The State of Urban and Community Forestry in California

Status in 2016
and
Trends since 1988

By

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Table of Contents

Executive Summary

♦ Human population growth is out-pacing growth in municipal trees, increasing from 4 residents/tree to 8 since 1988.

♦ Larger cities tend to have fewer trees per capita than smaller cities; a trend that is growing.

♦ The drought had a significant impact on municipal tree inventory and health. Over 40% reported removing more trees than planting as a percentage of inventory.

♦ The lack of growing space for street trees continues to be the primary factor in constraining species choice forcing reliance on small-stature, short-lived species. Crape Myrtle is by far the most planted street tree followed now by oaks, then Chinese Pistache.

♦ Oaks, sycamores, and pines are the most preferred genera for park trees.

♦ The lack of desired species/cultivar availability is cited now as the leading problem associated with nursery stock.

♦ The trend continues in shifting responsibility for maintaining trees once planted from homeowners to municipalities.

♦ Urban forestry remains heavily dependent upon taxpayer support through city or county general funds. Urban forestry budgets are declining - the average city tree budget per resident continued to decline from around $5 in 1988 to $2.50 in 2016 (in 1988 dollars); the inflation adjusted median has declined even more from over $3/resident to about $1. Medium to large cities have the greatest difficulty in maintaining financial support.

♦ The trend continues in moving Urban Forestry programs out of Parks & Rec departments and into Public Works and other departments.

♦ There was a sizable drop in full-time staff since the 2003 survey and a big jump in using volunteers and youth organizations to support the tree program. Medium and large cities continue to transfer tree activities to contractors, nearly all certified.

♦ The 2016 survey saw a return to the trend in trimming mature trees after a drop in the 2003 survey. Topping and similar practices continue to decline gradually.

♦ Nearly all programs try to prevent or repair tree hazards and not transfer the problem to owners. Still the trend in contesting damage claims continues to increase to nearly 50% of the respondents.

♦ Use of root barriers to prevent sidewalk damage has fallen out of favor as has use measures to mitigate other damage (e.g., eliminating tree lawns) This may be a result of having to divert money to removing trees due to the drought.

♦ The large wood waste stream resulting from the drought forced many municipalities to chip and dump far more material than in the past. Nevertheless, solidwood utilization of these raw materials increased markedly in the 2016 survey.

♦ Community support for municipal tree programs has changed little since 1988, with still over half of respondents without a Tree Board/Commission.

♦ Communicating the message of urban forestry and program needs to the community is critical. Arbor Day celebrations remain the primary outlet while new (since 2003) internet-based outlets are gaining on newspapers and school programs.

♦ Only 54% of respondents had an urban forest management plan and about one-third of them had incorporated social equity provisions (i.e., urban forest benefit distribution by community socioeconomic status).

♦ More respondents chose civic, business and financial benefits of urban forests over the environmental benefits, although the new choices of public health benefits and role of trees in mitigating climate change were near the top.

♦ The need for adequate program funding remains the number one need while better tree care, nursery stock and technical information continue to decline in relative importance

Introduction

Comprised of a complex mix of urbanized wildlands and introduced forests, California's urban forests are facing serious challenges with a human population greater than Canada's, unique and varied environments, and significant forest health threats. The California Department of Forestry and Fire Protection (Cal Fire) has been at the forefront of raising public awareness of these issues and supporting communities to protect and expand their urban forests.

Under authorization of the California Urban Forestry Act of 1978, Cal Fire created the Urban Forestry Program to provide monetary and technical support for municipalities to establish and sustain their urban forests. In order to assess the program's effectiveness, Cal Fire has funded periodic surveys of municipalities seeking information on a wide range of management issues. Phytosphere, Inc. conducted the 1988 and 1992 surveys (Bernhardt and Swiecki, 1988 and 1992). The Urban Forest Ecosystems Institute (UFEI)[1] at Cal Poly, San Luis Obispo, managed the 1998, 2003 and 2017 surveys.

The original 1988 survey instrument was less detailed than subsequent ones which limits the trend information on some issues. However, the instrument has changed little since 1992. A few questions relating to current issues were added to the 2017 survey based on advise from the California Urban Forest Council (advisory body for Cal Fire Urban Forestry Program). See Appendix 2 for the survey instrument. The 2017 survey of municipal urban and community forestry programs in California was begun in March 2017 and closed the following July. Information presented in this report is therefore based upon FY 2016 data, and hereafter, all references to the current survey will be 2016.

Naturally one of the primary issues for this survey is the organizational and funding status of city tree programs. Despite early gains, funding to support community tree program has generally lagged behind that for other city services (Clark et al. 2005, Hauer and Peterson 2015, NU-CFAC 2015). As a result, many communities must rely to varying degrees on volunteers and non-profit organizations for tree planting, maintenance, and to lobby for increased support for their urban forestry programs. Although matters relating to these organizations are very important, NGOs are not part of the survey population.

This report on the status and trends in municipal urban forestry programs is organized into three main sections: 1) Trees of the Urban Forest showing trends in species composition and factors affecting species selection, 2) Managing the Urban Forest addressing funding, staffing, and management practices, and 3) Community Involvement addressing community support, education, ordinances, and advocacy. Although each survey question was analyzed, this report presents results for only those deemed to provide meaningful trend information. The raw data are available upon request.

It is important to reiterate that nearly **all survey questions pertain only to public trees and programs of cities and counties -** a small minority of an incorporated area's urban forest, typically around 20%.

Quotation (sidebar boxes) appear throughout the report. They are intended to provide insightful comments from respondents on key programmatic issues. These remarks were offered voluntarily.

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[1] UFEI website: ufei.calpoly.edu

Survey Response

In past surveys, nearly all incorporated cities (now 482) and all 58 counties were mailed surveys with hopes of it reaching the appropriate official. The 2016 survey population was conducted using the Internet-based SurveyMonkey© software by contacting the city/county official via email with the survey link. Because the organizational location and structure of urban forestry programs is highly dynamic, the task of identifying the appropriate public official possessing the necessary information was difficult. The result was a survey population of 300 municipalities (284 cities and 16 counties). The primary difference with the 2016 population and those of the past is a large number of very small cities (<5000) not being reached. Typically, these communities are too small to justify tree programs or rely on the county for such services.
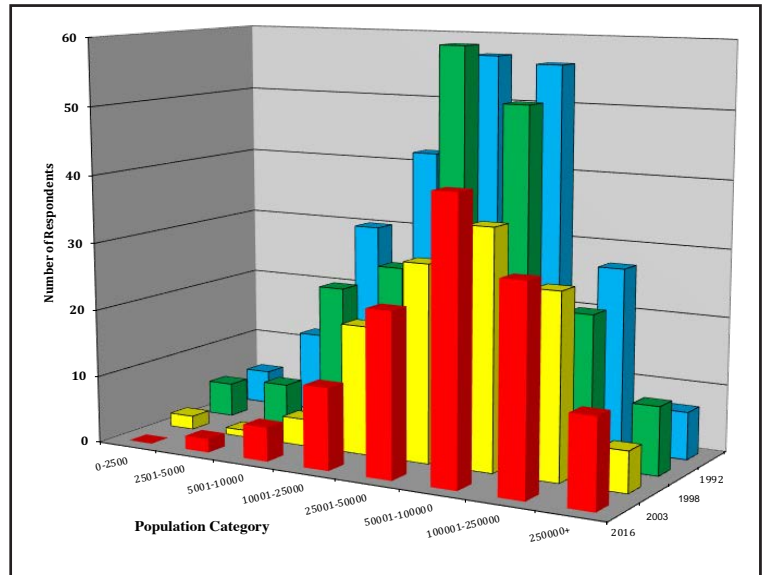

Figure 1. Respondent numbers by city size for the last 4 surveys

We estimated that about 2 hours would be required to complete the survey for the average-sized city once all the information was at hand. After several notification emails and phone calls, 130 cities and 4 counties responded; 5 city responses were unusable leaving 129 for analysis, a 42% response. Because the 2016 survey population was smaller than past ones, comparing response rates becomes problematic. Data for the 2003 survey was collected by Cal Fire directly, receiving 32% response (137 cities and 15 counties) and 270 in 1998 (see Appendix 3). Figure 1 presents the response numbers by city size category for the current and previous 3 surveys. Responses from the previous surveys shown in the figure are only from cities with tree programs. As Figure 2 illustrates, response from cities without tree programs has declined to the point in the current survey that essentially no cities responded that lacked a tree program. This accounts, in large measure, for the decline in survey response since 1988 - cities without tree programs had no reason to respond.

The distribution of responses across city size is skewed with the mode in the 50,000 to 100,000 population (Figure 1). Past surveys had a somewhat better response from cities in the 25,000-50,000 category. Response from population over 100,000 (only 45 cities in the state) remains excellent. The response from the 82 cities with populations between 50,000 and 100,000 was not quite half. Cities with populations over 25,000 are clearly more likely to possess tree (U&CF) programs (defined by the criteria designed to receive public funds for tree planting and care). The result is that about half of the state's population is represented in both the 2003 and 2016 survey responses.

Response from cities lacking a tree program are clearly declining over time (see Figure 3). Cities without a tree program would naturally find this survey to be irrelevant and not bother responding. Poor response also results from managers' impacted schedules, email fatigue, or not identifying the correct individual for the initial contact. Although the emailed instructions requested a response if another contact was more
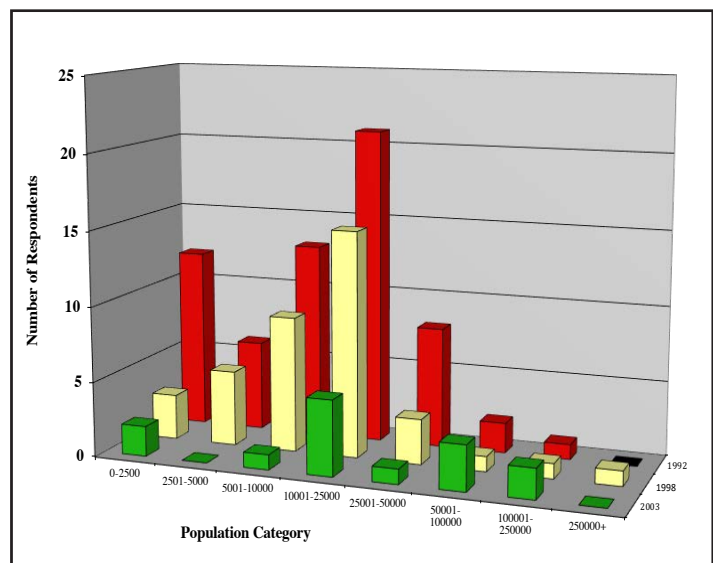

Figure 2. Respondents _without_ tree programs by city size for the previous 3 surveys

Survey Response (continued)

appropriate, many simply did not reply. Nevertheless, the 2016 results should be highly representative of urban and community forestry efforts in cities and counties with such programs. **Given that the respondents are not identical across surveys, conclusions about trends are not precise.**

Using Cal Fire's geographic regions, it appears that responses are gradually shifting to favor the South Coast while the San Francisco Bay Area remains stable at 22%, as illustrated in Figure 3. Responses from municipalities in the regions of the Central Valley declined noticeably from past surveys. These changes in response certainly reflect the population growth and distribution in the state. The population centroid has been moving southward along Interstate 5 from near Sacramento in 1880 to just north of Bakersfield currently (O'Brien, 2011).

1% North Coast (2%, 2%, 2%)

0% North Interior (1%, 5%, 3%)

2% Sacramento Valley (3%, 7%, 6%)

4% Central Sierra (5%, 3%, 4%)

22% Bay Area (18%, 21%, 20%)

6% San Joaquin Valley (13%, 11%, 15%)

10% Central Coast (12%, 7%, 10%)

11% Southern Interior (11%, 13%, 10%)
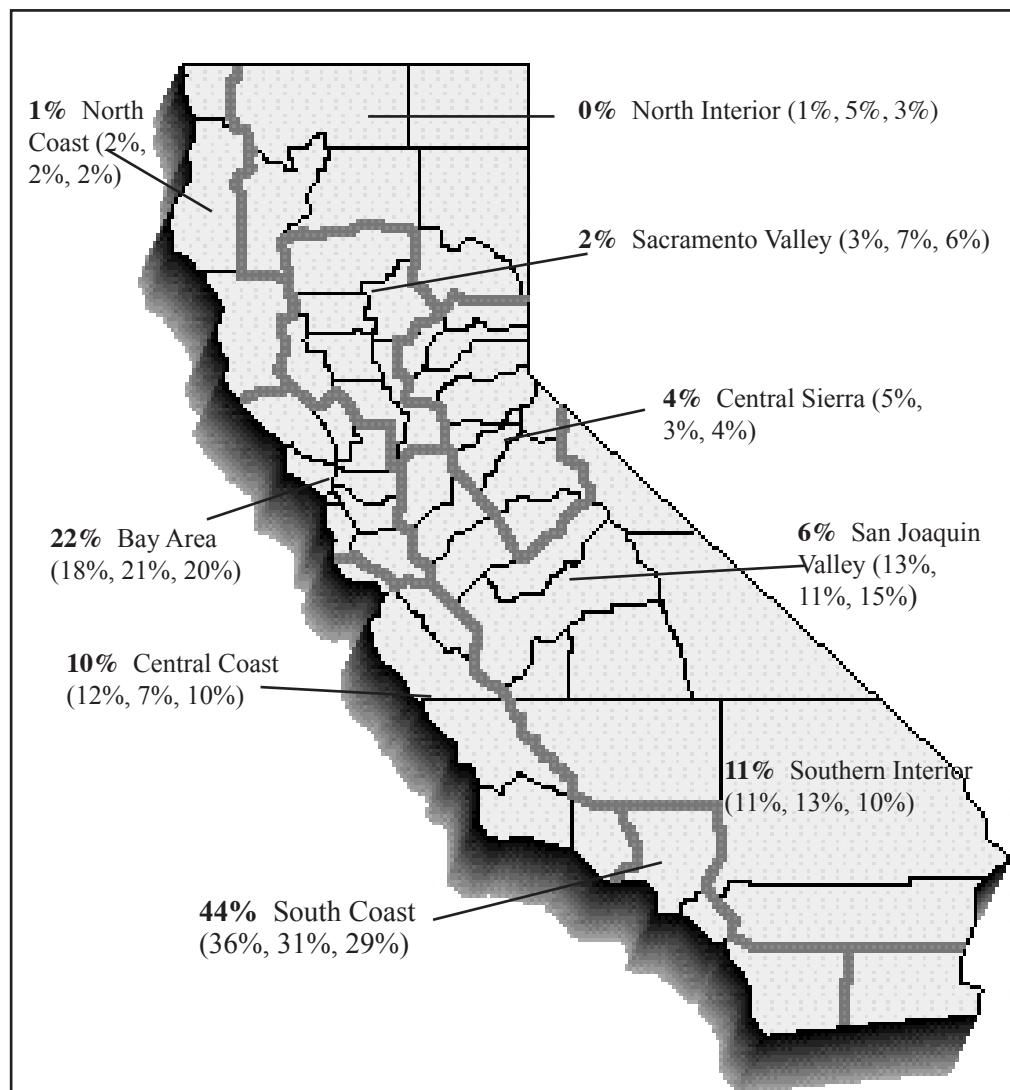
44% South Coast (36%, 31%, 29%)

Figure 3. 2016 Survey Response by California Region (2004, 1998 and 1992 responses in parentheses, respectively)

Trees of the Urban Forest

Tree Inventories

Bernhardt and Swiecki estimated that there were about 7 million public trees in *1988 and 28 million people, a residents per tree ratio of about 4:1*. The 2016 respondents indicated that they were responsible for about 2.4 million trees, 72% of which are street trees, 16% park trees, 9% open space with the small remainder in line clearance and other private property trees. *Based upon the population of responding municipalities, that is an average residents/tree ratio of about 8:1.* Allowing for differences in calculating these ratios, it seems clear that the public tree inventory is not keeping pace with population growth. Figure 4 illustrates this decline by providing the average city

Figure 4. City tree inventory by population category, 1998 - 2016

Note: 1988 and 1992 were excluded due to large variation by city category

tree inventory by population category over the last 3 surveys. It is interesting to note that the relatively steady inventory increase as city size increases was altered in 2016 where cities between 50,000 and 150,000 appear to have lost considerable inventory.
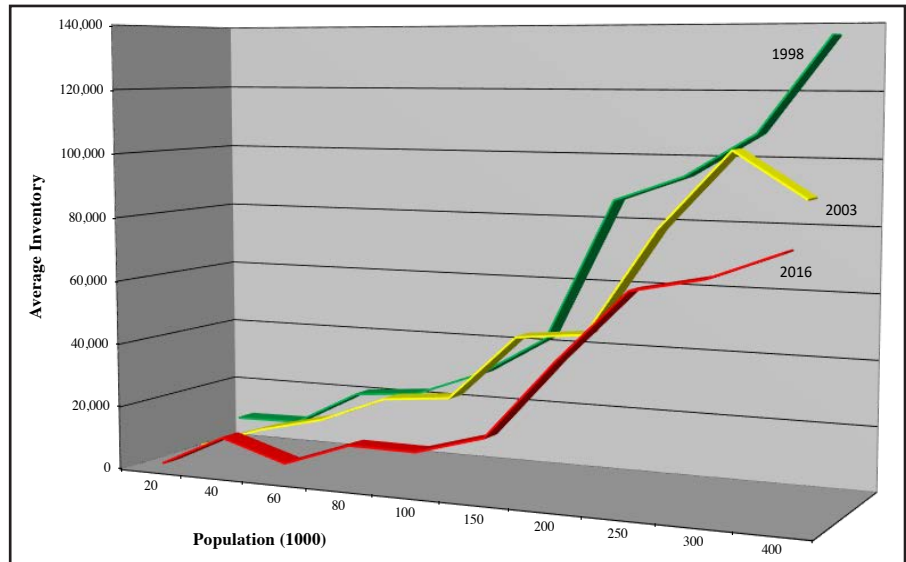
Figure 5 indicates that smaller cities have continued to increase their plantings as a percentage of the total public tree inventory to nearly 12% on average (though a relative few number of trees can represent a large percentage of a small inventory). There was a positive trend in planting through 2004 in the larger cities but that was significantly reversed with the 2016 survey. There a various explanations for this decline. Perhaps one cause is the deterioration in supporting and renewing federal and state programs begun 20 or 30 years ago to assist communities in tree planting, e.g., *America the Beautiful* program in 1990 (goal was to plant a billion city trees by 2000), California *Proposition 70* in 1988, *Proposition 12* in 2000, and more recently *Proposition 40* in 2002. Now municipalities are relying almost solely on their general funds, helped considerably by efforts from non-profit organizations. However, another explanation is that the drought effect diverted money from tree planting to removal.
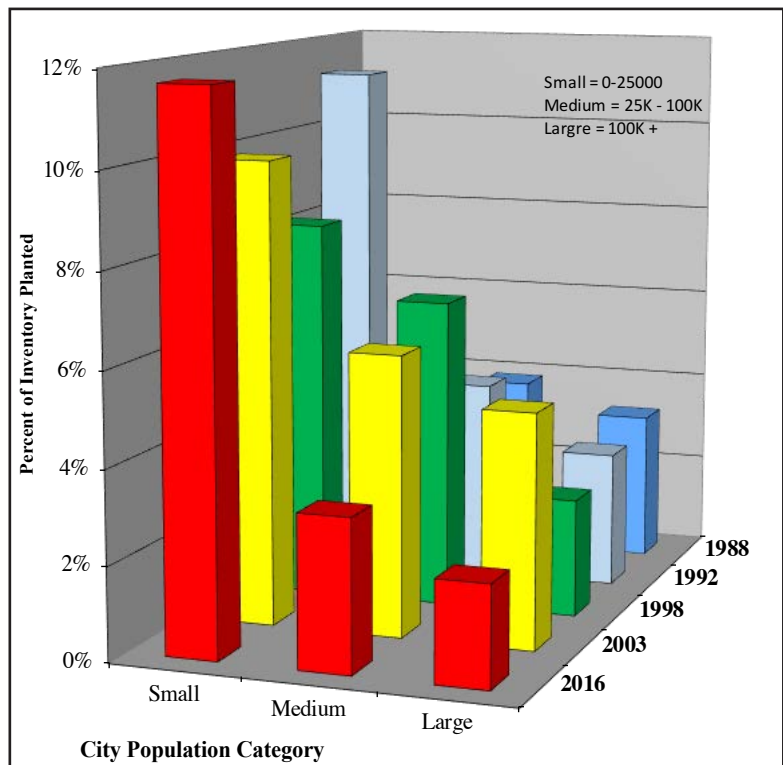

Figure 5. Percent of inventory planted by city population category

Inventory Changes - *Plantings vs. Removals*

The information displayed in Figure 6 shows the percent of inventory planted and removed, along with the percentage of respondents indicating more tree were removed than planted in 2016. This is perhaps the clearest indication of the impact of the 2011-2017 drought. Removing trees is quite costly, consuming much of the tree program's budget available for tree planting.

Although respondents indicated that the percentage of the public tree inventory that is removed remains low (just over 1%), over 40% reported removing more trees than they planted in 2016. The figure clearly shows this dramatic increase.

As a percentage of inventory, planting has declined slightly from about 5% in the previous survey to about 3.5% in 2016. Even so, tree planting has outpaced removals over time, and it is not surprising to see total public tree inventories grow. Recall that most of the gains have occurred in smaller cities.
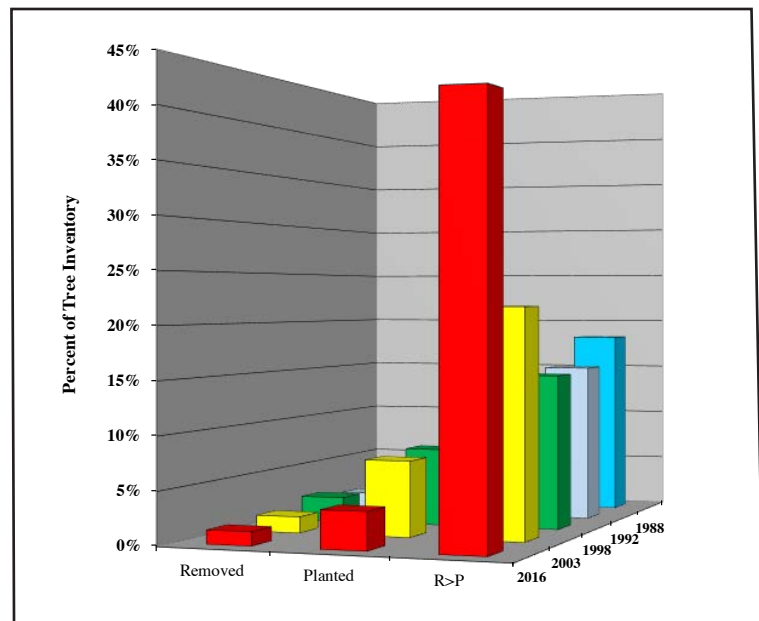

Figure 6. Percent of municipal tree inventory planted and removed in 2016, and the percent of respondents that indicated a greater percent of inventory was removed than planted.

One condition for sustainability of the urban forest is the need for a relatively uniform age class distribution of the trees. Programs designed to plant trees are rarely maintained over long periods of time resulting in a large percentage of the overall inventory in a narrow range of ages classes separated by large age class gaps. One effect from this is surges in removals when a spike in an age class reaches maturity.

Another equally important matter is the species composition of the urban forest. The beautiful, large shade trees planted in the early days of city building are now approaching the end of their life span and are much more vulnerable to damage. These structurally weakened, older trees present legal liabilities and represent hazards to the utility infrastructure sometimes forcing Public Works departments to remove them in large numbers. Are the large, beautiful shade trees that are being removed today being replaced in-kind, or are cities favoring smaller stature species?

Tree cover on private property is experiencing similar declines. In a study by USC's Spatial Sciences Institute, tree cover for single-family homes in Los Angeles has declined anywhere from 14% to 55% between 2000 and 2009. The authors attribute this decline to increases in mass-produced dwellings and home expansion (Lee et al. 2017). Whether public or private property, it's certain that both felt the impact of the drought of 2011-2017.

Impact of the Drought

Although the California drought (2011-2017) officially ended by proclamation in January 2017, the National Integrated Drought Informaiton System reports that "current drought conditions continue to affect 93% of the state's population" (www.drought.gov). Therefore it is appropriate to address this matter at the outset. The 1992 survey was the first to seek specific information on this subject. Figure 7 reveals that few significant changes resulted from previous droughts. Planting drought resistant species was the natural response for coping with this reality.

The last drought changed everything where the urban forest experienced similar mortality as in the natural forests. In such extreme conditions, sufficient irrigation is not an option or ignored due to water conservation policies. About half of the reporting municipalities reduced watering while roughly a quarter were able to use reclaimed water. Still planting drought resistant species is the most popular strategy.

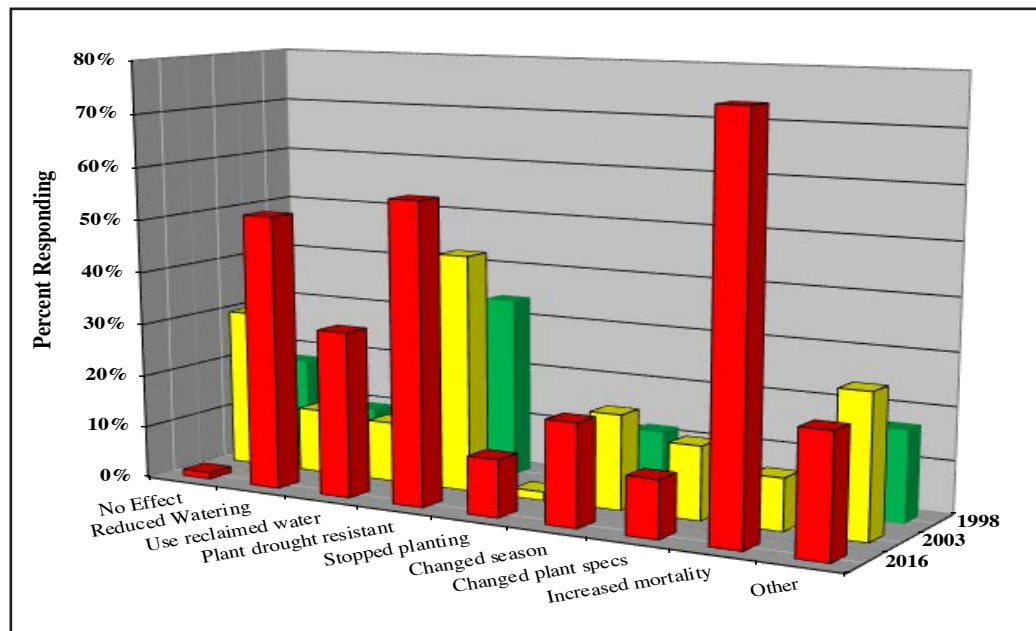The effect of the recent drought will arise again throughout this report.

Figure 7. Effects of drought on the urban forest and management decisions

"The community came together during the drought and volunteers went door to door to those properties with drought stressed trees and handed out soaker hoses and information on how to water their tree." *Claremont, 2017*

"Crisis is an opportunity for significant changes. Tree removals along California Avenue prompted public outcry about lack of unified decision making within the City and transparency to the public. An urban forester position was created which organized all urban forestry functions under one leader." *Palo Alto, 2017*

*"*We've averaged over 150 tree plantings over the past 10 years but the drought played a major role in our removals and lock of plantings. Now that the drought is over we plan on catching up on our plantings over the next five years." *Tustin, 2017*

We made "use of Polymers during the drought." *Alameda, 2017*

Species Selection - Street Trees

Although drought and flooding have a definite effect on species selection, Figure 8 indicates that space limitations in street rights-of-way remain the primary consideration. All other factors have declined significantly in importance since the 2003 survey. Overall, focus has shifted from a variety of factors affecting tree selections to just available planting space. As one might expect, the relative importance of these influences seems more evenly distributed for park tree species selection. In park settings, no single factor dominated in tree selection other than shade.

Given the importance of limited growing space in species selection, it should not be surprising that the *most frequently used species for street tree plantings is* **Lagerstromia (*Crape Myrtle) by almost twice the frequency of the next most popular species (see Figure 9).** The next most popular are oaks followed by Chinese Pistache (*Pistacia*). It is interesting to note that the <u>most frequently planted street tree is often no more than a shrub</u>. A study by McPherson and Kotow (2013) explored the structure and composition of the urban forest in much greater detail. Using two decision-making tools, 29 California municipalities were "graded" using four criteria - species dominance, age structure, pest threat and potential asset loss. Twelve of the 29 municipalities received their highest grade for species dominance.
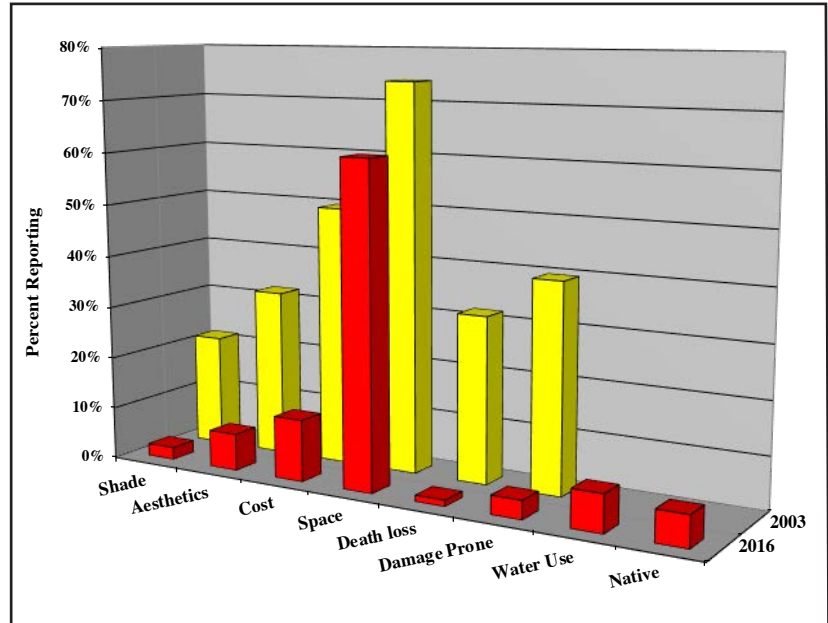

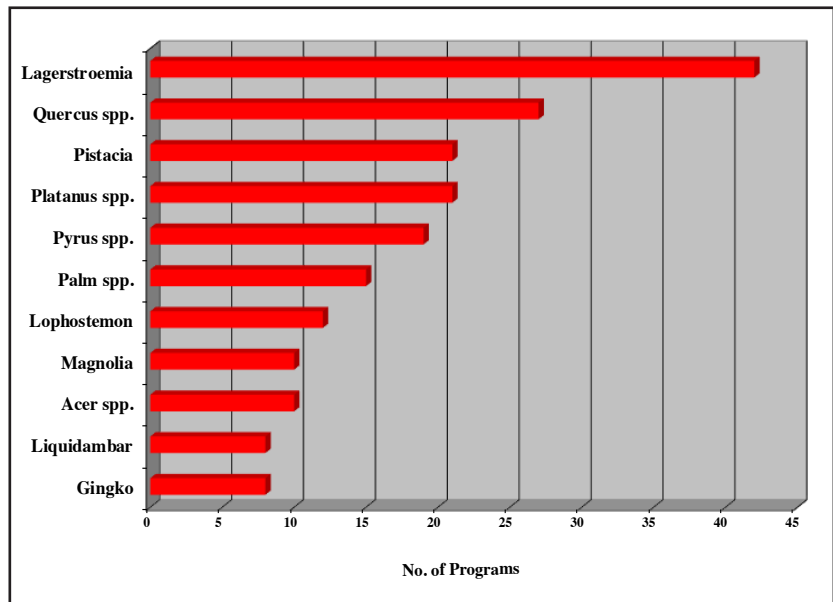*Figure 8. Factors affecting street tree selection, 2003 and 2016*

Figure 9. Most preferred genera/species for street tree planting in 2016

> "We have limited public space to plant trees. We are planting many new trees on private property."
> *Rancho Cordova, 2017*
>
> "We have just adopted a street tree planting prioritization model. The model is GIS based and uses 9 metrics (human need, environmental need and tree resource need) to prioritize tree planting efforts ." *Santa Monica, 2017*

Trends in Species Selection - Street Trees, cont'd.

Figures 10 and 11 illustrate the trends in species selection over the last 5 surveys. It is important to note that the 1988 data do not represent planting preference but prevalence in the street tree inventory. Figure 11 depicts the trend by using the top 10 species planted in 2016 and tracking their frequency of use back in the 4 previous surveys. Figure 12 presents the opposite approach by showing the 10 most prevalent species in 1988 and the extent to which they were used in street tree plantings in subsequent surveys. Comparing the top 10 in 1988 and 2016, the only genera that remain are Quercus, Platanus, Liquidambar, and Magnolia.

The most obvious changes over the last 30 years have been the increased use of Lagerstroemia, and the disappearance of Alnus and Morus genera due to litter and root invasiveness issues. Similarly, Eucalyptus species that were the fourth most prevalent species in 1988 have dramatically declined in preference for planting. Preference for oaks appears to be on the rise along with Platanus and Pyrus species. Lastly, Ginkgo has emerged at the bottom of the top 10 list.

Species selection for street trees always involves a compromise between desirable shade trees and conflicts with the existing gray infrastructure. Faced with these limitations; urban foresters are challenged to maintain an urban canopy that was historically comprised of large shade trees.
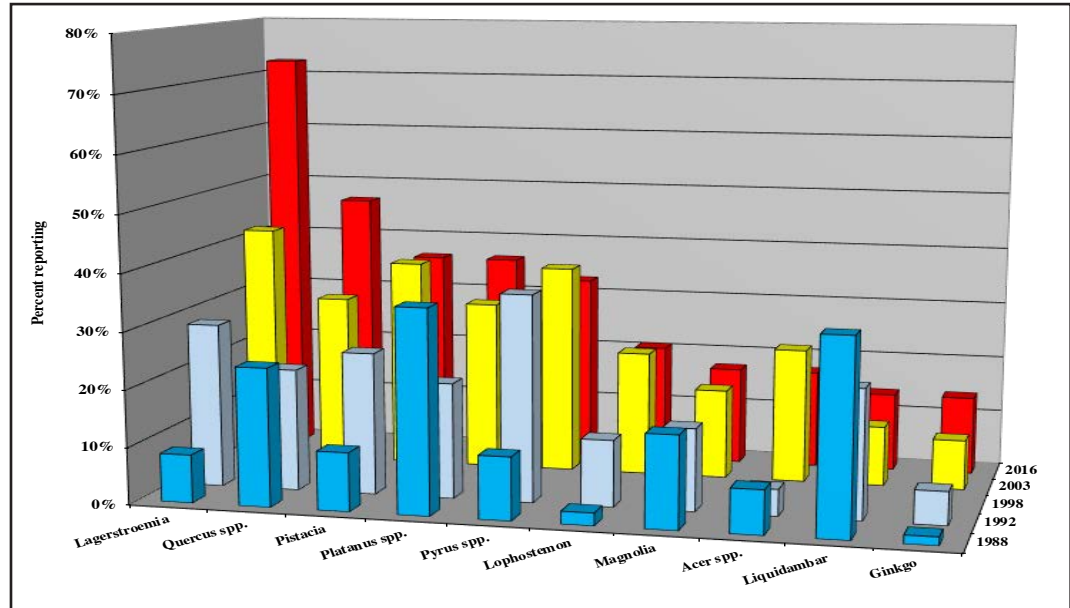

Figure 10. Ten most preferred street trees in 2016 and their ranking in past surveys.
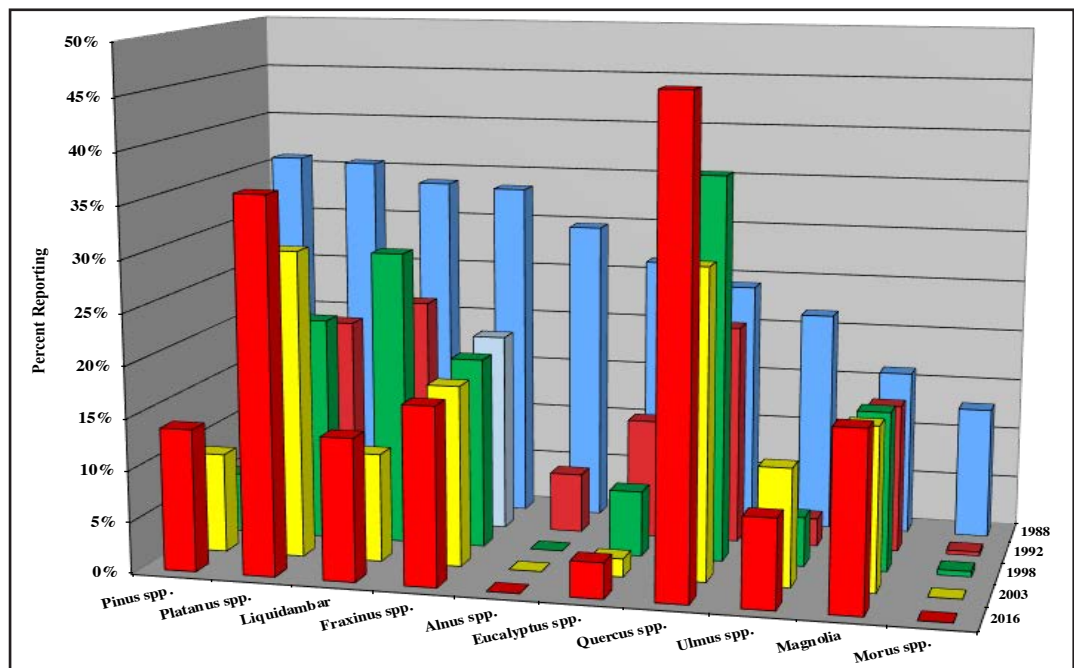

Figure 11. Ten most prevalent street trees in 1988 and their ranking in subsequent surveys.

Note: 1988 data were based on the most common species in inventory, not planted.

Trends in Species Selection - Park Trees

Only limited by concerns over fruit debris or other related hazards in parks, municipalities are relatively free to select from a large palette of species that offer the full range of benefits for urban environments. As illustrated in Figure 12, large shade trees dominate the top 10 species planted in parks. **Oaks are by far the most preferred species with sycamores and pine rounding out the top 3 species**. Nevertheless, Lagerstroemia still ranks 8 on the list. There appears to be a good mix of deciduous and evergreens among the top 5 species.
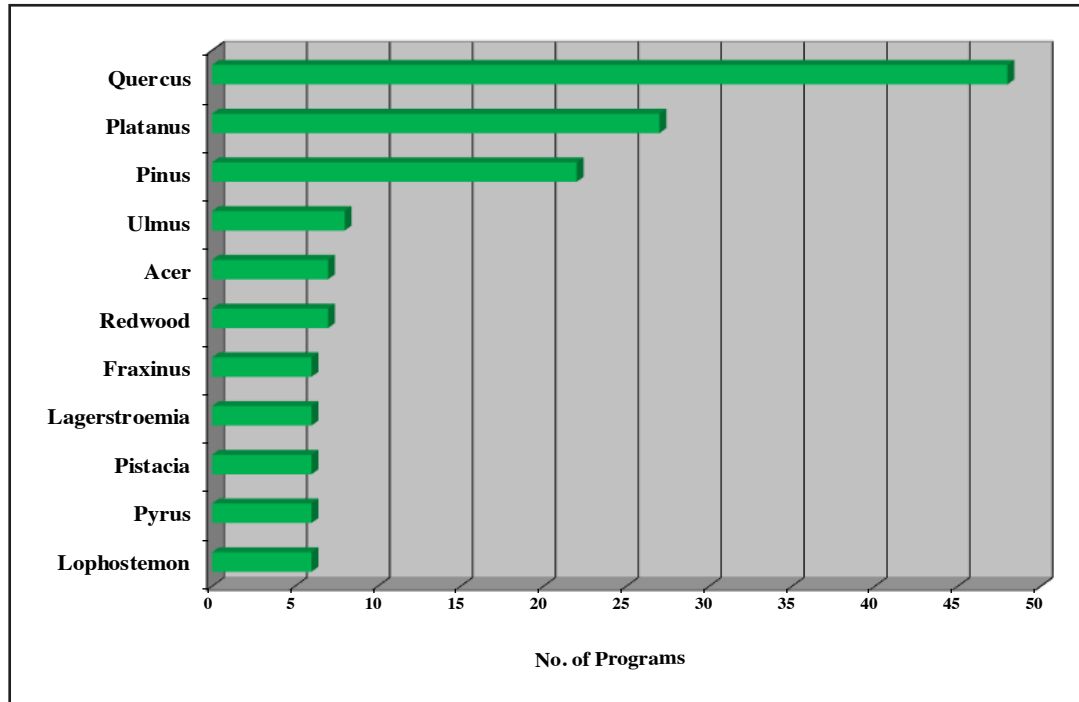

Figure 12. Most preferred genera/species for park plantings in 2016

UFEI SelecTree

SelecTree (selectree.calpoly.edu), with 1,380 tree listings and over 13,000 images, is a tree selection guide designed to assist in the selection of appropriate trees for a given site. It not only provides basic tree information but will pair trees to user-selected characteristics. For those planting near power lines a Utility Precautions search limits results to trees with a 25-foot maximum height within 20 feet of power lines. Other attributes such as drought tolerance and root invasiveness are also among the 40 tree characteristics available for filtering searches. Lists of trees generated by SelecTree should be viewed as a guide, and not as the final authority in a tree search.
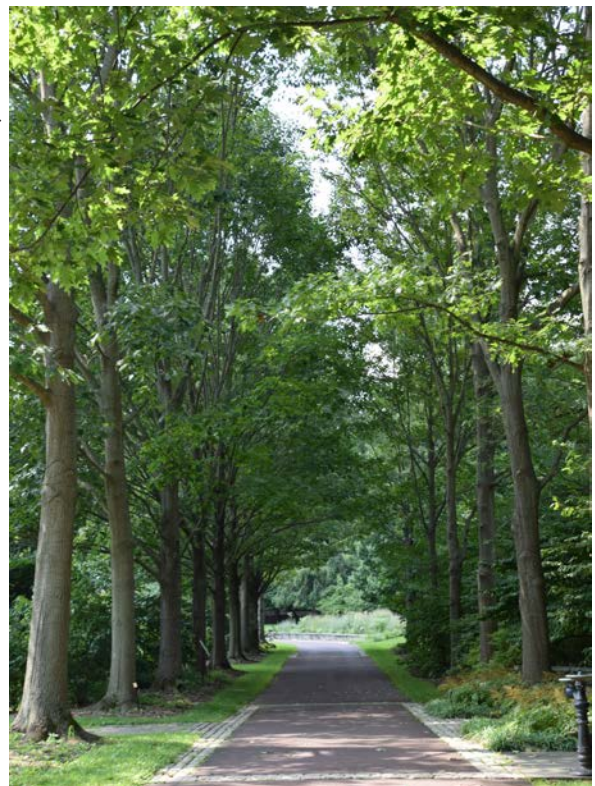
Nursery Stock

A matter of increasing importance in municipal urban forestry is the size, quality and availability of nursery stock. Spending a little more for larger, better quality nursery trees can increase survival, especially for street trees, and significantly reduce long-term maintenance costs. Figure 13a clearly illustrates that larger nursery trees are increasingly preferred with a shift away from 15 gal. to 24" and even 36" box sizes for street plantings. As expected, this pattern is repeated for park tree plantings with the shift toward boxed nursery stock even more pronounced (see Figure 13b).

Figure 14 demonstrates that significant problems in obtaining the desired nursery stock are on the increase. This may be a result of more informed buyers or higher standards for stock. Nevertheless, the most apparent problem is the lack of availability of the desired species/cultivar, one that has been growing from the beginning of the surveys. Over half of the respondents indicated that the desired stock sizes are not available and poor quality of the stock (about 20% reported that "almost always" there were problems with the top or roots). Cost does not appear to be a issue.
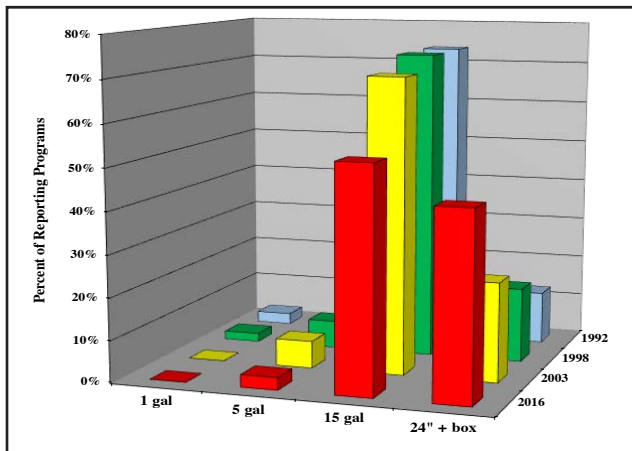

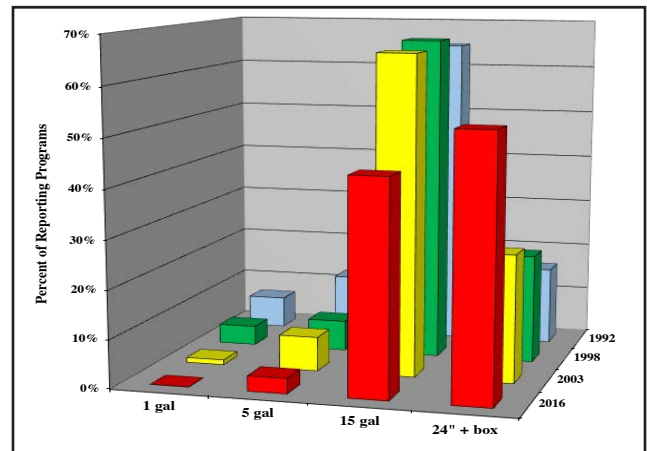*Figure 13a. Most preferred street tree nursery stock size*
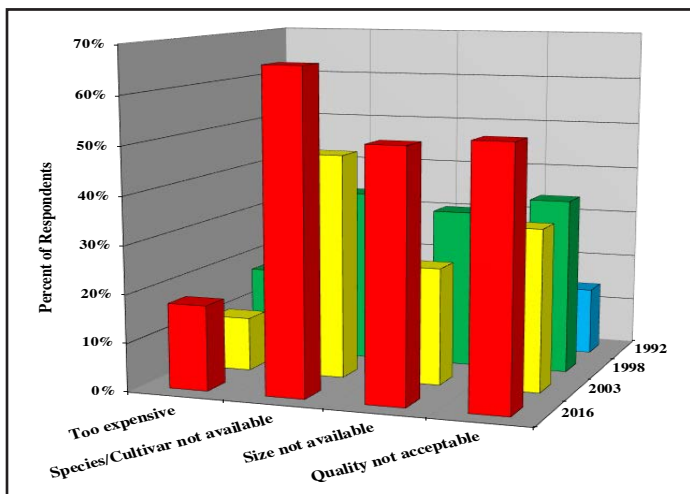

Figure 13b. Most preferred park tree nursery stock size

Figure 14. Problems in obtaining the desired nursery stock

Managing the Urban Forest

Budgets

Maintaining financial support for municipal forestry programs is a perennial problem. Nearly always the green infrastructure loses to the gray infrastructure in the competition for scarce public funds. Managers must constantly promote the benefits of urban forests to maintain support of the public and elected officials.

To evaluate the trends in public support for urban forestry, Figure 15 presents the average (mean) and median city budgets per resident over the last 5 surveys. Adjusting for inflation, it's clear that support has dropped significantly since 1992. Greater population densities and far more hardscape in very large cities likely biases this result downward. With more respondents in the medium-sized cities, the distribution of estimates is skewed causing the

median budget per resident to be consistently less than the mean. The fact that the gap between the mean and median has grown steadily since 1988 suggests that tree budgets in smaller cities have not eroded as rapidly as in larger cities. In the 80s when urban forestry was relatively new and getting attention, the average budget was over $5 per resident (unadjusted for inflation). Now it's about $4.75, or only $2.50/resident adjusting for inflation. The two major recessions of the early 90s and late 2000s was likely a major cause for slippage in funding priority for city tree programs.

Figure 16 provides a different perspective by showing the mean and median budgets on a per tree basis. The mean budget declined noticeably after 1988 while the median remained fairly steady over time until 2016. The median is perhaps a better estimate for comparing over time given how the mean can be easily affected by a few extreme values. This presents an interesting perspective - that cities are spending less and less on tree establishment and care despite the increasing tax base. Headlines are replete with stories of growing pension and benefit packages straining municipal budgets to the point where little is left for city infrastructure.
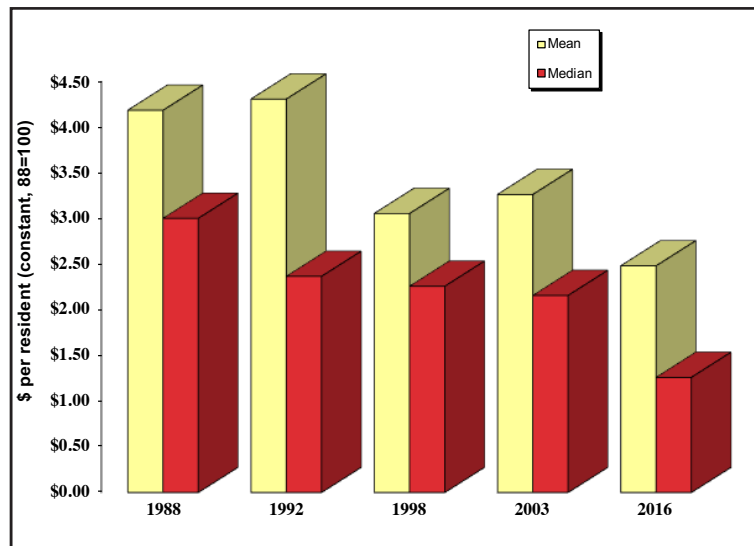
*Figure 15. Urban forestry budgets per resident adjusted for inflation, 1988 - 2016 ***
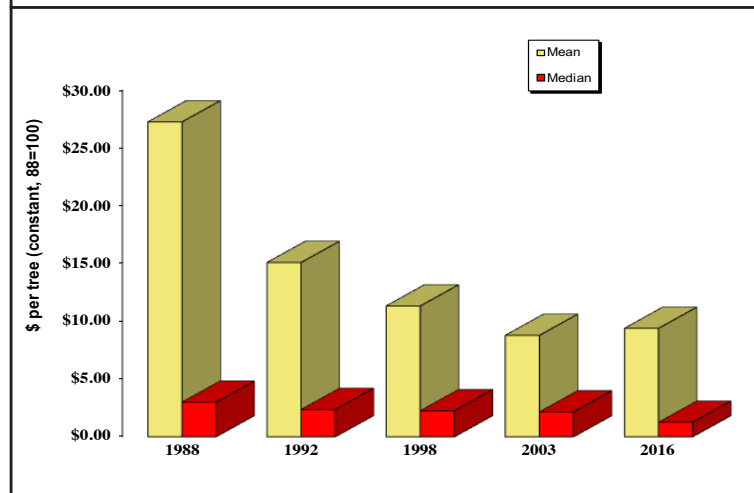
*Figure 16. Urban forestry budgets per city tree adjusted for inflation, 1988 - 2016 ***

"CDF's support of urban forestry is improving public awareness. City leaders have provided funding for accelerated tree pruning."
Stockton, 2003

* Note: All dollar amounts were adjusted for inflation using the GDP Deflator, base year 1988. US Dept. of Commerce, Bureau of Labor Statistics.

Budgets (continued)

Having discussed the dissimilarities in funding by city size, a more in-depth look at funding trends by city population categories is warranted. Figure 17 shows the average urban forest budgets per resident by city size category since 1988. Spending that was fairly consistent across city sizes in 88 and 92 declined as city size increased, especially after 1992. In all cases there is an expected drop only in the mega-metropolitan areas due to their economies of scale. After adjusting for inflation, ***small cities have been able to maintain effective budgets while cities with populations over 100,000 have experienced sharp declines in spending since 1992***. As an example, Anaheim's urban forestry budget was $1.75 million in 1988 when its population was 295,000 ($6/resident). In 2016, their budget had dropped to $1.5 million while its population increased to 350,000, that's $4.2/resident unadjusted for inflation or barely over $1/resident adjusted.
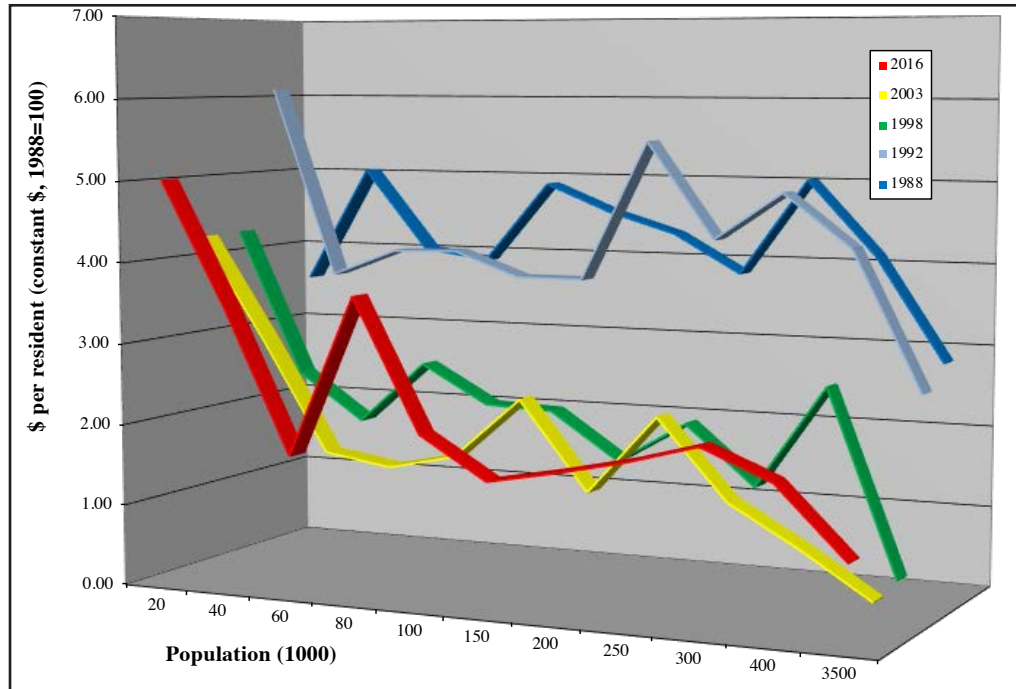

Figure 17. Urban forest budgets/resident by city size category, 1988 - 2016.

Funding Sources

Funding municipal forestry in California has become a significant problem. Identifying the sources of those funds may help explain the decline. There has been a concerted effort by program managers to diversify their funding sources but, as Figure 18 illustrates, these programs are still heavily dependent upon the general fund. Nevertheless, that dependence is slowly giving way to other sources of funds - assessment districts, gas taxes, and a variety of other sources. An example of "other" sources is Santa Ana's Sanitation Enterprise Fund which covers their entire tree program.

The heavy reliance on city general funds is to be expected for any city program. However, under tight budget conditions, city officials are forced to cut services starting with those viewed as non-essential. If urban forestry is to be sustainable then the benefits that an urban forest provides must be "translated" into essential benefits. In essence, urban foresters ask communities to invest major capital into building the green infrastructure, but the returns seem intangible or indirect. Efforts to assess fees or divert costs such as in Assessment Districts will likely be part of the future.

Grants have not played a large role in funding due to limited sources and funds and that many grants are directed toward social priorities, non-profits and tree planting. This has led to the *pervasive problem of street and park trees being added to the public inventory with little to no funding for their maintenance.* Acknowledging this issue, recent Cal Fire grants have included funding for multiple maintenance cycles following plantings. Although currently limited to disadvantaged communities, municipalities would be wise to take note of these grant opportunities.

The urban forest itself has the potential to generate revenues from the marketing of wood resources derived from tree removals. Laws like California's AB 939 in 1999 have forced communities to seriously reduce dumping these useful materials in landfills. In turn, this has helped to spur the emergence of a wood products industry that uses wood recycled from our urban forests (see the section, "Utilization of Greenwaste Resources," pages 21 and 22).
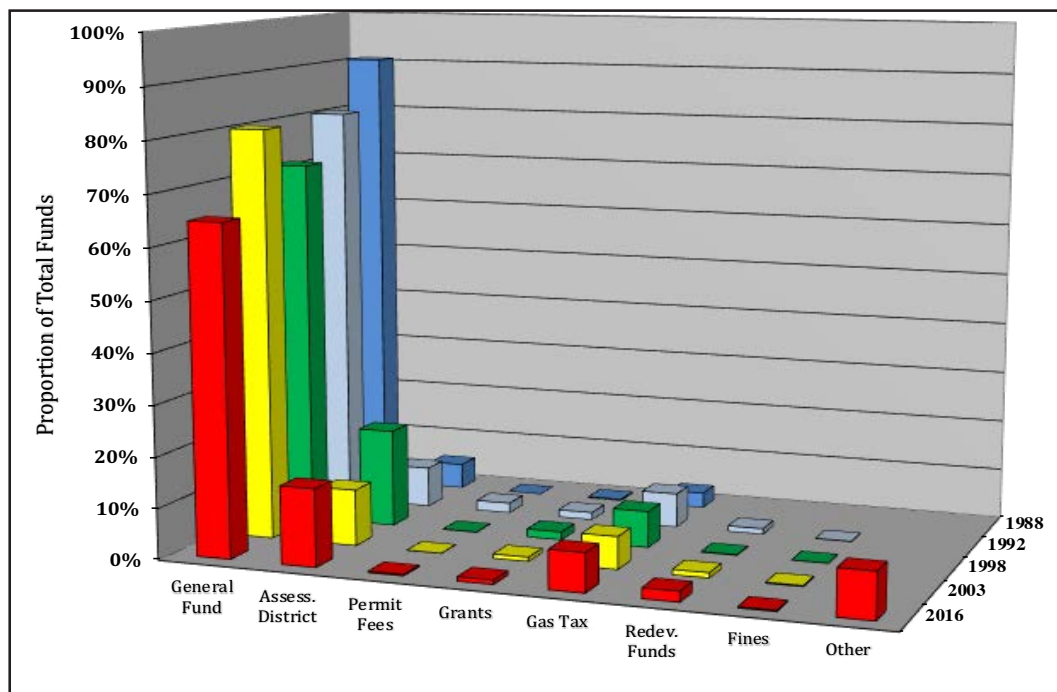

Figure 18. Source of funds for urban forestry programs

"California ranked 47th in per capita funding from the Federal Grant for Urban and Community Forestry in 2005. The national average in 2005 was $0.12 per person. California's funding in 2006 was decreased to $841,500, around $0.02 per person." *Cal Fire Urban Forestry Program Administrator, 2006*

Program Organization

The position of the urban forestry program in municipal government has a significant impact on the "prominence" of the program. More prominence translates into greater and more reliable funding enabling the program to achieve its goals. Figure 19 shows that the urban forestry program's position in municipal government has shifted noticeably since 1988. In the 80s, nearly half of urban forestry programs were housed within Parks & Recreation departments with only 30% in Public Works. That pattern continued until the late 90s after which there was a significant movement away from Parks & Rec into Public Works or other departments.

After Public Safety, Public Works receives the next largest share of the general fund while Parks & Recreation departments are frequently poorly funded. Although this should portend well for urban forestry funding, it has already been pointed out that building and repairing public infrastructure takes priority especially during economic recovery. Heads of these departments are usually engineers who have historically perceived trees as hazards or interference rather than assets. Undoubtedly, wrong trees in the wrong place have caused serious problems. However, thanks to the work at the USDA Forest Service Center for Urban Forestry Research and educational outreach from Cal Fire, this perception has slowly changed. Properly selected and located, trees have been shown to extend the life of roads and parking lots, and reduce repaving costs.
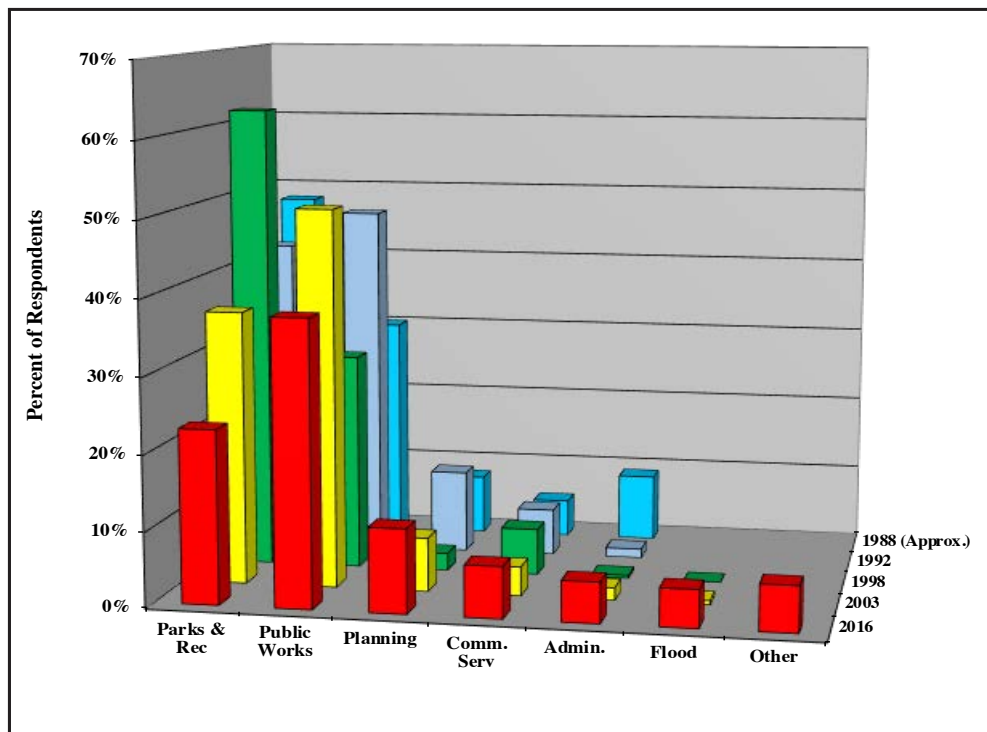

Figure 19. Organizational position of urban forestry programs in municipal government

Management Responsibilities by Sector

As policies that promote increased tree cover in new developments improve, the question arises over who pays. With ever-tightening municipal tree program budgets, one would expect those costs to be shifted to the developers or homeowners. But as Figure 20 shows, cities are increasingly taking on the responsibility for maintaining the trees. As part of development, planting trees is a relatively small financial impact, whereas maintaining them can be quite expensive.
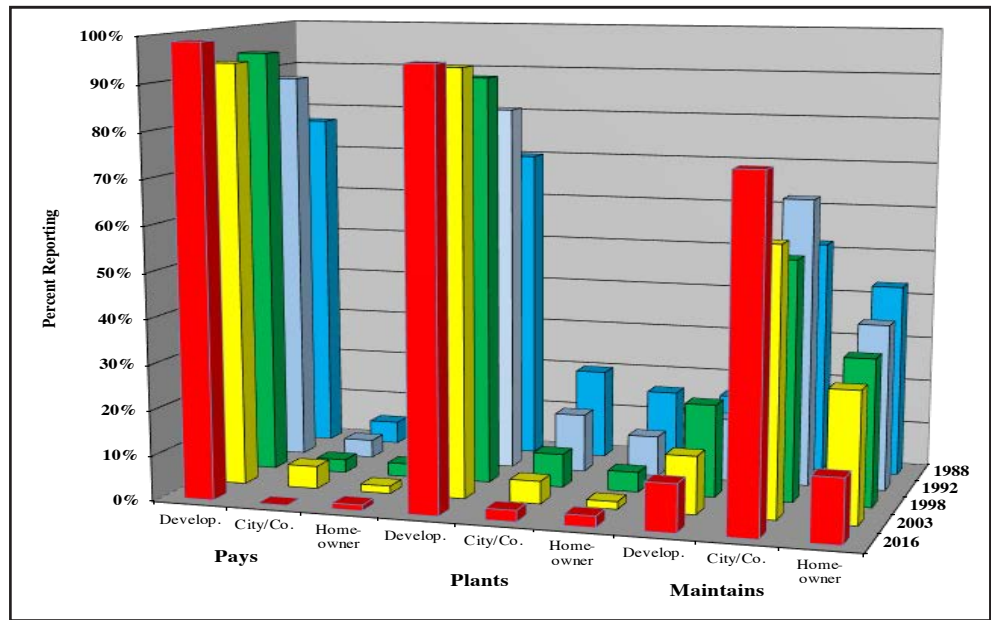

Figure 20. Who pays for, plants, and maintains trees in new residential subdivisions

Figure 21 illustrates the proportion of the municipality's tree budget spent on contractors by the three broad city size categories. Large cities are replacing in-house staff work with contractors, while small to medium-sized cities have always been heavily reliant upon contractors. For many small cities, 100% of their budgets is spent on contract services. Ownership of trees should be clearly established when trees are purchased and planted, even though policies that require tree planting may infer municipal ownership. Some municipalities are creating assessment districts with new developments wherein the responsibility for planting and maintenance trees is transferred to those residents.
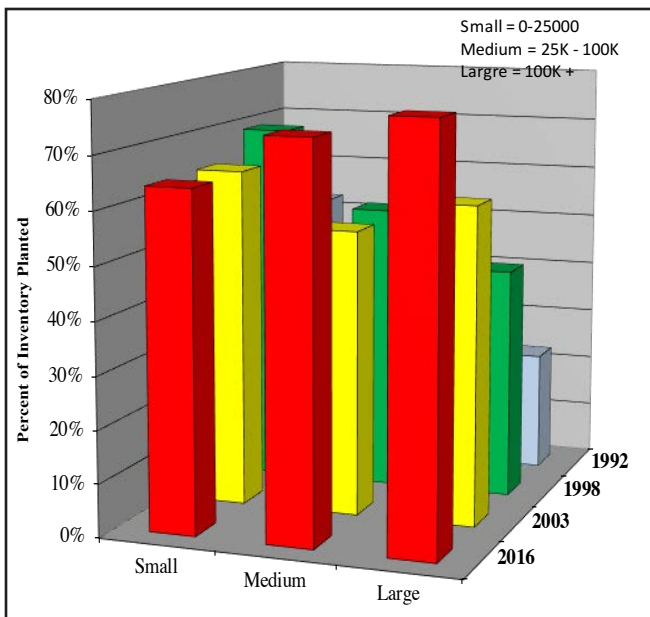

Figure 21. Percent of tree budget spent on contractors by city size category

"Heritage tree grant program - we pay 50% private maintenance costs on private property & street trees to help save trees that have been denied for removal by the city." *Santa Cruz, 2017*

"Difficulty getting homeowners to agree to let the City plant in the residential parkway due to watering requirements, lack of valuing trees." *Saratoga, 2017*

Staffing and External Organization Support

Staffing municipal urban forestry programs is certainly under pressure given the trend in their budgets. As was shown in Figure 21, more municipal tree work is being out-sourced to contractors. ***The average proportion of the city's tree programs spent on contractors has steadily increased from 34% in 1992 to roughly two-thirds in 2016***. The result is a general decline in the number of municipal staff positions, as illustrated in Figure 22. The average number of full-time equivalent (FTE) positions is about one-half of that in 1988. Figure 23 illustrates that the distribution of full-time staff remains fairly steady with about 70% reporting fewer than 4 FTE. The only survey that had less than half of municipalities reporting that staffing remained the same for the previous year was in 1988.
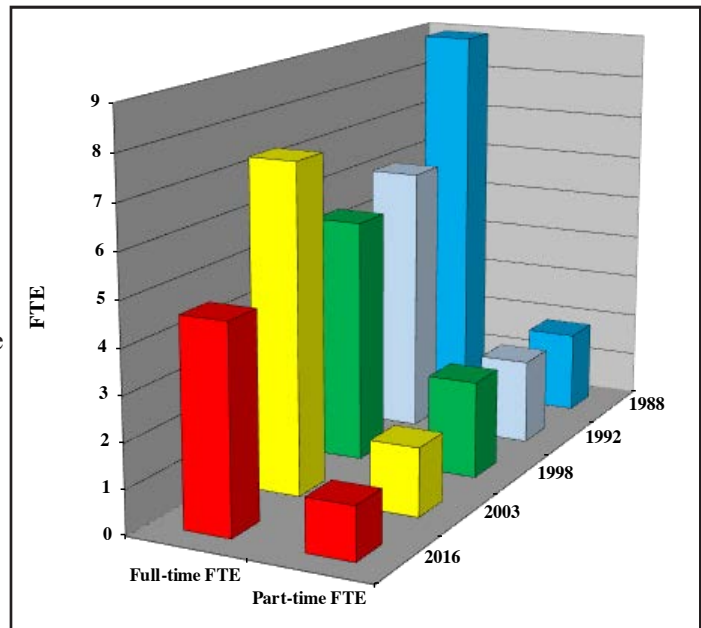
There can be other explanations for decreasing staff other than declining budgets and greater out-sourcing of tree services. The initial roles played by municipal foresters to plan, design and establish the urban forest

Figure 22. Changes in average full-time and part-time staff

have since transitioned to maintenance of the urban forest, a function perhaps better suited for contract services. Furthermore, the growth in non-profit tree programs has helped in supporting tree work. Figure 24 shows that there has been a significant growth in volunteer, civic and youth-based tree organizations and a decrease in dependence upon support from correctional institutions.
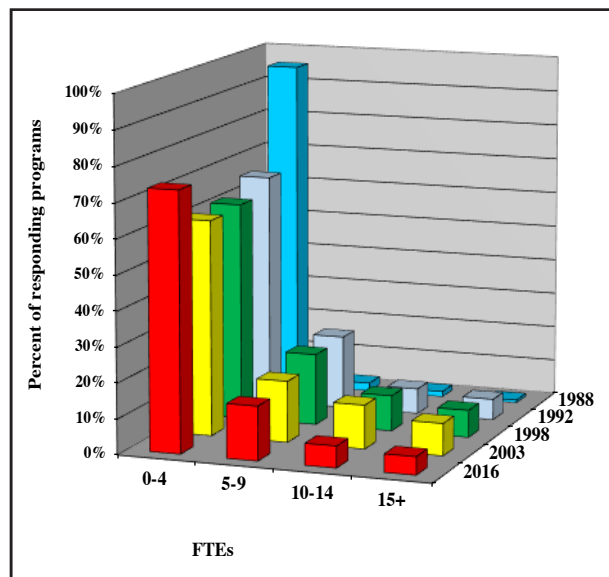
Figure 23. Distribution of full-time staff

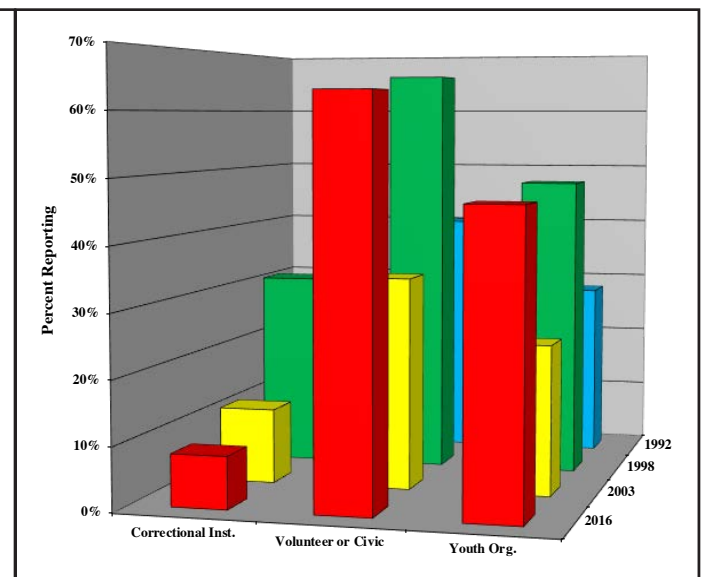*Figure 24. Distribution of groups that support the municipal urban forest*

We have "engaged CalFire to sponsor inmate crews working in City greenbelts and open space areas." ***Monterey, 2017***

*"*I personally wish policy makers knew and understood the true benefit of urban forestry programs using consultants to help write policy and fill voids due to low staffing for tree departments." ***Fontana, 2017***

Tree Care - Pruning

Once a tree is established, maintenance work mainly consists of some type of limb removal. With proper species selection and placement, and using quality nursery stock, the cost of such maintenance work can be significantly reduced. Unfortunately, as was shown in Figure 15, there appears to be growing dissatisfaction with the quality and availability of the desired nursery stock. Thankfully, nursery specifications like the Guideline Specifications for Nursery Tree Quality, published by the Urban Tree Foundation (2009, urbantree.org) are available to assist municipal foresters.

Along with obtaining the right nursery stock, scheduling maintenance work can be done well in advance helping to predict budgets. Figure 25 indicates that, although about 60% of tree maintenance is scheduled rather than conducted on-demand, this split has improved little since the first survey in 1988.
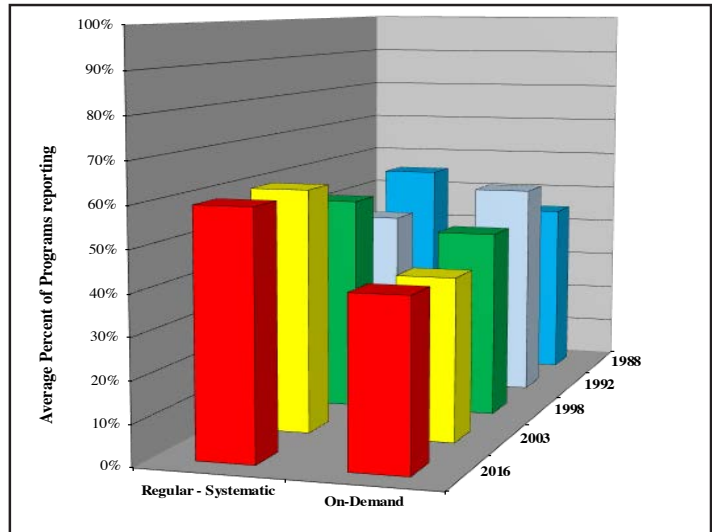

Figure 25. Scheduling of tree maintenance work

Pruning, trimming, pollarding, and topping are all terms referring to removing tree limbs to achieve some objective. Pruning is defined as "the removal of parts of a plant for size control, health, or appearance" (Rice and Rice 2000). Whether at the nursery or after, pruning juveniles correctly will yield tremendous savings in maintenance costs as the tree matures ("Pruning Young Trees," International Society of Arboriculture 2006).

All too frequently, the objective in removing limbs does not include the tree's health. Topping (a.k.a., "heading," "tipping," "hat-racking," and "rounding over") involves shortening of the central leader of a tree to make the head fuller and keep the tree short (Rice and Rice 2000). Topping is a bad practice since it is not designed to improve the health or appearance of a tree. Planting the wrong species could lead to frequent structural pruning to avoid topping. Since frequent treatments are expensive and funds are scarce, street trees often go untreated forcing programs or utilities to top to mitigate hazardous conditions. Yet healthy trees not interfering with utilities or paving are often topped due to lack of proper training or failure to implement known best practices.

Tree Care - Pruning, cont'd.

Figure 26 indicates that ***topping remains a problem despite a slight improvement since the last survey.*** Policies to curtail practices such as topping must require training and appropriate certifications for all tree workers. Figure 27 illustrates that requiring tree workers to follow professional pruning standards has barely improved over the last 30 years.
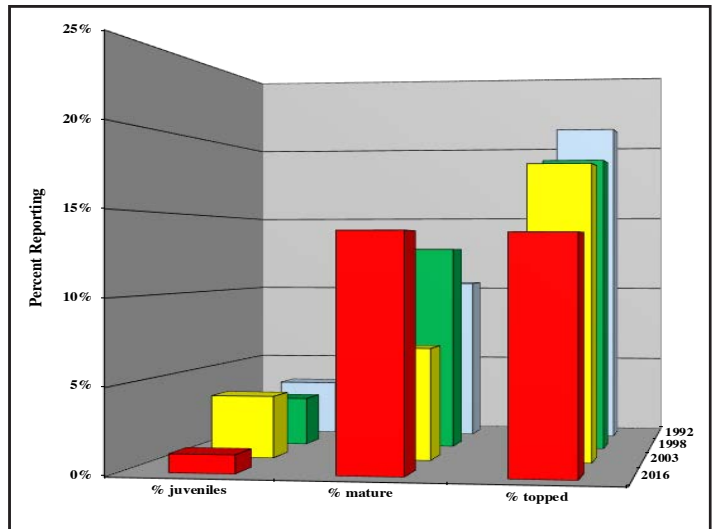

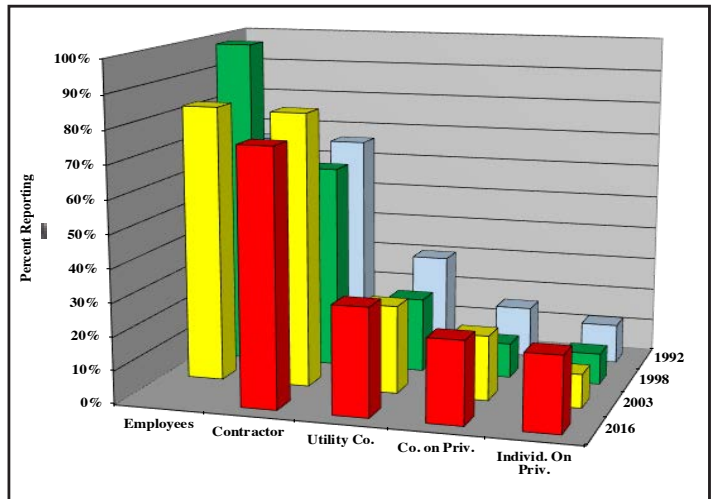***Figure 26. Average percent of street & park tree inventory pruned by tree size and percent topped***

Figure 27. External organizations required to follow ISA, NAA,

Tree Care - Hazard Mitigation and Liability

The potential for the green and gray infrastructure to conflict with one another has been discussed throughout this report. Working closely with Public Works is essential. Perhaps it is this realization that is driving the organizational move of municipal forestry programs into Public Works departments (see Figure 19).

Minimizing conflict is one of the most important factors in street tree selection. By now the species that create the least conflict for street locations are fairly well known, as shown by the trends in preferred species in Figures 10 and 11. Nevertheless, species chosen for street tree plantings in the past are still causing considerable problems with the gray infrastructure and is the primary reason for pruning. Figure 29 shows that municipalities are increasing their efforts to abate these conflicts, especially problems caused by roots. From Figure 28 it appears that municipal foresters are also increasingly contesting claims of tree problems. Transferring the responsibility of tree care to property owners to address such problems remains a minor solution.
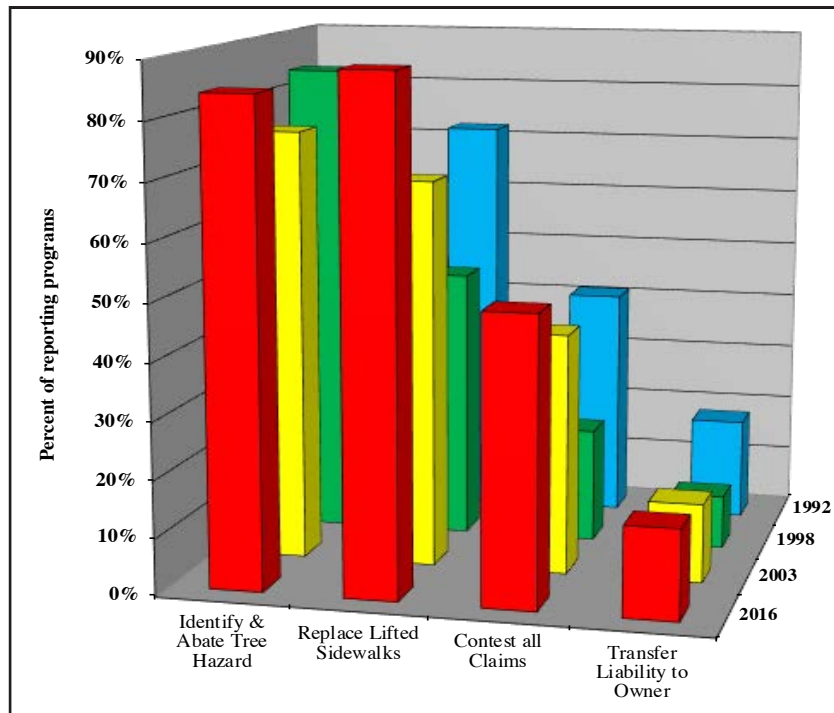

Figure 28. Methods used by municipalities to limit tree-related liability

Hazard Mitigation and Liability (continued)

A number of strategies and techniques have been devised to prevent infrastructure conflicts. Three techniques were identified to create barriers to root invasion of sidewalks - linear, encircling and chemical. Other strategies to mitigate root problems were included in the survey. Figure 29 shows the respondents' opinion on the effectiveness of these methods over the 5 surveys.

The use oft root barriers have fallen out of favor in recent years. As for mitigation methods, species selection remains the preferred approach for obvious reasons. Eliminating lawns has fallen to the least favored but that may be a result of water conservation policies to address the drought. Realigning sidewalks is the next most popular mitigation measure and one that often requires departments to cooperate. The other mitigation measures - root pruning and re-engineering sidewalks - are now seen as less effective than in past surveys. Although the survey sought opinions on effectiveness, these results may simply show that expensive tree hazard mitigations are no longer feasible in an era of declining budgets.
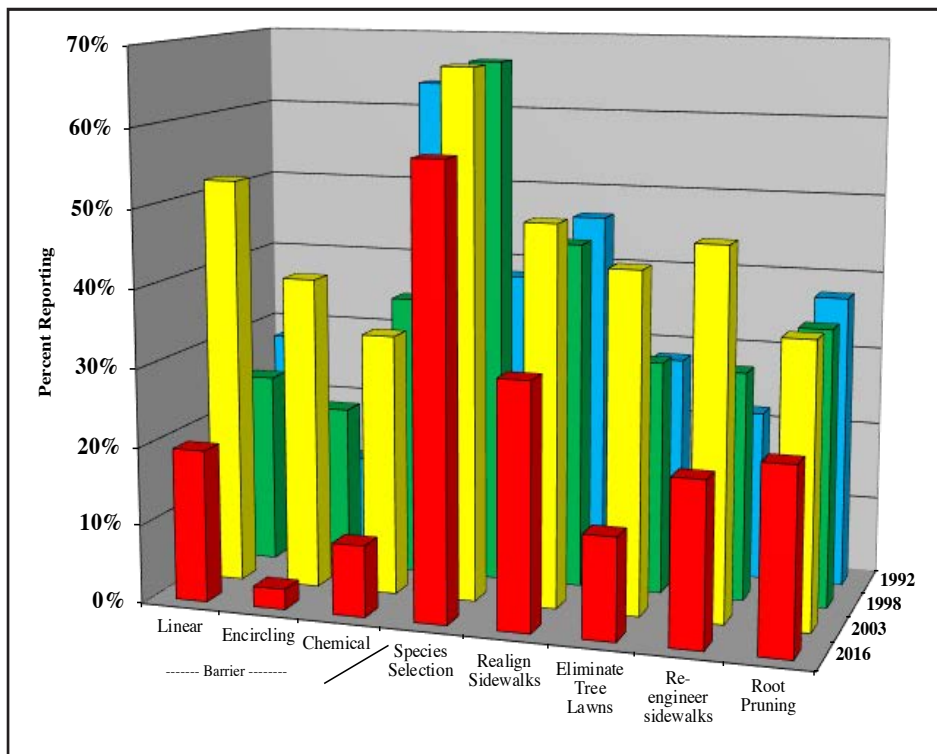

Figure 29. Percent citing damage mitigation measure as "effective"

> "Tree root mitigation using steel plates to inhibit root growth toward adjacent concrete infrastructure." ***Sunnyvale, 2017***
>
> "We have begun "implementation of silva cells." ***Westminster, 2017***

Utilization of Wood Residues

Urban tree trimming and removal is a normal and necessary part of managing the urban forest. The result is a steady flow of wood residues that must be processed. The recent major drought caused considerable tree decline and mortality, greatly increasing this stream of woody residue (recall Figure 7). Given the uncertain quantity and quality of this material, utilization other than chipping or for firewood has been problematic. As a result, municipalities simply burned or dumped the material. Now with air quality regulations and laws like AB 939 (Integrated Waste Management Act), municipalities have been compelled to find utilization solutions.

Figure 30 displays the trends in treating wood residues as waste or a valuable resource. Clearly burning wood residues is no longer viable, however, landfill disposal jumped significantly from previous surveys almost certainly due to the drought. Use of these residues has jumped markedly in recent years, especially for solidwood products. Still, all municipalities primarily chip wood residue for mulch.

While Figure 31 shows the percent of respondents using various methods of "greenwaste" utilization/disposal, Figure 32 displays the same information as the average percent of volume for utilization/disposal method.

Figure 30. Disposal/Utilization of tree trimmings and removals
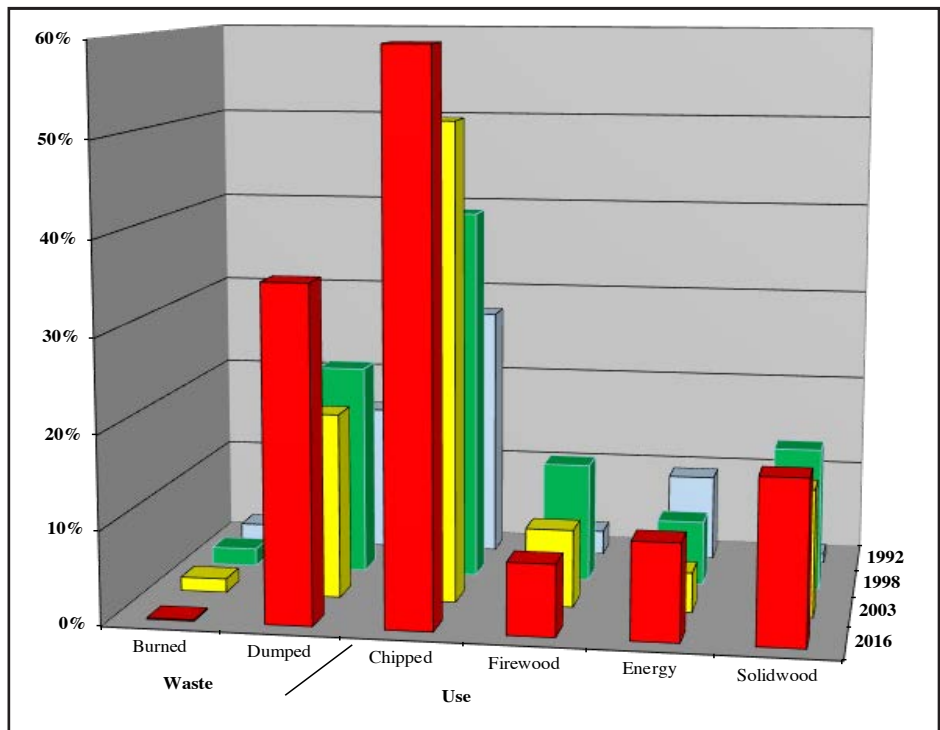
Figure 31. Average percent of trimmings/removals disposed or used

While all programs chip wood residues, the average percent chipped has grown steadily to about 60%. Use of wood residues for firewood or energy remains at around 10% but use for solidwood products has grown slightly to about 15% of the residue stream.
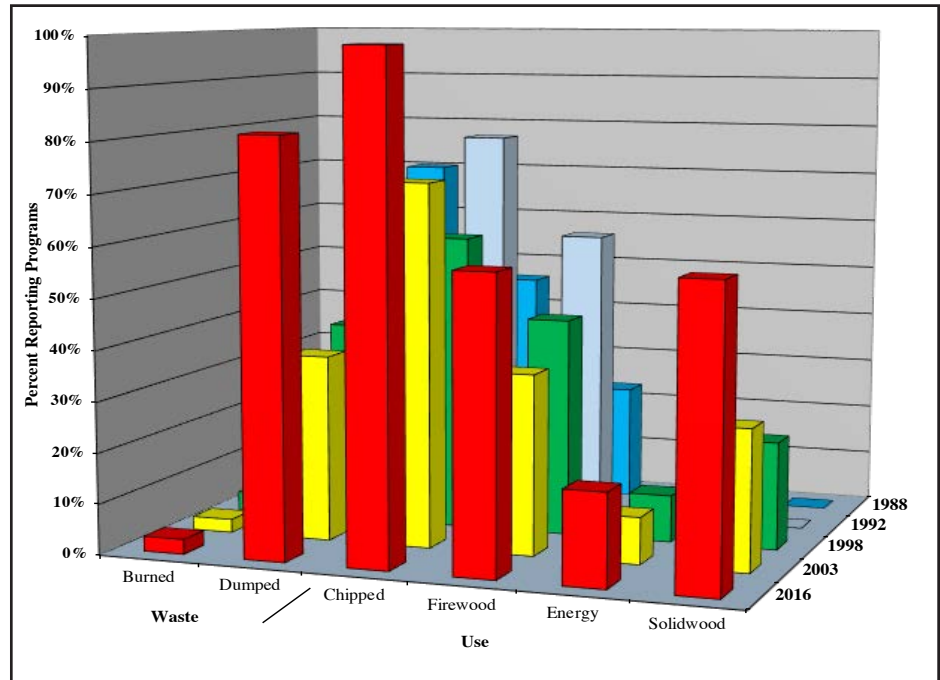
Urban Salvaged & Reclaimed Woods

A grass-roots effort to establish a coalition of like-minded companies, individuals, or government agencies who have networked together for the purpose of tree rescue and finding the highest value of the tree after its' natural life has come to an end.

urbansalvagedwoods.com

UFEI Urban Wood
A Woodworker's Resource

As part of UFEI's on-going efforts to demonstrate tangible benefits of the green infrastructure, this web resource is provided to promote the development of the market for urbanwood. As the urbanwood industry grows, communities will not only realize savings in greenwaste disposal costs but may soon obtain revenues.

The Urban Wood database is a cooperative project between UFEI and UCFPL. UCFPL provided the original data which is referenced in: Shelly, J.R., D.M. Lubin and A. Johl. 1999 California Hardwood Industry Profile: Final Report. University of California Forest Products Laboratory. Technical Report 35.01.454, June 30, 1999.

UFEI Urban Wood, 2018, ufei.calpoly.edu

Example Cities for Overall Performance

San Luis Obispo
- Population: 47,339
- Ron Combs, Urban Forester, Public Works
- Budget: $520,000 (***$11/resident***)
  - 90% General Fund, 8% capital improvement, 2% development funds
  - 4 Full-Time Staff
- Municipal Tree Inventory: 24,500 (***2 residents/tree***, ***$21/tree***)
  - 10,000 Street Trees
  - 10,000 Park Trees
  - 4,500 Open Space
- Plantings in 2016: ***0.8% of inventory***
- Removals in 2016: ***1.2% of inventory***, 75% for energy, 25% chipped
- Top Benefits: public health, reduced hazards, civic pride
- Top Needs: increased funding, improved tree maintenance, improved tree ordinance
- Tree Ordinance revised in 2012, variable effectiveness and enforced
  Tree City USA since 1983, Commemorative Tree Grove, and Heritage Tree Programs, 400 planting spaces available

Palo Alto
- Population: 66,853
- Walter Passmore, Urban Forester, Public Works
- Budget:
  - $5,401,602 (***$80/resident***)
  - 66% General Fund, 27% other, 6% development funds, 1% permits):
  - 14 Full-Time Staff, 1 FTE Part-Time
- Municipal Tree Inventory: 56,700 (***1 resident/tree, $95/tree***)
  - 37,101 Street Trees (Magnolia, London Plane, Liquidambar, Chinese Pistache, Mesquite
  - 2,214 Park Trees
  - 17,396 powerline ROW
- Plantings in 2016: ***1.5% of inventory***
- Removals in 2016: ***0.6% of inventory***, 75% for energy, 25% chipped
- Top Benefits: energy conservation, decreased air pollution, civic pride
- Top Needs: citizen support, planting space, increased funding
- Tree Ordinance in-place since 1990, effective and enforced
- Non- profit: *CANOPY*

Tree City USA for 30 years, Tree Line USA for 3 years, CANOPY, Urban Forest Master Plan adopted in 2015 promotes long-term goals including use of native species, development regulations and collaborative partnerships.
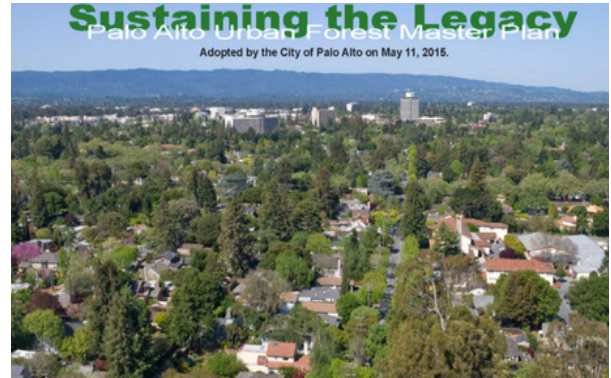
Sacramento
- Population: 490,712
- Kevin Hocker, City Arborist, Public Works
- Urban Forestry Budget: $5,300,000 (***$11/resident***)
  - 99% General Fund, 1% permit fees
  - 26 Full-Time Staff (half certified)
- Municipal Tree Inventory:100,000 (***5 residents/tree, $53/tree***)
  - 75,000 Street Trees London Plane, Chinese Zelkova, Valley Oak, Crape Myrtle)
  - 25,000 Park Trees
- Plantings in 2016: 1000 (***1% of inventory***)
- Removals in 2016: 450, (***0.5% of inventory*** - 99% chipped, 1% wood products or recycled
- Top Benefits: civic pride, decreased hazards, real estate value, public health,
- Top Needs: planting space, revised tree ordinance, more citizen support
- Non-Profit: *Sacramento Tree Foundation (STF)*
- *Known as the City of Trees since 1949, international recognition, residents eligible for free consultation and 10 shade trees through partnership between STF and SMUD.*

Community Relationships

Tree Boards/Commissions

The goal of all urban forestry programs is to enhance the living environment for all members of the community. Therefore, it is essential for urban forestry managers to have a healthy relationship with representatives of the community. This can be accomplished through a number of organizations - primarily tree boards and non-profits organized to advise the municipal forester and/or promote the program among the community.

Tree boards (or commissions) can be either citizen-led or formed by city officials. Those created by government are generally responsible for tree care decisions. Citizen-formed boards advise the municipal forester. Having a tree board is one of four requirements to be designated a Tree City USA.

Figure 32 shows the percentage of respondents that have tree boards (with formal duties) and those without a board. Since the first survey in 1988, there appears to only be a slight drop in municipalities without tree boards, currently at 58%. Also, little has changed in the purpose of these boards where there about twice as many with only limited duties vs. those with a full-range of duties.
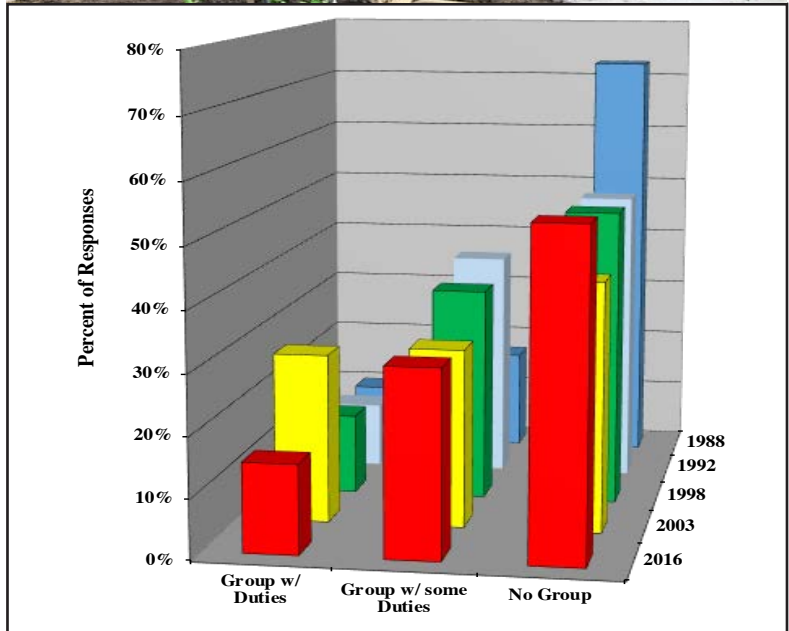
Figure 33 provides the duties or functions served by tree boards. In earlier surveys their primary role was one of public education. This has declined perhaps due to success in this area but they still have a significant role in promoting the urban forest. Help in setting policy and hearing appeals remains their primary responsibility aside from oversight of Arbor Day celebrations.
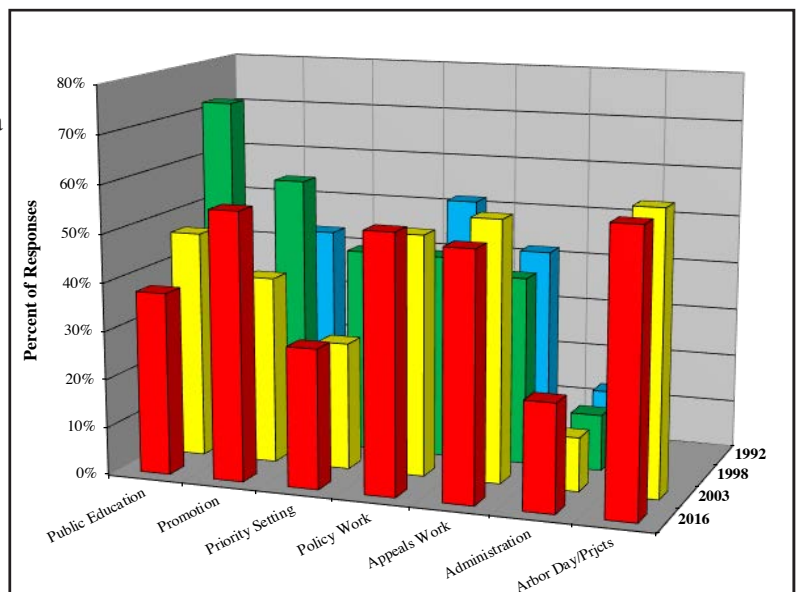

Figure 32. Trend in municipalities tree boards/commissions

Figure 33. Functions of municipality tree boards/commissions

Government and Citizen Support

As already stated, the primary goal of tree boards and citizen-led groups is to promote and build support for the urban forestry program. When asked to evaluate the effect of tree boards, **57% of the respondents indicated that they had no beneficial effect** (see Figure 34). In past surveys, there appeared to be a much more favorable evaluation of these groups' effects.

The degree to which these groups are successful should be felt in the level of support urban foresters receive from the local government and the citizenry in general. Municipal foresters were asked to rate the support received by these two groups. Figure 35 shows the results from the previous 4 surveys that ask respondents to rate the level of support on a 5-point ordinal scale. Since there has generally been a tendency to rate in the middle, we used a 3 point scale for the 2016 survey. The results shown in Figure 35, indicate a fairly high level of support from local government. Repeating the question for an evaluation of support from local citizens shows a much lower rating of support (see Figure 36).

These results suggest that a renewed or fresh effort to inform and educate the community is warranted. Clearly, erosion in support from the citizenry can have serious long-term consequences.
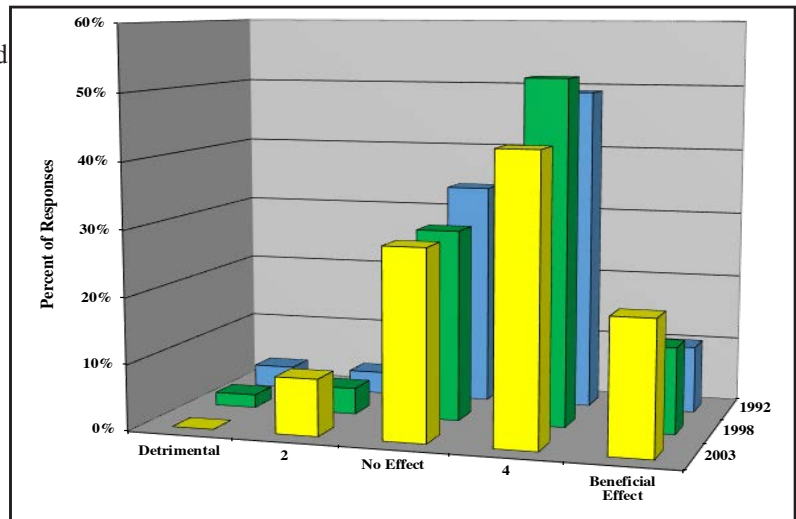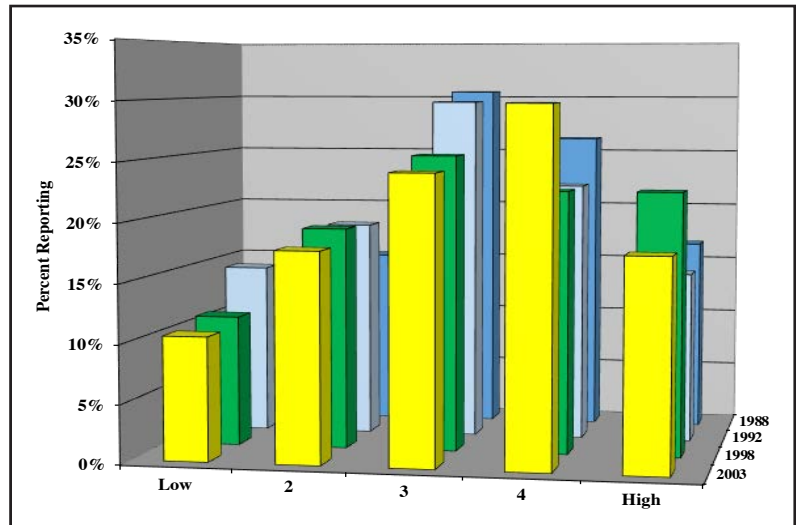

Figure 34. Evaluation of tree board's performance

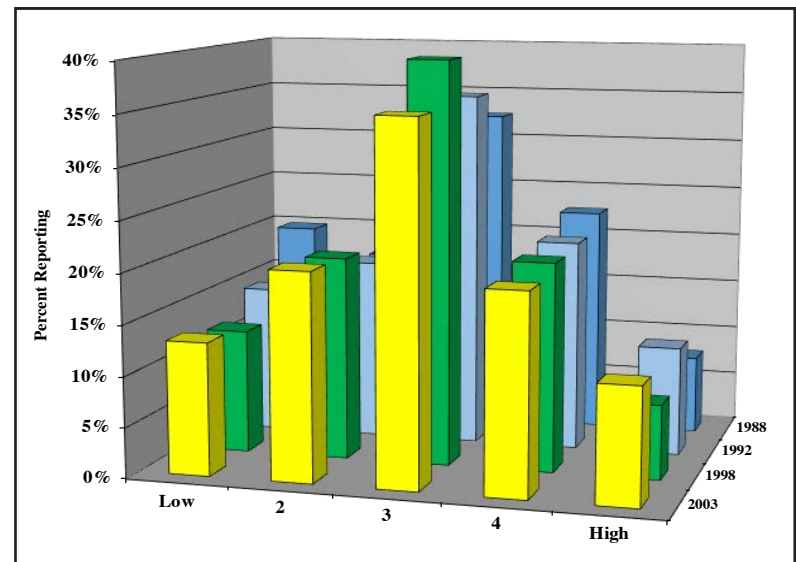*Figure 35. Evaluation of local government support*

Figure 36. Evaluation of citizen support

Education and Communication Methods

Survey results indicate that greater effort is needed to build support in the community for the urban forestry program. Communication is the key to changing attitudes and building these relationships.

Amazingly, it has only been since the last survey that the Internet has become the dominant means of communication around the world. This has resulted in a rapid decline in the demand for newspapers, TV and radio.

Figure 37 shows the trend in use of various communication methods. In the first three surveys, around one-third of the

Figure 37. Outlets for communicating the urban forestry message

respondents indicated that no education/communication means were used. Now nearly all programs do so and most use multiple outlets. The trend in using Arbor Day celebrations continues to grow as the primary means. Use of all other outlets remain consistent since the first survey. However, the Internet and related social media have grown to about 30% and 25%, respectively, given their low cost relative to purchasing time on TV or radio.

"We utilize the city's newsletter and media outlets to promote urban forestry, Arbor Day and related activities. Our staff contributes in the field and are great ambassadors at Tree Committee meetings and elevator talks with stakeholders." *San Luis Obispo, 2017*

"I used the Tree Circus to promote Arbor Day and it was a big success." *Carlsbad, 2017*

Management Plans & Tree Ordinances

Management plans are an essential part of any urban forestry program for a host of reasons. They establish the long-term goals and document the needs and benefits of the urban forest. With the community and city councils' engagement in preparing and approving the plan, support for the program is greatly improved. The 2016 survey was the first time municipalities were asked if they had a management plan and if it incorporated provisions to distribute urban forest benefits equitably. **Only 54% of the respondents had a management plan** and one-third of those had equitability provisions.

A well-designed tree ordinance is an important policy tool to achieve the urban forest goals and to help defuse conflicts over tree problems. Beginning with the 1992 survey, 65% of the respondents had a tree ordinance; now nearly all respondents indicated their municipality had one. In 2016, **75% thought their ordinance was overall effective**. The effectiveness of 6 common ordinance provisions is presented in Figure 46 and a new one added for the 2016 survey - "assists tree canopy cover goals".

Nearly all common provisions are viewed as being relatively effective without much difference from past surveys. As in past surveys, the most effective provision remains "requiring tree planting in new residential and commercial developments". It is easy to enforce, not controversial and contributes to the other goals if combined with a mandatory species list. Ordinance types or provisions that appear to be least effective are those aimed at protecting trees on private property and contributing to tree canopy cover goals.

Updating tree ordinances is needed to address ineffective provisions or to address problems of enforceability (36% thought their ordinance was not adequately enforced). As of 2016, 40% of the tree ordinances among the respondents had been revised in the last 5 years, and 50% in the last 25 years. Still, 11% indicated that their ordinance had not been revised for over 25 years. Refer to Swiecki and Bernhardt (2001) for guidelines in developing tree ordinances.

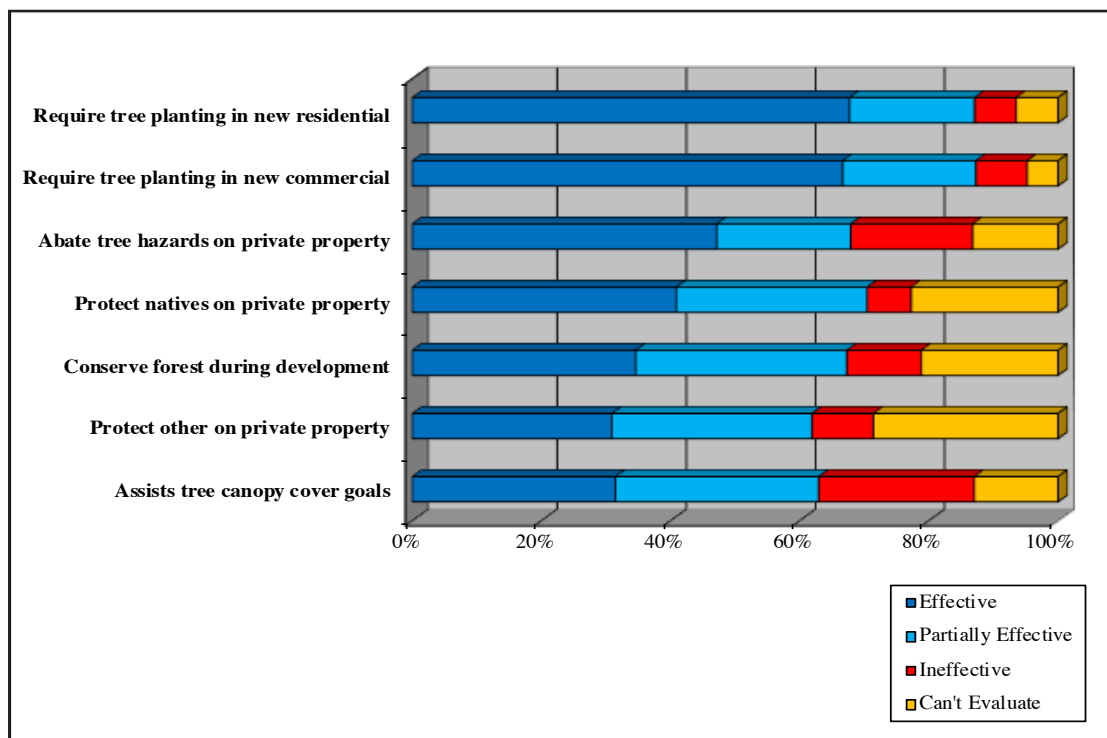*Figure 38. Effectiveness of 7 provisions in tree ordinances*

"Tree protection during construction has been effective. Public works staff manage hiring of tree contractors and implementation of tree and pesticide work. Risk management policy has been effective." *Saratoga, 2017*

"I am very interested in how to enforce tree ordinance without having to go to court. How do cities fine for violations?" *Carson, 2017*

Urban Forestry Benefits

Generally, promoting the urban forest to the community is not difficult in that most people have an innate recognition of its benefits once they look. Just ask anyone on a street to consider what it would be like if the trees were not there and the benefits become obvious. That may have happened in some communities that were hard hit by the drought.

Beginning in the 1992 survey, urban forestry managers have been asked to rank their perception of the benefits provided by the urban forest and the program from 1 (greatest) to 5 (least). Two new items were listed for response given the role of trees in climate change mitigation as well as the public health benefits of trees. Figure 39

presents the percent of respondents who cited a benefit summing across all 5 ranks. Aside from the two new benefits, the overall ranking of benefits has not changed much since 1992. The most frequently and consistently cited benefits of their green infrastructure are civic pride, decreasing tree hazards (which received the most #1 rankings), and the economic contribution to business. Interestingly, public health benefits was the fourth most frequently cited. The least cited were the set of environmental benefits - wildlife habitat, stormwater retention and least of all soil conservation. However, climate change mitigation, air quality and energy conservation effects were of moderate importance.
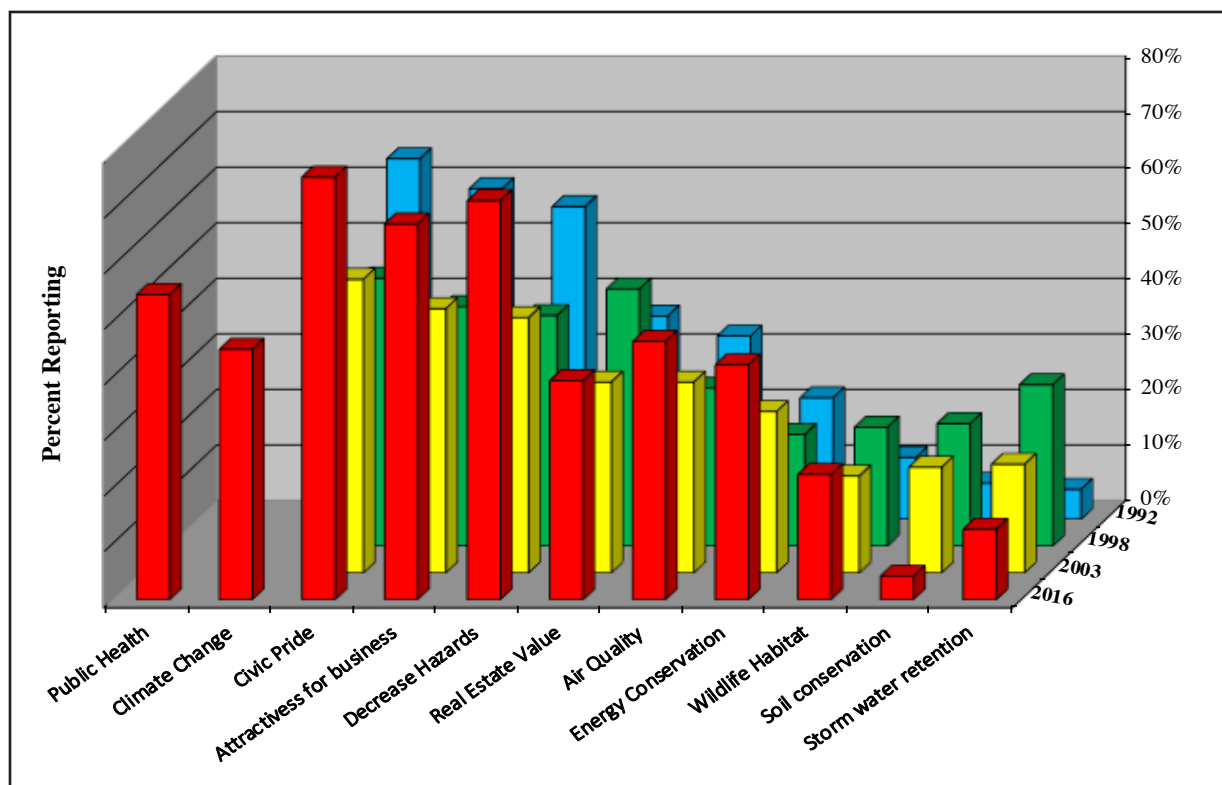

Figure 39. Trends in perceived urban forest benefits based on ordered rankings in 1992

Recent publications on the benefits of urban forests

McPherson, E.G.; Xiao, Q.; de Goede, J.; van Doorn, N.; Bjorkman, J.; Hollander, A.; Boynton, R.M.; Quinn, J.H. 2017. The structure, function and value of urban forests in California communities. *Urban Forestry & Urban Greening* 28: 43-53.

McPherson, E.G.; van Doorn, N.; de Goede, J. 2016. Structure, function and value of stree trees in California USA. *J. of Arboriculture & Urban Forestry* 17: 104-115.

McPherson, E.G.; Kotow, L. 2013. A municipal forester report card: Results for California. *Urban Forestry & Urban Greening* 12: 134-143.

McPherson, E.G.; Simpson, J.R.; Peper, P.J.; Maco, S.E.; Xiao, Q. 2005. Municipal forest benefits and costs in five U.S. cities. *J. of Forestry* 103(8): 411-416.

McPherson, G.E. 2005. Effects of street tree shade on asphalt concrete pavement performance. *J. of Arboriculture* 31(6): 303-310.

Program Needs & Resources

As with the evaluation of benefits of the urban forest, managers were asked to identify their most important needs. These needs have already been identified and explored from previous questions. Now we ask for them to rank their most important, second most, and third most important need.

Figure 40 shows the most important needs (again summing across the 3 rankings) based on their ranked order from the 1992 survey. As expected, increased funding remains the top priority; however, the priority of other needs has changed somewhat. Twenty-five years ago, better tree care and citizen support were the next most important needs. This has given way to the need for planting space and new

or improved tree ordinances in 2016. Among the categories, better nursery stock and technical information remain of least importance to managers.

Two new questions were added to the 2016 survey - (1) if managers were aware of Cal Fire's Urban Forestry Toolkit and how it was used, and (2) how the Water Efficiency Landscape Ordinance (WELO) has affected their program. About 40% were aware of the Toolkit which most used to help build an overall strategy for their program or to improve the tree ordinance. As for the impact of WELO, 63% indicated that it forced changes in policy or tree ordinances, 27% that it required them to seek additional funding and the remainder that new staff were added.
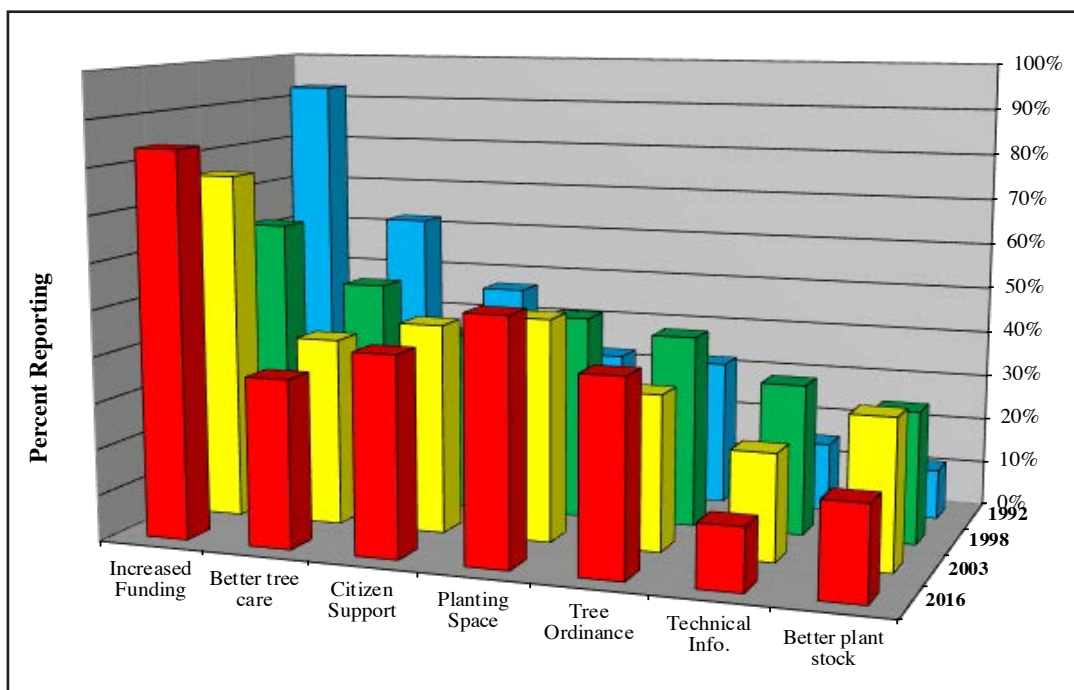

Figure 40. Trends in greatest need based on ordered rankings in 1992

"We need to build awareness and knowledge around tree related topics, before expecting ordinances and programs to be accepted and effective; then policies can express the true will and intent of a community that loves trees." ***Redwood City, 2017***

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Appendix 1. References and Organizations related to Urban & Community Forestry

Federal Government

USDA Forest Service, Urban & Community Forestry
www.fs.fed.us/psw/topics/urban_forestry/

USDA Forest Service, Center for Urban Forest Research
www.fs.fed.us/psw/programs/cufr

California State Government

California Department of Forestry & Fire Protection, Urban Forestry Program
calfire.ca.gov/resource_mgt/resource_mgt_urbanforestry
The mission of the California Department of Forestry and Fire Protection's Urban Forestry Program is to lead the effort to advance the development of sustainable urban and community forests in California. Trees provide energy conservation, reduction of storm-water runoff, extend the life of surface streets, improve local air, soil and water quality, reduce atmospheric carbon dioxide, improve public health, provide wildlife habitat and increase property values.

Urban Forest Ecosystems Institute

The Urban Forest Ecosystems Institute (UFEI) was developed by the Natural Resources Management & Environmental Sciences (NRES) Department faculty to address the increasing need for improved management of the urban forests in California.
www.ufei.calpoly.edu

Non-Profit (National)

The National Arbor Day Foundation
www.arborday.org

Tree Musketeers
treemusketeers.com
TREE MUSKETEERS was the nation's first known nonprofit actually administered by kids with support of adults partners. The mission is to empower young people to lead environmental improvement in Earth's communities through innovative action and education programs that motivate others to become partners in a united youth movement. TREE MUSKETEERS is non-membership and headquartered in the Los Angeles area.

Non-Profit (California)

California ReLeaf
www.californiareleaf.org
California ReLeaf was founded in 1989 and incorporated as a 501(c)(3) nonprofit organization in 2004. Our mission is to empower grassroots efforts and build strategic partnerships that preserve, protect, and enhance California's urban and community forests.

California Urban Forest Council
www.caufc.org
The mission of CaUFC is to promote the proper planning, planting, and management of urban and community forests to maximize the quality of life for every Californian.

Professional

International Society of Arboriculture
www.isa-arbor.com

Society of Municipal Arborists
www.urban-forestry.com
Founded in 1964, the SMA is an organization of municipal arborists and urban foresters affiliated with ISA. Our membership also includes consultants, commercial firms and citizens who actively practice or support some facet of municipal forestry.

General References

Urban Forestry Bibliography
www.lib.umn.edu/cgi-bin/forestry/index.cgi?page=search_urban

USDA Forest Service Northern Research Station
www.milliontreesnyc.org/downloads/pdf/urban_tree_bib.pdf

Tree Ordinances
www.isa-arbor.com/Credentials/Types-of-Credentials/ISA-Certified-Arborist-Municipal-Specialist/Tree-Ordinance-Guidelines

Urban Forestry Management Plan Toolkit
www.ufmptoolkit.net/

Urban and
Community
Forestry

2016 Urban & Community Forestry Survey - Final

INTRODUCTION TO SURVEY

Hello from Cal Poly's Urban Forest Ecosystems Institute,

As promised, we're launching the survey. To recap its importance, Cal Fire's Urban Forestry Program has surveyed municipal urban and community tree programs of California in 1988, 1992, 1998, and 2003. The survey results were presented in reports that have been very helpful to urban forest managers and advocates (see http://ufei.calpoly.edu/ufeipublications.lasso).

The last 10 years have brought many changes that affect our urban forests. This follow-up survey will allow us to document these changes and trends. The results of this survey will be presented in an online report to aid in the planning and management of our urban and community forests. Your information is needed to assist Cal Fire in setting priorities to support California's urban forestry programs.

Please read the following instructions.

Please respond with answers appropriate to your jurisdiction from the most recently completed fiscal year (e.g., FY 15/16) or the most recent data available. This survey covers the following topics related to your tree program: planning and management, budgets, personnel, tree planting and stock, tree care, pruning and removal, liability and hardscape damage, community involvement, and ordinances.

We recommend that you access your management and budget records before starting. With this information available, it should take less than 2 hours for the average municipality. The survey does not have to be completed in one sitting. You can return multiple times and pick up where you left off.

Important: Your answers are saved each time you click 'Next' to move to the next page. Do not leave your browser window without clicking 'Next'. You can leave or close your browser window at that time after that. You may return and continue the survey via the original email link. You can edit your previous responses (by clicking 'Previous'), or pick up where you left off anytime until you submit the survey. Edits cannot be made once the survey is submitted.

Email support questions to ufei@calpoly.edu.

Thank you!

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INTRODUCTORY QUESTIONS

* 1. We are a:

◯ City

◯ County

2. We currently use {{ Q1 }} funds to carry out tree<u>planting</u> activities within our boundaries.

◯ Yes

◯ No

3. We currently use {{ Q1 }} funds to carry out tree<u>care</u> activities within our boundaries.

◯ Yes

◯ No

4. Identify the highest position held by the primary individual responsible for tree care in your {{ Q1 }}. (Devoted at least half-time to tree care management)

◯ Department Head

◯ Program Manager

◯ Field Supervisor

◯ Field Employee

◯ Other (please specify)

[   ]

5. The data entered in this survey represent activities occurring in the following {{ Q1 }} departments/functions. (Check all that apply)

☐ Public Works

☐ Parks and Recreation

☐ Planning

☐ Community Services

☐ Administration

☐ Storm Water Management

☐ Transportation

☐ Utilities

☐ Other (please specify)

[   ]

A. MANAGEMENT AND PLANNING

6. Does your {{ Q1 }} have a tree inventory?

◯ Yes

◯ No

7. What year was your inventory established?

8. How often do you update your inventory?

◯ Daily (continually)

◯ Semi-annually

◯ Annually

◯ Every 2 or more years

◯ Never have

◯ Other (please specify)

9. How often is the tree inventory used as a tool for decision making?

	Rarely				Frequently
Inventory is used for decisions	◯	◯	◯	◯	◯

10. Does your {{ Q1 }} have an Urban Forestry Management Plan?

◯ Yes

◯ No

11. Does your {{ Q1 }} tree-related progam incorporate provisions for an equitable distribution of urban forestry (UF) benefits? (e.g., canopy cover in disadvantaged communities)

◯ Yes

◯ No

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A. TREE PROGRAM BUDGETS

12. What is your {{ Q1 }} total budget for tree-related activities?

```
[                                                    ]
```

* 13. Compared to the previous fiscal year, did your tree budget (choose one):

- ◯ Increase
- ◯ Decrease
- ◯ Remain the same

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A. TREE PROGRAM BUDGETS (Cont)

14. Please estimate percent % {{ Q13 }} of tree budget.

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A. TREE PROGRAM BUDGETS (Cont)

15. Approximately what percent of your tree budget is spent on private contractors? (Write "UE" if unable to estimate.)

Urban and Community Forestry

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A. TREE PROGRAM BUDGETS (Cont)

16. Approximately what percent of the tree budget comes from the following funding sources? (Total = 100%)

% General Fund

% Assessment Districts

% Permit Fees

% Grants

% Gas Tax Money

% Development Funds

% Fines

% Capital Improvement

% Other

11

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B. PERSONNEL

* 17. Compared to the previous year, did staffing levels for tree-related activities (choose one):

○ Increase

○ Decrease

○ Remain the same

B. PERSONNEL (Cont)

18. Please estimate percent {{ Q17 }} of staffing levels

[   ]

19. How many people did your tree program employ in 15/16?

Number Full Time

[   ]

Number Seasonal/Part Time

[   ]

Total Number of FTE (Full Time Equivalents) For Seasonal/Part Time

[   ]

20. How many of those individuals are certified?

Certified Arborist

[   ]

Certified Tree Worker

[   ]

Certified Urban Forester

[   ]

Registered Landscape Architect

[   ]

Certified Irrigation Specialist

[   ]

Registered Professional Forester (RPF)

[   ]

21. List the number of private contracting firms you use in each of the following categories:

Arborist/tree reports

Emergency work

Pest control

Planting

Routine pruning

Specialized equipment

Inventory/Mgmt Plan

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B. PERSONNEL (Cont)

22. How satisfied are you with the results of the private contracting firms?

	Unsatisfied	Partially Satisfied	Satisfied	Very Satisfied
Arborist/tree reports	○	○	○	○
Emergency work	○	○	○	○
Pest control	○	○	○	○
Planting	○	○	○	○
Routine pruning	○	○	○	○
Specialized equipment	○	○	○	○
Inventory/Mgmt Plan	○	○	○	○

2016 Urban & Community Forestry Survey - Final

C. TREE PLANTING AND NURSERY STOCK

23. Please indicate the top 4 most important characteristics in choosing trees for street plantings.

	First	Second	Third	Fourth
Amount of shade tree will cast	○	○	○	○
Aesthetics of tree	○	○	○	○
Cost of future maintenance	○	○	○	○
Space Available for growth	○	○	○	○
Longevity	○	○	○	○
Disease/Flood, wind fall	○	○	○	○
Water Usage	○	○	○	○
Native	○	○	○	○

24. Please indicate the top 4 most important characteristics in choosing trees for park plantings.

	First	Second	Third	Fourth
Amount of shade tree will cast	○	○	○	○
Aesthetics of tree	○	○	○	○
Cost of future maintenance	○	○	○	○
Space Available for growth	○	○	○	○
Longevity	○	○	○	○
Disease/Flood, wind fall	○	○	○	○
Water Usage	○	○	○	○
Native	○	○	○	○

25. In total, how many trees did your program plant on {{ Q1 }} property? (Write "UE" if Unable to Estimate.)

Street Trees (including parking lots)

[   ]

Park Trees (include trees in cemeteries, golf courses, public buildings, etc.)

[   ]

Open Space / Wildland Trees

[   ]

26. Of all those trees, how many were planted by non-{{ Q1 }} personnel? (Include only trees that your program will care for in the future. Write "UE" if unable to estimate)

Private Property Owner

[   ]

Volunteer

[   ]

Developer

[   ]

27. When tree planting is required in new residential subdivisions, who is required to:

	Developer	{{ Q1 }}	Homeowner
Pay for trees	○	○	○
Plant trees	○	○	○
Maintain trees	○	○	○

28. Please list the 5 tree species most commonly planted by your program along streets.

1. [   ]

2. [   ]

3. [   ]

4. [   ]

5. [   ]

29. Please list the % of total planted for each of the 5 tree species listed above along streets. (Round to whole numbers)

1.

2.

3.

4.

5.

30. Please list the 5 tree species most commonly planted by your program in parks.

1.

2.

3.

4.

5.

31. Please list the % of total planted for each of the 5 tree species listed above in parks. (Round to whole numbers)

1.

2.

3.

4.

5.

32. Please rank the sizes of tree nursery stock your program uses in street plantings. (with 1 being the most commonly used)

	1	2	3	4	5	Not Used
# 1 (or smaller)	○	○	○	○	○	○
# 5	○	○	○	○	○	○
# 15	○	○	○	○	○	○
24 in. Box	○	○	○	○	○	○
36 in. Box or larger	○	○	○	○	○	○

33. Please rank the sizes of tree nursery stock your program uses in park plantings. (with 1 being the most commonly used)

	1	2	3	4	5	Not Used
# 1 (or smaller)	○	○	○	○	○	○
# 5	○	○	○	○	○	○
# 15	○	○	○	○	○	○
24 in. Box	○	○	○	○	○	○
36 in. Box or larger	○	○	○	○	○	○

34. In the past year, which of the following nursery stock factors have affected your tree planting program? (Please check all that apply)

☐ Desired trees available but too expensive

☐ Desired tree species or cultivars not available

☐ Desired sizes of tree nursery stock not available

☐ Tree nursery stock of acceptable quality not available

35. How often have you encountered the following quality conditions in tree planting stock?

	Never	Almost Never	Sometimes	Almost Always	Always
Poor root structure (example-girdled roots)	○	○	○	○	○
Poor stem taper	○	○	○	○	○
Poor top structure (example-leader headed)	○	○	○	○	○
Insects or diseases	○	○	○	○	○

36. Do you have trees contract-grown for your {{ Q1 }}?

○ Yes

○ No

D. TREE CARE

37. How has California's extended drought affected your tree program? (Check all that apply)

☐ No effect

☐ We've reduced watering of trees

☐ Increased the use of recycled wastewater (purple pipe)

☐ We're planting more low-water use trees (climate adapted)

☐ We've stopped planting trees altogether

☐ We're still planting trees, but we're planting fewer trees

☐ We've changed season of planting

☐ We've changed planting specifications

☐ We've had increased tree mortality

☐ We're planting disease resistant trees

38. Approximately what percentage of the trees in your {{ Q1 }} are irrigated?

[   ]

39. Have concerns about fire prevention affected your program in any way?

○ No

○ Yes

If Yes, Please specify how

[   ]

40. How many trees is your {{ Q1 }} responsible for?

Street trees (including parking lots)

_____

Park trees (include trees in cemeteries, golf courses, public buildings, etc.)

_____

Open space / Wildland trees

_____

Line clearance

_____

Private property e.g., utility, heritage trees, mitigation

_____

41. Approximately what percent of all {{ Q1 }} trees does your program care for? (Write UE if unable to estimate.)

% of all trees {{ Q1 }} -wide

_____

42. For the tree maintenance that your program performs, please estimate the percentage that falls into each of the following categories: (Total = 100%)

% Is performed on a systematic, regularly scheduled cycle

_____

% Is performed on demand, in response to unanticipated problems

_____

43. What is the longest pruning cycle in year(s) for your tree program?

_____

E. PRUNING AND REMOVAL

44. Approximately how many trees did your {{ Q1 }} prune or trim last year? (Write "UE" if unable to estimate.)

Juvenile trees being trained

Established trees being trimmed

45. Including all public and private trees in your {{ Q1 }}, what percent would you estimate have been topped?

46. How does your program dispose of trimmings and removals? (Please estimate the percent in each category. Total = 100%)

% Burned

% Dumped

% Chipped for mulch and used by the {{ Q1 }}

% Cut for firewood and sold or given away

% Used for biofuel energy generation

% Used for solid wood recycling

47. Please check any pruning specifications that {{ Q1 }} tree workers follow.

☐ ISA (International Society of Arboriculture)

☐ ANSI (American National Standards Institute)

☐ CDPR (California Department of Parks and Recreation)

☐ Cal Fire Standards

☐ None (No pruning standards are followed)

☐ Other (please specify)

[   ]

48. Does your {{ Q1 }} require any of the groups listed below to follow any pruning specifications?

	ISA (International Society of Arboriculture)	ANSI (American National Standards Institute)	CDPR (California Department of Parks and Recreation)	Cal Fire Standards
Contractors doing work for {{ Q1 }}	☐	☐	☐	☐
Utility Companies	☐	☐	☐	☐
Companies doing work on private trees	☐	☐	☐	☐
Individuals doing work on private trees	☐	☐	☐	☐

Other (please specify)

[   ]

49. Approximately how many trees did your {{ Q1 }} program remove?

[   ]

G. LIABILITY AND HARDSCAPE DAMAGE

50. Which of the following methods does your {{ Q1 }} use to limit tree-related liability claims? (Please check all that apply)

☐ Program to identify and abate hazardous trees and branches

☐ Program to identify and replace sidewalks displaced by tree roots

☐ All filed claims are strongly contested by the city

☐ Transfer responsibility for city trees to private landowners

51. Please rate the overall effectiveness of following types of root barriers (in place at least 5 years) your {{ Q1 }} uses in preventing damage to sidewalks and curbs.

	Ineffective	Partially Effective	Effective	Not Sure	Not Used
Linear barriers	○	○	○	○	○
Encircling barriers	○	○	○	○	○
Chemical impregnated barriers	○	○	○	○	○

52. Please rate the overall effectiveness of following types of methods (used or in place at least 5 years) your {{ Q1 }} uses in preventing damage to sidewalks and curbs.

	Ineffective	Partially Effective	Effective	Not Sure	Not Used
Species selection	○	○	○	○	○
Re-aligning sidewalks around existing trees	○	○	○	○	○
Eliminating tree lawns between sidewalk and curbs	○	○	○	○	○
Re-engineering sidewalks to avoid damage by roots	○	○	○	○	○
Pruning roots of trees that are damaging sidewalks	○	○	○	○	○

H. COMMUNITY INVOLVEMENT WITH THE TREE PROGRAM

53. How many of the following groups plant or care for {{ Q1 }} street, park, or open space trees?

Youth organizations/programs

Adult volunteers or civic organizations

Correctional institutions or programs

54. What outlets or events do you use for public education? (Please check all that apply)

☐ School programs

☐ Local TV/Radio

☐ Arbor Day celebrations

☐ Local paper

☐ Speak to local groups

☐ Online

☐ Social media

☐ Other (please specify)

55. Please rate the level of support you believe your program has in each category listed below.

	Low		Moderate		High
Local government support	○	○	○	○	○
Local citizen support	○	○	○	○	○

56. What is the relationship between your {{ Q1 }} tree-related activities and citizen boards or commissions?

○ A citizen tree board/tree commission with duties related only to the tree program

○ A citizen tree board/tree commission with some duties related to the tree program

○ No citizen tree board/tree commission interact with the tree program

57. What functions does the citizen board or commission perform? (Please check all that apply)

☐ Public education about the tree program

☐ Promoting tree program to city council

☐ Setting priorities for the tree program

☐ Establishing policy related to trees

☐ Hearing appeals related to the tree ordinance

☐ Administering the tree program

☐ Arbor Day and special tree planting events

58. Please rate the effect the citizen board or commission has on the tree program.

	Detrimental Effect		No Effect		Beneficial Effect
Effect on program	○	○	○	○	○

H. COMMUNITY INVOLVEMENT WITH THE TREE PROGRAM (Cont)

* 59. Do you have "tree advocacy" organizations in your {{ Q1 }}? (Do not include city boards or commissions.)

○ No

○ Yes

60. Please Specify Group Name(s) from previous question.

[   ]

61. Please rate the effect the citizen "tree advocacy" has on the tree program.

	Detrimental Effect		No Effect		Beneficial Effect
Effect on program	○	○	○	○	○

H. COMMUNITY INVOLVEMENT WITH THE TREE PROGRAM (Cont)

62. In your opinion, what are the three greatest needs of your {{ Q1 }} tree program?

	Most Important Need	Second Important Need	Third Important Need
Increased funding	○	○	○
Better quality planting stock	○	○	○
Improved tree maintenance	○	○	○
Increased citizen support	○	○	○
More technical information about trees and tree care	○	○	○
Adequate space for trees	○	○	○
New or improved tree ordinance	○	○	○

63. In your opinion, what are the five most important benefits the tree program can provide to your {{ Q1 }} (where 1 is the most important)?

	1	2	3	4	5
Decrease the prevalence of hazards associated with trees	○	○	○	○	○
Improve attractiveness of our community for business development	○	○	○	○	○
Improve civic pride and sense of community among city residents	○	○	○	○	○
Help the community conserve energy	○	○	○	○	○
Provide wildlife habitat	○	○	○	○	○
Decrease soil erosion	○	○	○	○	○
Decrease runoff during storms	○	○	○	○	○
Decrease local air pollution	○	○	○	○	○
Increase real estate values & hence the tax base of our community	○	○	○	○	○
Public Health	○	○	○	○	○
Climate Change/Adaptation/Sustainability	○	○	○	○	○

2016 Urban & Community Forestry Survey - Final

I. ORDINANCES

64. Are you aware of the Urban Forestry Toolkit?

◯ Yes

◯ No

65. Has this resource been used in your {{ Q1 }} in any of the following ways? (Please check all that apply.)

☐ Used to help write new ordinance

☐ Used to help revise existing ordinance

☐ Used evaluation methods to evaluate existing ordinance effectiveness

☐ Used to help establish an overall urban forest management strategy

I. ORDINANCES (Cont)

66. Does your {{ Q1 }} have a tree ordinance and/or sections of municipal code pertaining to trees?

◯ Yes

◯ No

67. Do you feel your tree ordinance is effective?

◯ Yes

◯ No

* 68. What year was your tree ordinance or code last revised? (Enter 0 if never)

```
[                              ]
```

I. ORDINANCES (Cont)

69. Has the Water Efficiency Landscape Ordinance (WELO) required you to:

☐ Add staff

☐ Change local ordinance or policy

☐ Seek additional funding

70. Please indicate how effective each of the following tree ordinance objectives, is in accomplishing the purpose for which it was intended. Check N/A if not included.

	Ineffective	Partially Effective	Effective	Can't Evaluate	N/A
Provides for protection of individual native trees on private property	○	○	○	○	○
Provides protection of other trees on private property	○	○	○	○	○
Provides / conserves integrity of forests or woodlands during development	○	○	○	○	○
Requires tree planting in new residential developments	○	○	○	○	○
Requires tree planting in new commercial developments	○	○	○	○	○
Allows city to abate tree hazards and nuisances on private property	○	○	○	○	○
Assists in achieving tree canopy cover goals	○	○	○	○	○

71. Overall, are tree-related ordinances adequately enforced in your {{ Q1 }}?

○ Yes

○ No

○ Not Sure

2016 Urban & Community Forestry Survey - Final

Contact Information

72. Many tree managers are interested in how other communities are approaching problems in urban forest management. Do you have a "success story," an example of an innovative solution to a community forest management problem which you would be willing to share with other tree programs? If so, please describe briefly below. We would like to feature a number of these "success stories" in the report that describes the findings of this survey.

* 73. Please indicate the following:

Your Name

Job Title or Position

Mailing Address

Department

City/Town

ZIP/Postal Code

Email Address

Phone Number

74. We would appreciate any other comments you have related to community tree programs.

Thank you for completing this survey!

Appendix 3. Respondent Municipalities

Alameda	Goleta	Poway
Alhambra	Hawthorne	Rancho Cordova
Anaheim	Hesperia	Rancho Cucamonga
Antioch	Highland	Redwood City
Arcata	Huntington Beach	Richmond
Arroyo Grande	Huron	Rocklin
Auburn	Imperial Beach	Rosemead
Baldwin Park	Irvine	Roseville
Bell Gardens	Kerman	Rossmoor
Benicia	King City	Sacramento
Beverly Hills	La Canada Flintridge	San Bernardino County
Buellton	La Mesa	San Diego
Buena Park	La Mirada	San Francisco
Burbank	Laguna Hills	San Jose
Calabasas	Lakewood	San Luis Obispo
Campbell	Larkspur	San Pablo
Carlsbad	Livermore	Santa Ana
Carmel	Lompoc	Santa Barbara
Carson	Long Beach	Santa Barbara County
Ceres	Long Beach	Santa Clara
Chula Vista	Los Angeles	Santa Clarita
Citrus Heights	Los Angeles	Santa Clarita
Claremont	Los Gatos	Santa Cruz
Clovis	Marin County	Santa Maria
Concord	Menlo Park	Santa Monica
Corona	Montebello	Santa Rosa
Cupertino	Monterey	Santee
Del Mar	Moorpark	Saratoga
Diamond Bar	Moraga	Sebastopol
Discovery Bay	Morgan Hill	Sierra Madre
Downey	Newport Beach	South Gate
El Centro	Norco	South Pasadena
El Monte	Oakley	Spring Valley Ca
El Segundo	Oceanside	Sunnyvale
Elk Grove	Ojai	Temecula
Encinitas	Oxnard	Thousand Oaks
Escondido	Palm Desert	Torrance
Firebaugh	Palmdale	Tustin
Fontana	Palo Alto	Vallejo
Foster City	Paramount	Visalia
Fountain Valley	Pittsburg	Vista

Fullerton	Placer County	Walnut Creek
Gardena	Pleasant Hill	Westminster
Glendale	Pleasanton	Yorba Linda
Glendora	Porterville	