	3	0.00
Eucalyptus spp.	0.00	0.00	33.33	66.67	0.94	3	0.00
Acacia millefolia	0.00	0.00	50.00	50.00	1.02	2	0.00
Ulmus glabra 'Camperdownii'	0.00	0.00	0.00	100.00	1.20	2	0.00
Nannorrhops ritchiana	0.00	0.00	0.00	100.00	1.20	2	0.00
Dalbergia sissoo	0.00	0.00	0.00	100.00	1.20	2	0.00
Sambucus nigra ssp. Cerulea	0.00	50.00	0.00	50.00	0.85	2	0.00
Eucalyptus formannii	0.00	0.00	0.00	100.00	1.20	2	0.00
Trachycarpus fortunei	0.00	0.00	0.00	100.00	1.09	2	0.00
Acacia willardiana	0.00	0.00	0.00	100.00	1.20	2	0.00
Ginkgo biloba 'Autumn Gold'	0.00	0.00	100.00	0.00	0.85	2	0.00
Caesalpinia palmeri	0.00	0.00	0.00	100.00	1.20	2	0.00
Acacia estrophiolata	0.00	0.00	0.00	100.00	1.20	2	0.00
Acer ginnala	0.00	50.00	0.00	50.00	0.85	2	0.00
Quercus rubra	0.00	50.00	50.00	0.00	0.67	2	0.00
Quercus wislizenii	0.00	50.00	50.00	0.00	0.67	2	0.00
Ulmus crassifolia	0.00	0.00	0.00	100.00	1.20	2	0.00
Populus alba	0.00	0.00	0.00	100.00	1.20	2	0.00
Pinus contorta 'bolanderi'	0.00	0.00	50.00	50.00	1.02	2	0.00
Salix x sepulcralis Simonkai	0.00	0.00	100.00	0.00	0.85	2	0.00
Geoffroea decorticans	0.00	0.00	0.00	100.00	1.20	2	0.00
Ailanthus altissima	0.00	0.00	50.00	50.00	1.02	2	0.00
Eucalyptus microcarpa	0.00	0.00	0.00	100.00	1.20	2	0.00
Machaerium tipu	0.00	0.00	50.00	50.00	1.02	2	0.00
Cercis canadensis texensis	0.00	0.00	0.00	100.00	1.20	2	0.00
Eucalyptus spp.	0.00	0.00	50.00	50.00	1.02	2	0.00
Quercus texana Buckley	0.00	0.00	100.00	0.00	0.85	2	0.00
Pinus canariensis	0.00	0.00	0.00	100.00	1.20	1	0.00

Species	Dead or Dying	Poor	Fair	Good	RPI	# of Trees	% of Pop.
Maclura pomifera	0.00	0.00	0.00	100.00	1.20	1	0.00
Mimosa dysocarpa	0.00	0.00	0.00	100.00	1.20	1	0.00
Acacia constricta var. paucispina	0.00	0.00	0.00	100.00	1.20	1	0.00
Quercus engelmannii	0.00	0.00	0.00	100.00	0.99	1	0.00
Acacia brachystachya	0.00	0.00	0.00	100.00	1.20	1	0.00
Condalia hookeri	0.00	0.00	0.00	100.00	1.20	1	0.00
Acacia karroo	0.00	0.00	0.00	100.00	1.20	1	0.00
Acacia papyrocarpa	0.00	0.00	0.00	100.00	1.20	1	0.00
Acacia tetragonophylla	0.00	0.00	0.00	100.00	1.20	1	0.00
Acacia erioloba	0.00	0.00	0.00	100.00	1.20	1	0.00
Havardia pallens tenaza	0.00	0.00	0.00	100.00	1.20	1	0.00
Acacia coriacea	0.00	0.00	0.00	100.00	1.20	1	0.00
Syringa vulgaris	0.00	0.00	100.00	0.00	0.85	1	0.00
Salix matsudana 'Tortuosa'	0.00	0.00	0.00	100.00	1.20	1	0.00
Chionanthus retusus	0.00	0.00	0.00	100.00	1.20	1	0.00
Fraxinus velutina 'Bonita'	0.00	0.00	0.00	100.00	1.20	1	0.00
Thuja occidentalis var. filiform	0.00	0.00	0.00	100.00	1.20	1	0.00
Ilex vomitoria	0.00	0.00	0.00	100.00	1.20	1	0.00
Juglans major	0.00	0.00	100.00	0.00	0.85	1	0.00
Bismarckia nobilis	0.00	0.00	0.00	100.00	1.20	1	0.00
Phoenix roebelenii	0.00	0.00	0.00	100.00	1.20	1	0.00
Fraxinus angustifolia ssp. Oxycarpa	0.00	0.00	0.00	100.00	1.20	1	0.00
Quercus polymorpha	0.00	0.00	0.00	100.00	1.20	1	0.00
Havardia mexicana	0.00	0.00	0.00	100.00	1.20	1	0.00
Populus balsamifera ssp. Balsamifera	0.00	0.00	100.00	0.00	0.85	1	0.00
Salix spp.	0.00	0.00	100.00	0.00	0.85	1	0.00
Betula papyrifera	0.00	0.00	100.00	0.00	0.85	1	0.00
Salix laevigata	0.00	0.00	0.00	100.00	1.20	1	0.00
Sapium sebiferum	0.00	0.00	100.00	0.00	0.85	1	0.00
Eucalyptus latens	0.00	0.00	0.00	100.00	1.20	1	0.00
Grevillea robusta	0.00	100.00	0.00	0.00	0.49	1	0.00
Olneya tesota	0.00	0.00	0.00	100.00	1.20	1	0.00
Fraxinus americana junjinger	0.00	0.00	0.00	100.00	1.20	1	0.00
Juniperus spp.	0.00	0.00	0.00	100.00	1.20	1	0.00
Prunus spp.	0.00	0.00	100.00	0.00	0.85	1	0.00
Caesalpinia cascalaco	0.00	0.00	100.00	0.00	0.85	1	0.00
Cercis reniformis	0.00	0.00	0.00	100.00	1.20	1	0.00
Malus spp.	0.00	0.00	0.00	100.00	1.20	1	0.00
Nicotiana glauca	0.00	0.00	0.00	100.00	1.20	1	0.00
AOI Average	**0.15**	**5.97**	**43.27**	**50.62**	**1.00**	**117,059**	**100%**

Table 30. Replacement Value of Inventoried Trees Across the AOI

Species	DBH Class (in) 0-3	3-7	7-13	13-19	19-25	25-31	24+	31-37	37-42	> 42	Total	% of Total $	% of Pop.
Pinus eldarica	161,269	4,430,465	28,903,645	25,406,834	7,316,357	1,028,787	353,983	231,548	122,435	0	**67,601,341**	24.49	14.26
Pinus halepensis	10,878	324,443	5,761,886	18,759,235	10,216,679	2,593,270	1,148,051	1,029,793	56,405	61,853	**38,814,442**	14.06	8.69
Fraxinus velutina 'Fan-Tex'	602,473	4,302,247	7,389,848	2,634,665	252,684	79,058	0	0	0	0	**15,260,975**	5.53	5.03
Fraxinus velutina	181,083	1,432,751	4,411,469	3,074,322	784,481	336,191	365,096	124,330	31,768	208,997	**10,585,392**	3.84	4.56
Pistacia chinensis	248,088	3,804,053	5,039,568	916,224	0	0	0	0	0	0	**10,007,933**	3.63	4.11
Quercus virginiana	197,441	3,161,549	5,246,900	1,102,044	65,176	0	0	0	0	0	**9,773,110**	3.54	4.02
Chiltalpa tashkentensis	137,274	2,691,491	6,098,009	374,721	24,493	0	0	0	0	0	**9,325,987**	3.38	3.88
Morus alba	9,326	35,628	450,716	3,149,907	2,739,690	1,612,771	1,266,842	854,134	263,226	149,482	**9,264,881**	3.36	3.66
Acacia stenophylla	357,472	3,080,103	3,943,541	1,120,622	138,300	0	0	0	0	0	**8,640,037**	3.13	3.56
Prosopis velutina	328,039	1,583,983	4,337,217	1,843,279	295,957	0	0	0	0	0	**8,388,475**	3.04	3.27
Ulmus parvifolia	196,176	1,991,765	2,255,698	857,990	46,100	0	0	0	0	0	**5,347,729**	1.94	3.25
Fraxinus angustifolia	128,733	1,831,422	2,332,084	907,105	38,699	0	0	0	0	0	**5,238,044**	1.90	3.10
Parkinsonia x 'Desert Museum'	582,421	2,155,484	2,185,280	164,617	24,493	0	0	0	0	0	**5,112,295**	1.85	3.05
Chilopsis linearis	893,814	2,040,543	1,530,904	289,656	0	0	0	0	0	0	**4,754,917**	1.72	2.83
Prosopis chilensis	298,250	981,324	1,628,059	1,024,659	199,187	132,377	0	0	0	0	**4,263,856**	1.54	2.67
Prosopis glandulosa	322,400	1,148,618	2,154,074	340,064	0	0	0	0	0	0	**3,965,156**	1.44	2.61
Parkinsonia florida	102,257	922,511	2,102,777	689,876	24,493	0	0	0	0	0	**3,841,913**	1.39	2.04
Pinus pinea	1,651	56,028	1,401,404	1,605,353	314,751	149,068	79,906	0	79,906	0	**3,608,161**	1.31	1.89
Acacia farnesiana	348,439	935,765	1,149,068	709,370	132,671	0	0	0	0	0	**3,275,312**	1.19	1.61
Olea europaea	70,038	651,026	1,443,174	612,982	191,862	39,621	0	0	0	0	**3,008,703**	1.09	1.31
Phoenix dactylifera	133	2,174	73,945	1,579,981	1,113,337	14,828	3,601	3,601	0	0	**2,787,999**	1.01	1.25
Prosopis alba	189,737	513,536	1,099,314	703,506	177,561	22,063	0	0	0	0	**2,705,718**	0.98	1.02
Vitex agnus-castus	840,944	1,114,561	361,059	118,227	0	30,842	0	0	0	0	**2,465,633**	0.89	0.97
Rhus lancea	111,421	836,928	1,156,460	191,697	30,203	43,692	0	0	0	0	**2,370,401**	0.86	0.87
Prosopis torreyana	124,828	686,071	1,050,320	381,219	34,698	0	0	0	0	0	**2,277,135**	0.83	0.79
Populus fremontii	5,348	26,109	117,419	463,181	527,907	398,480	279,639	195,693	62,704	21,242	**1,818,083**	0.66	0.78
Washingtonia robusta	10,164	20,852	696,178	854,838	113,000	28,974	18,513	15,555	2,440	518	**1,742,521**	0.63	0.72
Pinus roxburghii	1,693	95,348	481,178	946,792	195,671	0	0	0	0	0	**1,720,683**	0.62	0.65
Gleditsia triacanthos	51,780	265,931	927,902	351,450	87,642	0	0	0	0	0	**1,684,705**	0.61	0.59
Ulmus pumila	12,455	48,135	142,140	311,408	525,402	296,816	276,874	160,150	81,430	35,294	**1,613,231**	0.58	0.53
Populus species	2,501	42,458	166,156	398,906	381,818	252,190	160,632	137,907	22,725	0	**1,404,661**	0.51	0.49
Pyrus calleryana	12,628	371,453	800,671	18,411	153,081	0	0	0	0	0	**1,356,245**	0.49	0.45
Washingtonia filifera	1,405	2,388	207,706	326,817	551,494	143,827	90,608	49,261	22,311	19,036	**1,324,244**	0.48	0.44
Fraxinus velutina 'Glabra'	7,055	67,146	586,527	352,056	161,626	62,511	0	0	0	0	**1,236,921**	0.45	0.44
Quercus ilex	54,742	463,259	326,927	186,630	19,076	0	0	0	0	0	**1,050,635**	0.38	0.37
Robinia pseudoacacia	22,992	285,862	370,387	69,684	0	0	0	0	0	0	**748,925**	0.27	0.37
Eucalyptus microtheca	4,878	38,217	259,333	253,343	127,172	0	0	0	0	0	**682,943**	0.25	0.37
Olea europaea 'Swan Hill'	32,646	277,365	357,713	14,356	0	0	0	0	0	0	**682,080**	0.25	0.35
Fraxinus uhdei	3,357	34,819	253,423	192,219	54,086	44,626	0	0	0	0	**582,530**	0.21	0.35
Parkinsonia aculeata	45,486	93,692	234,155	131,591	56,017	0	0	0	0	0	**560,940**	0.20	0.34
Cupressus sempervirens	9,830	84,668	367,082	53,202	19,076	17,991	0	0	0	0	**551,849**	0.20	0.34
Pyrus kawakamii	4,647	212,678	250,229	70,290	0	0	0	0	0	0	**537,843**	0.19	0.33
Yucca brevifolia	4,605	301,172	200,774	28,712	0	0	0	0	0	0	**535,264**	0.19	0.29
Morus alba 'Chaparral'	0	1,909	29,069	220,934	222,478	56,129	0	0	0	0	**530,519**	0.19	0.28

Species	DBH Class (in)										Total	% of Total $	% of Pop.
	0-3	3-7	7-13	13-19	19-25	25-31	24+	31-37	37-42	> 42			
Platanus wrightii	4,401	10,911	142,571	200,936	153,485	17,389	0	0	0	0	**529,694**	0.19	0.28
Prosopis juliflora	4,669	32,012	148,336	265,337	34,698	0	0	0	0	0	**485,052**	0.18	0.27
Phoenix canariensis	922	10,185	10,904	207,016	76,845	68,367	88,330	74,383	4,649	9,298	**462,569**	0.17	0.24
Pinus brutia	0	0	7,065	170,236	215,289	0	57,817	0	57,817	0	**450,407**	0.16	0.21
Plantanus occidentalis	1,808	7,159	201,622	224,255	0	0	0	0	0	0	**434,844**	0.16	0.19
Schinus molle	954	26,940	186,051	97,959	54,048	0	44,134	44,134	0	0	**410,087**	0.15	0.17
Robinia ambigua 'Purple Rose'	38,956	127,025	202,601	0	0	0	0	0	0	0	**368,581**	0.13	0.16
Cercidium praecox	37,579	158,865	103,399	38,846	0	0	0	0	0	0	**338,689**	0.12	0.16
Parkonsonia hybrid	25,107	116,704	171,420	12,996	0	0	0	0	0	0	**326,226**	0.12	0.15
Acacia greggii	57,305	138,638	56,886	57,425	0	0	0	0	0	0	**310,253**	0.11	0.14
Platanus racemosa	192	3,456	35,326	191,530	76,621	0	0	0	0	0	**307,124**	0.11	0.14
Ligustrum lucidum	22,149	187,148	79,306	14,356	0	0	0	0	0	0	**302,958**	0.11	0.13
Pistacia X atlantica	1,032	15,536	283,593	0	0	0	0	0	0	0	**300,161**	0.11	0.12
Brachychiton populneum	7,774	117,605	164,635	0	0	0	0	0	0	0	**290,014**	0.11	0.12
Pinus ponderosa var. scopulorum	0	0	39,820	63,336	100,148	74,534	0	0	0	0	**277,838**	0.10	0.12
Platycladus orientalis	2,518	43,677	125,149	82,759	19,076	0	0	0	0	0	**273,178**	0.10	0.12
Celtis occidentalis	4,089	59,211	163,193	42,416	0	0	0	0	0	0	**268,910**	0.10	0.12
Prosopis spp.	9,539	90,121	108,070	59,989	0	0	0	0	0	0	**267,719**	0.10	0.11
Brahea armata	1,714	115,912	69,139	79,242	0	0	0	0	0	0	**266,008**	0.10	0.11
Parkinsonia microphylla	15,771	54,814	165,007	0	24,493	0	0	0	0	0	**260,085**	0.09	0.11
Eucalyptus camaldulensis	14,118	39,372	53,617	55,805	83,704	12,454	0	0	0	0	**259,070**	0.09	0.09
Sophora secundiflora	180,595	50,743	8,220	0	0	0	0	0	0	0	**239,559**	0.09	0.09
Juniperus chinensis 'Torulosa'	0	0	37,900	192,813	0	0	0	0	0	0	**230,713**	0.08	0.09
Platanus x acerfolia	135	494	151,914	53,739	15,453	0	0	0	0	0	**221,735**	0.08	0.09
Acacia aneura	93,802	110,982	11,377	0	0	0	0	0	0	0	**216,161**	0.08	0.08
Prunus cerasifera	49,912	116,192	44,727	0	0	0	0	0	0	0	**210,831**	0.08	0.08
Juniperus spp.	1,147	30,847	44,588	128,542	0	0	0	0	0	0	**205,124**	0.07	0.08
Quecus shumardii	3,385	26,166	159,873	5,856	0	0	0	0	0	0	**195,280**	0.07	0.07
Melia azedarach	2,525	8,335	39,650	95,134	33,008	0	0	0	0	0	**178,652**	0.06	0.07
Quercus fusiformis	11,610	91,918	56,217	10,134	0	0	0	0	0	0	**169,878**	0.06	0.07
Salix gooddingii	692	2,867	14,022	17,573	89,919	31,256	0	0	0	0	**156,329**	0.06	0.07
Eucalyptus polyanthemos	791	34,011	46,178	10,134	0	43,692	0	0	0	0	**134,806**	0.05	0.06
Tamarix chinensis	22,295	45,266	52,580	12,996	0	0	0	0	0	0	**133,138**	0.05	0.06
Koelreuteria paniculata	4,692	29,139	58,508	7,271	27,317	0	0	0	0	0	**126,927**	0.05	0.06
Acacia pendula	1,909	58,892	36,474	5,911	19,076	0	0	0	0	0	**122,262**	0.04	0.06
Albizia julibrissin	6,870	22,271	37,716	49,082	0	0	0	0	0	0	**115,938**	0.04	0.05
Chamaerops humilis	34,881	52,341	18,547	934	0	0	0	0	0	0	**106,703**	0.04	0.05
Prosopis pubescens	13,664	39,608	45,936	0	0	0	0	0	0	0	**99,207**	0.04	0.05
Cupressus leylandii	428	796	14,618	58,174	21,874	0	0	0	0	0	**95,890**	0.03	0.05
Acacia constricta	11,619	54,685	28,443	0	0	0	0	0	0	0	**94,748**	0.03	0.05
Geijera parviflora	382	2,299	30,468	0	60,639	0	0	0	0	0	**93,789**	0.03	0.04
Elaeocarpus decipiens	4,036	55,937	29,069	0	0	0	0	0	0	0	**89,042**	0.03	0.04
Xylosma congestum	14,442	18,616	44,505	10,134	0	0	0	0	0	0	**87,697**	0.03	0.04
Lagerstroemia indica	32,454	45,828	7,267	0	0	0	0	0	0	0	**85,549**	0.03	0.04
Juniperus chinensis	0	15,711	63,166	0	0	0	0	0	0	0	**78,877**	0.03	0.04

Species	DBH Class (in) 0-3	3-7	7-13	13-19	19-25	25-31	24+	31-37	37-42	> 42	Total	% of Total $	% of Pop.
Cupressus glabra	1,308	6,569	42,391	28,169	0	0	0	0	0	0	**78,437**	0.03	0.04
Eucalyptus sideroxylon	258	0	29,112	48,980	0	0	0	0	0	0	**78,350**	0.03	0.04
Other	10,156	14,947	22,754	0	27,024	0	0	0	0	0	**74,882**	0.03	0.03
Pinus thunbergiana	0	0	66,511	0	0	0	0	0	0	0	**66,511**	0.02	0.03
Cercis canadensis	25,225	17,859	20,519	0	0	0	0	0	0	0	**63,604**	0.02	0.03
Quercus lobata	1,194	7,693	22,899	29,970	0	0	0	0	0	0	**61,756**	0.02	0.03
Pinus sabiniana	258	1,522	8,031	24,490	27,024	0	0	0	0	0	**61,324**	0.02	0.03
Prunus dulcis	2,107	12,243	19,664	25,992	0	0	0	0	0	0	**60,007**	0.02	0.03
Salix matsudana	0	494	1,955	29,970	21,892	0	0	0	0	0	**54,310**	0.02	0.03
Parkinsonia x 'Sonoran Emerald'	234	13,366	39,328	0	0	0	0	0	0	0	**52,929**	0.02	0.03
Zelkova serrata	270	3,086	33,371	15,846	0	0	0	0	0	0	**52,573**	0.02	0.03
Podocarpus macrophyllus	15,405	33,026	0	0	0	0	0	0	0	0	**48,431**	0.02	0.02
Casuarina equisetifolia	258	6,086	39,820	0	0	0	0	0	0	0	**46,164**	0.02	0.02
Prunus caroliniana	4,787	22,375	15,393	0	0	0	0	0	0	0	**42,555**	0.02	0.02
Machaerium tipu	0	0	0	10,301	0	0	31,557	31,557	0	0	**41,858**	0.02	0.02
Quercus muehlenbergii	3,549	17,498	20,665	0	0	0	0	0	0	0	**41,712**	0.02	0.02
Sophora japonica	96	2,098	38,537	0	0	0	0	0	0	0	**40,731**	0.01	0.02
Ziziphus jujuba	569	1,909	19,664	18,411	0	0	0	0	0	0	**40,553**	0.01	0.02
Pistacia X atlantica 'Red Push'	231	6,801	20,550	10,301	0	0	0	0	0	0	**37,883**	0.01	0.02
Quercus suber	954	10,114	11,377	14,356	0	0	0	0	0	0	**36,801**	0.01	0.02
Arbutus unedo	8,765	21,928	5,689	0	0	0	0	0	0	0	**36,381**	0.01	0.02
Celtis reticulata	6,178	12,736	7,011	10,301	0	0	0	0	0	0	**36,226**	0.01	0.02
Ebenopsis ebano	9,471	13,336	9,704	0	0	0	0	0	0	0	**32,510**	0.01	0.02
Quercus gambelii	569	0	10,260	18,411	0	0	0	0	0	0	**29,239**	0.01	0.02
Eucalyptus spathulata	0	9,997	0	18,411	0	0	0	0	0	0	**28,408**	0.01	0.02
Ilex cornuta Burfordii	4,366	7,233	16,567	0	0	0	0	0	0	0	**28,165**	0.01	0.02
Pistacia vera	461	2,067	25,627	0	0	0	0	0	0	0	**28,156**	0.01	0.02
Pittosporum angustifolium	258	10,651	17,066	0	0	0	0	0	0	0	**27,974**	0.01	0.02
Fraxinus sieboldiana	3,156	23,700	0	0	0	0	0	0	0	0	**26,856**	0.01	0.02
Ceratonia siliqua	2,060	0	9,704	14,356	0	0	0	0	0	0	**26,120**	0.01	0.02
Caesalpinia mexicana	11,179	9,129	5,689	0	0	0	0	0	0	0	**25,997**	0.01	0.01
Eucalyptus rudis	406	987	6,702	4,134	10,946	0	0	0	0	0	**23,175**	0.01	0.01
Phoenix sylvestris	0	0	17,485	4,490	0	0	0	0	0	0	**21,975**	0.01	0.01
Citrus species	5,157	4,744	12,046	0	0	0	0	0	0	0	**21,947**	0.01	0.01
Cercis occidentalis	3,415	10,895	7,267	0	0	0	0	0	0	0	**21,577**	0.01	0.01
Pinus contorta 'bolanderi'	0	0	21,551	0	0	0	0	0	0	0	**21,551**	0.01	0.01
Quercus macrocarpa	0	5,266	16,197	0	0	0	0	0	0	0	**21,463**	0.01	0.01
Prunus spp.	5,025	8,537	7,267	0	0	0	0	0	0	0	**20,829**	0.01	0.01
Ficus carica	1,137	1,909	17,527	0	0	0	0	0	0	0	**20,574**	0.01	0.01
Eucalyptus formannii	0	0	5,689	14,356	0	0	0	0	0	0	**20,045**	0.01	0.01
Nerium oleander	15,160	3,602	0	0	0	0	0	0	0	0	**18,762**	0.01	0.01
Punica granatum	8,764	9,772	0	0	0	0	0	0	0	0	**18,536**	0.01	0.01
Gleditsia triacanthos v. inermis	0	0	8,220	10,301	0	0	0	0	0	0	**18,521**	0.01	0.01
Cordia boissieri	7,907	4,565	5,689	0	0	0	0	0	0	0	**18,160**	0.01	0.01
Laurus nobillis	6,086	11,367	0	0	0	0	0	0	0	0	**17,453**	0.01	0.01

Species	DBH Class (in)										Total	% of Total $	% of Pop.
	0-3	3-7	7-13	13-19	19-25	25-31	24+	31-37	37-42	> 42			
Myrtus communis	5,925	0	0	0	11,128	0	0	0	0	0	**17,052**	0.01	0.01
Acacia salicina	170	2,017	0	0	0	13,284	0	0	0	0	**15,471**	0.01	0.01
Prunus persica	3,730	6,515	5,130	0	0	0	0	0	0	0	**15,374**	0.01	0.01
Fraxinus anomala	1,489	13,591	0	0	0	0	0	0	0	0	**15,080**	0.01	0.01
Cycas revoluta	430	8,103	6,171	0	0	0	0	0	0	0	**14,703**	0.01	0.01
Platanus mexicana	0	494	2,374	11,712	0	0	0	0	0	0	**14,580**	0.01	0.01
Eysenhardtia orthocarpa	10,755	3,819	0	0	0	0	0	0	0	0	**14,574**	0.01	0.01
Dalbergia sissoo	0	0	4,110	10,301	0	0	0	0	0	0	**14,411**	0.01	0.01
Geoffroea decorticans	0	0	4,110	10,301	0	0	0	0	0	0	**14,411**	0.01	0.01
Celtis sinensis	766	5,554	7,400	0	0	0	0	0	0	0	**13,720**	0.00	0.01
Cocculus laurifolius	0	7,608	5,689	0	0	0	0	0	0	0	**13,296**	0.00	0.01
Eucalyptus melliodora	364	12,888	0	0	0	0	0	0	0	0	**13,252**	0.00	0.01
Sabal palmetto	0	0	8,743	4,490	0	0	0	0	0	0	**13,233**	0.00	0.01
Malus sylvestris	201	7,526	5,130	0	0	0	0	0	0	0	**12,856**	0.00	0.01
Prunus armeniaca	1,990	3,257	7,267	0	0	0	0	0	0	0	**12,515**	0.00	0.01
Prosopis spp.	2,233	6,868	3,385	0	0	0	0	0	0	0	**12,486**	0.00	0.01
Bauhinia variegata	2,792	9,547	0	0	0	0	0	0	0	0	**12,339**	0.00	0.01
Lysiloma microphyllum	485	1,348	10,260	0	0	0	0	0	0	0	**12,092**	0.00	0.01
Thuja occidentalis	151	7,697	4,142	0	0	0	0	0	0	0	**11,990**	0.00	0.01
Cercis occidentalis 'Oklahoma'	9,269	1,909	0	0	0	0	0	0	0	0	**11,178**	0.00	0.01
Prunus mexicana	10,506	0	0	0	0	0	0	0	0	0	**10,506**	0.00	0.01
Eucalyptus papuana	3,203	1,522	5,689	0	0	0	0	0	0	0	**10,413**	0.00	0.01
Cotinus coggygria	3,328	1,909	5,130	0	0	0	0	0	0	0	**10,368**	0.00	0.01
Salix x sepulcralis Simonkai	0	0	2,901	7,271	0	0	0	0	0	0	**10,173**	0.00	0.01
Koelreuteria bipinnata	1,323	7,935	0	0	0	0	0	0	0	0	**9,258**	0.00	0.01
Quercus texana	946	987	7,121	0	0	0	0	0	0	0	**9,054**	0.00	0.01
Olea europaea 'Wilson'	182	7,608	0	0	0	0	0	0	0	0	**7,789**	0.00	0.01
Schinus terebinthifolius	258	1,522	5,689	0	0	0	0	0	0	0	**7,468**	0.00	0.01
Havardia mexicana	0	0	7,267	0	0	0	0	0	0	0	**7,267**	0.00	0.01
Chionanthus retusus	0	0	7,267	0	0	0	0	0	0	0	**7,267**	0.00	0.00
Acacia gerrardii	0	3,043	4,015	0	0	0	0	0	0	0	**7,059**	0.00	0.00
Acacia saligna	0	1,134	5,802	0	0	0	0	0	0	0	**6,936**	0.00	0.00
Vauquelinia californica	954	0	5,689	0	0	0	0	0	0	0	**6,643**	0.00	0.00
Fraxinus cuspidata	3,332	3,257	0	0	0	0	0	0	0	0	**6,590**	0.00	0.00
Acacia schaffneri	182	627	5,689	0	0	0	0	0	0	0	**6,497**	0.00	0.00
Pyrus communis	1,480	800	4,110	0	0	0	0	0	0	0	**6,391**	0.00	0.00
Carya illinoinensis	1,030	1,253	4,015	0	0	0	0	0	0	0	**6,299**	0.00	0.00
Magnolia grandiflora	1,646	4,296	0	0	0	0	0	0	0	0	**5,942**	0.00	0.00
Eucalyptus spp.	182	0	5,689	0	0	0	0	0	0	0	**5,870**	0.00	0.00
Jacaranda mimosifolia	170	3,772	1,787	0	0	0	0	0	0	0	**5,729**	0.00	0.00
Acacia coriacea	0	0	5,689	0	0	0	0	0	0	0	**5,689**	0.00	0.00
Juniperus spp.	0	0	5,689	0	0	0	0	0	0	0	**5,689**	0.00	0.00
Leucaena retusa	1,394	0	4,015	0	0	0	0	0	0	0	**5,409**	0.00	0.00
Sapium sebiferum	0	0	5,130	0	0	0	0	0	0	0	**5,130**	0.00	0.00
Populus alba	0	0	4,747	0	0	0	0	0	0	0	**4,747**	0.00	0.00

Species	DBH Class (in)										Total	% of Total $	% of Pop.
	0-3	3-7	7-13	13-19	19-25	25-31	24+	31-37	37-42	> 42			
Acacia rigidula	1,727	2,596	0	0	0	0	0	0	0	0	**4,322**	0.00	0.00
Acacia species	408	3,898	0	0	0	0	0	0	0	0	**4,305**	0.00	0.00
Cedrus deodara	439	3,849	0	0	0	0	0	0	0	0	**4,288**	0.00	0.00
Amelanchier laevis	170	4,044	0	0	0	0	0	0	0	0	**4,213**	0.00	0.00
Carnegiea gigantea	0	0	0	4,203	0	0	0	0	0	0	**4,203**	0.00	0.00
Populus balsamifera ssp. Balsamifera	0	0	0	4,134	0	0	0	0	0	0	**4,134**	0.00	0.00
Salix matsudana 'Tortuosa'	0	0	4,110	0	0	0	0	0	0	0	**4,110**	0.00	0.00
Fraxinus velutina 'Bonita'	0	0	4,110	0	0	0	0	0	0	0	**4,110**	0.00	0.00
Malus spp.	2,679	1,348	0	0	0	0	0	0	0	0	**4,027**	0.00	0.00
Arecastrum romanzoffianum	0	494	3,085	0	0	0	0	0	0	0	**3,579**	0.00	0.00
Callistemon viminalis	1,733	0	1,787	0	0	0	0	0	0	0	**3,520**	0.00	0.00
Forestiera pubescens	3,328	0	0	0	0	0	0	0	0	0	**3,328**	0.00	0.00
Eriobotyra deflexa	258	3,043	0	0	0	0	0	0	0	0	**3,301**	0.00	0.00
Trachycarpus fortunei	1,137	2,061	0	0	0	0	0	0	0	0	**3,198**	0.00	0.00
Quercus agrifolia	0	3,133	0	0	0	0	0	0	0	0	**3,133**	0.00	0.00
Ulmus crassifolia	0	699	2,374	0	0	0	0	0	0	0	**3,073**	0.00	0.00
Ulmus glabra 'Camperdownii'	0	699	2,374	0	0	0	0	0	0	0	**3,073**	0.00	0.00
Acer negundo 'Flamingo'	801	2,267	0	0	0	0	0	0	0	0	**3,068**	0.00	0.00
Eucalyptus microcarpa	0	3,043	0	0	0	0	0	0	0	0	**3,043**	0.00	0.00
Quercus berberidifolia	364	2,148	0	0	0	0	0	0	0	0	**2,512**	0.00	0.00
Rhaphiolepis indica	182	2,148	0	0	0	0	0	0	0	0	**2,330**	0.00	0.00
Quercus texana Buckley	0	494	1,676	0	0	0	0	0	0	0	**2,169**	0.00	0.00
Ligustrum japonicum	515	1,522	0	0	0	0	0	0	0	0	**2,037**	0.00	0.00
Butia capitata	0	842	0	1,174	0	0	0	0	0	0	**2,017**	0.00	0.00
Acacia jennerae	439	1,522	0	0	0	0	0	0	0	0	**1,961**	0.00	0.00
Celtis pallida	1,939	0	0	0	0	0	0	0	0	0	**1,939**	0.00	0.00
Nannorrhops ritchiana	0	1,854	0	0	0	0	0	0	0	0	**1,854**	0.00	0.00
Ilex attenuata	1,803	0	0	0	0	0	0	0	0	0	**1,803**	0.00	0.00
Fraxinus greggii	1,787	0	0	0	0	0	0	0	0	0	**1,787**	0.00	0.00
Ungnadia speciosa	1,615	0	0	0	0	0	0	0	0	0	**1,615**	0.00	0.00
Quercus polymorpha	0	1,522	0	0	0	0	0	0	0	0	**1,522**	0.00	0.00
Nicotiana glauca	0	1,522	0	0	0	0	0	0	0	0	**1,522**	0.00	0.00
Acacia karroo	0	1,522	0	0	0	0	0	0	0	0	**1,522**	0.00	0.00
Pinus canariensis	0	1,522	0	0	0	0	0	0	0	0	**1,522**	0.00	0.00
Acacia papyrocarpa	0	1,522	0	0	0	0	0	0	0	0	**1,522**	0.00	0.00
Quercus rugosa	364	1,074	0	0	0	0	0	0	0	0	**1,438**	0.00	0.00
Salix spp.	0	1,348	0	0	0	0	0	0	0	0	**1,348**	0.00	0.00
Prunus spp.	0	1,348	0	0	0	0	0	0	0	0	**1,348**	0.00	0.00
Rhus lanceolata	1,137	0	0	0	0	0	0	0	0	0	**1,137**	0.00	0.00
Thuja occidentalis var. filiform	0	1,128	0	0	0	0	0	0	0	0	**1,128**	0.00	0.00
Quercus douglasii	1,093	0	0	0	0	0	0	0	0	0	**1,093**	0.00	0.00
Bismarckia nobilis	0	0	0	1,051	0	0	0	0	0	0	**1,051**	0.00	0.00
Ginkgo biloba 'Autumn Gold'	170	800	0	0	0	0	0	0	0	0	**970**	0.00	0.00
Bauhinia lunarioides	853	0	0	0	0	0	0	0	0	0	**853**	0.00	0.00
Betula papyrifera	0	800	0	0	0	0	0	0	0	0	**800**	0.00	0.00

Species	DBH Class (in)										Total	% of Total $	% of Pop.
	0-3	3-7	7-13	13-19	19-25	25-31	24+	31-37	37-42	> 42			
Ilex altaclarensis 'Wilsonii'	773	0	0	0	0	0	0	0	0	0	**773**	0.00	0.00
Acacia millefolia	204	526	0	0	0	0	0	0	0	0	**730**	0.00	0.00
Eucalyptus latens moon lagoon	727	0	0	0	0	0	0	0	0	0	**727**	0.00	0.00
Crataegus phaenopyrum	700	0	0	0	0	0	0	0	0	0	**700**	0.00	0.00
Eucalyptus spp.	606	0	0	0	0	0	0	0	0	0	**606**	0.00	0.00
Eriobotyra japonica	597	0	0	0	0	0	0	0	0	0	**597**	0.00	0.00
Cercis canadensis texensis	569	0	0	0	0	0	0	0	0	0	**569**	0.00	0.00
Caesalpinia palmeri	569	0	0	0	0	0	0	0	0	0	**569**	0.00	0.00
Acacia estrophiolata	515	0	0	0	0	0	0	0	0	0	**515**	0.00	0.00
Olneya tesota	484	0	0	0	0	0	0	0	0	0	**484**	0.00	0.00
Acacia willardiana	461	0	0	0	0	0	0	0	0	0	**461**	0.00	0.00
Acer ginnala	401	0	0	0	0	0	0	0	0	0	**401**	0.00	0.00
Sambucus nigra ssp. Cerulea	401	0	0	0	0	0	0	0	0	0	**401**	0.00	0.00
Quercus wislizenii	352	0	0	0	0	0	0	0	0	0	**352**	0.00	0.00
Ailanthus altissima	327	0	0	0	0	0	0	0	0	0	**327**	0.00	0.00
Quercus palustris	326	0	0	0	0	0	0	0	0	0	**326**	0.00	0.00
Grevillea robusta	0	307	0	0	0	0	0	0	0	0	**307**	0.00	0.00
Malus spp.	284	0	0	0	0	0	0	0	0	0	**284**	0.00	0.00
Cercis reniformis	284	0	0	0	0	0	0	0	0	0	**284**	0.00	0.00
Salix laevigata	284	0	0	0	0	0	0	0	0	0	**284**	0.00	0.00
Mimosa dysocarpa	284	0	0	0	0	0	0	0	0	0	**284**	0.00	0.00
Ilex vomitoria	258	0	0	0	0	0	0	0	0	0	**258**	0.00	0.00
Havardia pallens tenaza	258	0	0	0	0	0	0	0	0	0	**258**	0.00	0.00
Condalia hookeri	258	0	0	0	0	0	0	0	0	0	**258**	0.00	0.00
Acacia erioloba	258	0	0	0	0	0	0	0	0	0	**258**	0.00	0.00
Acacia tetragonophylla	258	0	0	0	0	0	0	0	0	0	**258**	0.00	0.00
Acacia brachystachya	258	0	0	0	0	0	0	0	0	0	**258**	0.00	0.00
Acacia constricta var. paucispina	258	0	0	0	0	0	0	0	0	0	**258**	0.00	0.00
Eucalyptus latens	258	0	0	0	0	0	0	0	0	0	**258**	0.00	0.00
Quercus rubra	231	0	0	0	0	0	0	0	0	0	**231**	0.00	0.00
Fraxinus angustifolia ssp. Oxycarpa	231	0	0	0	0	0	0	0	0	0	**231**	0.00	0.00
Maclura pomifera	231	0	0	0	0	0	0	0	0	0	**231**	0.00	0.00
Phoenix roebelenii	215	0	0	0	0	0	0	0	0	0	**215**	0.00	0.00
Quercus engelmannii	212	0	0	0	0	0	0	0	0	0	**212**	0.00	0.00
Syringa vulgaris	201	0	0	0	0	0	0	0	0	0	**201**	0.00	0.00
Fraxinus americana junjinger	192	0	0	0	0	0	0	0	0	0	**192**	0.00	0.00
Caesalpinia cascalaco	182	0	0	0	0	0	0	0	0	0	**182**	0.00	0.00
Juglans major	170	0	0	0	0	0	0	0	0	0	**170**	0.00	0.00
AOI Total	**$7,750,909**	**$46,262,317**	**$104,783,111**	**$76,732,023**	**$28,561,128**	**$7,645,088**	**$4,265,584**	**$2,952,047**	**$807,816**	**$505,720**	**$276,000,160**	**100%**	**100%**