



# Public Tree Inventory Report

July 2015

Prepared for:

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*Funding provided by Proposition 84 to Improve the Sustainability and Livability of California's Communities through the Strategic Growth Council's Urban Greening for Sustainable Communities Grant Program.*



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# Executive Summary

A complete tree inventory is an invaluable tool for urban forest managers. It should be kept current and accessed regularly to develop work assignments and identify strategies for improving and enhancing the urban forest. In April 2015, the City of Pacific Grove contracted with Davey Resource Group (DRG) to collect an inventory of all public street and park trees, recording data about location, species, condition, size, and maintenance needs. Private trees were not included in the inventory.

Managers now have an opportunity to use this data to prioritize work, reduce hazards, and increase the health of the urban forest. During the inventory, maintenance priorities were assigned for each tree, including a description of the work required and the timeframe within which it should be conducted. The inventory data includes additional information that can help urban forest managers determine priorities and anticipate future needs. Information about tree age, disease, defects, nearby utilities, sidewalk displacement, and location can also be used to strategically plan work.

Analysis of the inventory data provides the following information:

- The inventory includes 7,394 trees and 623 vacant sites and stumps, for a stocking level of 92.2%
- The most common species are *Quercus agrifolia* (coast live oak, 30% of the population), *Pinus radiata* (Monterey pine, 25%), and *Cupressus macrocarpa* (Monterey cypress, 21%),
- The most common condition ratings are fair (40%, 3,226 trees) to good (39%, 3,084 trees).
- The most common maintenance recommendation is routine pruning (64%, 5,115 trees).
- Removal is recommended for 8.8% of the inventory, (718 trees).
- Sidewalk repair is required at 258 tree sites.
- Pruning for clearance is recommended for 128 sites.
- Issues with tree stakes were found for 200 trees.

Based on these findings, the following recommendations are provided:

- Prioritize removal of and pruning of 530 **Priority 1** trees.
- Provide clearance pruning for 128 trees, especially for visibility and public safety.
- Develop a 3-5 year pruning cycle for **Priority 2** and **routine pruning** of the remaining trees.
- Repair hardscape damage at 395 tree sites.
- Develop a planting plan to increase stocking level and provide replacements for removals where appropriate. Considering both current vacant sites, and removals anticipated in the next 5-10 years, there will be 1,341 sites available for tree planting in the near future.
- Address issues with tree stakes for 200 trees.

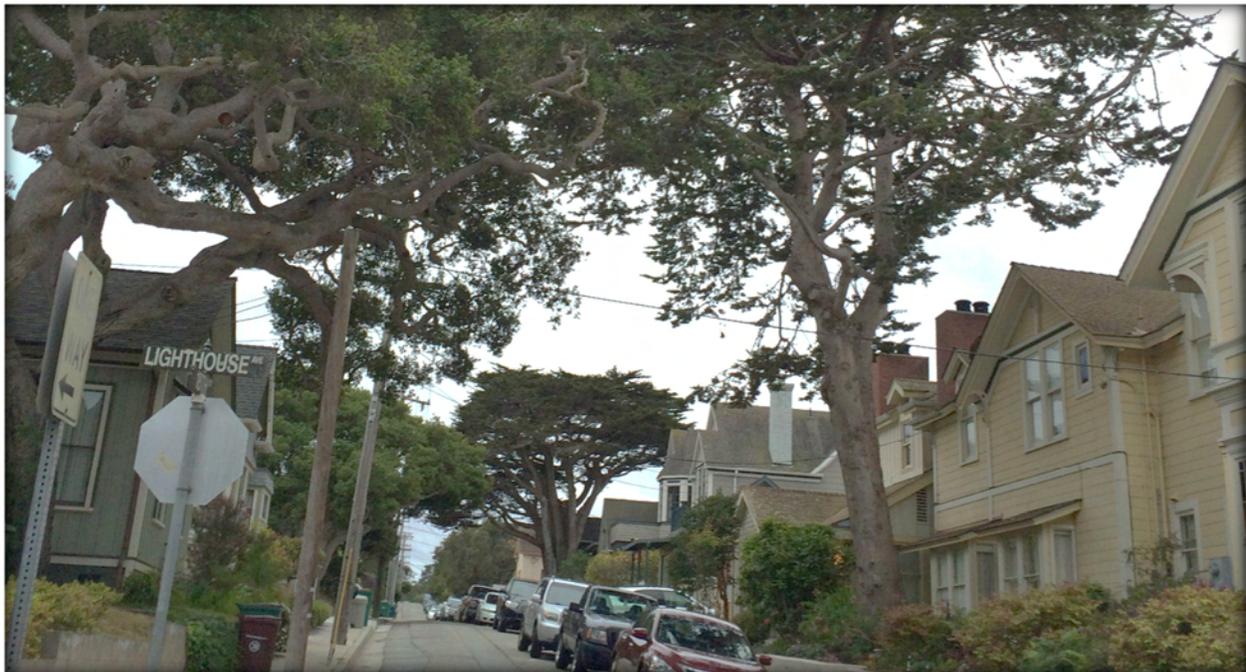
Considering that Pacific Grove has an established public tree population with a large portion of native trees, the urban forest is an important and iconic component of the community. Residents rely on urban forestry staff to manage this resource proactively in order to maintain public safety, enhance and preserve the life expectancy of established trees, and plan for future tree planting. Managers have an opportunity to increase the diversity in the entire population by carefully selecting a diversity of tree species for use in the community tree palette. With appropriate management and replanting, the Pacific Grove urban forest can continue to be a vital community asset for many years to come.

# Introduction

This report outlines strategies to help managers sort, interpret, and analyze data collected in the 2015 inventory of Pacific Grove’s public trees. To collect this inventory, a team of International Society of Arboriculture (ISA) certified arborists from DRG mapped the location and collected data for street trees using global positioning system technology. In addition to location, the arborists collected information about the species, size, condition, and current maintenance needs of each tree. This inventory was a ground-level visual inspection, and did not include root excavation, or climbing to inspect defects visible from the canopy or scaffold branches.

Pacific Grove’s public urban forest is unique, including a large number of native and well-established trees. This population requires a management plan that is responsive to the special details of this particular community. As a coastal community, the common native trees, including *Pinus radiata* (Monterey pine), *Quercus agrifolia* (coast live oak), and *Cupressus macrocarpa* (Monterey Cypress) are a vital part of the landscape, comprising 76% of the population. These and other large stature trees provide a sense of place, framing breathtaking views, supporting outdoor recreational activities, and providing residents and visitors an unparalleled quality of life. Home to a monarch butterfly habitat, many of the urban trees produce nectar, and provide habitat for butterflies and other wildlife. Furthermore, the 7,394 public trees provide quantifiable environmental and economic benefits, which are described in the Pacific Grove Urban Forest Resource Analysis (2015), a companion to this report.

An urban forest is a dynamic resource, constantly changing and growing in response to environment and care. This Inventory Report focuses on the maintenance needs for the next 5-10 years. With maintenance needs and priority identified, managers can schedule crews appropriately, and request appropriate levels of funding to maintain Pacific Grove’s community trees.



***Large Stature Trees Create a Sense of Place***

# Inventory Methods

Inventory arborists are trained to collect accurate, standardized, replicable data. All personnel who collected field data followed consistent methods to ensure uniformity and lack of individual bias in evaluating the trees. The specific definitions below helped maintain this standard, yielding highly reliable, accurate data about the inventoried trees and sites.

## Site Data

Site data includes information about the location of the tree that will help managers identify the tree on their next visit. The City also provided a map of 16 areas or neighborhoods, and these were recorded with the tree record. If a tree was in a park, the name was recorded with the tree record. Physical addresses generally corresponded with the information provided by the city, except in some cases where the physical address (numbers posted on a building) were different. In those cases, the physical address was recorded along with a note that the map was inaccurate. Nearby cross streets were also recorded, including the cross street before and after the block on which the tree is located (Figure 1). This method has the particular advantage of supporting tree crew management by blocks and neighborhood.

**Figure 1. Street Records Support Block-Side Work**



**Tree Data includes information to support block-side work assignments for crew efficiency.**

In some cases, no address was available, so a block side address was assigned. Generally, the assigned addresses end in 00 or 01, and a note is made in the database that the address is assigned. Trees were collected with the flow of traffic, and median trees were collected with the flow of traffic on the even side of the street. The location of each tree on the property was recorded, including left, right, front and back, and each tree was numbered in sequence with the flow of traffic. Park trees were sequenced based on the path the arborist took to collect the trees and generally was conducted in a clockwise manner. Since parks do not have property sides (left, right, front, and back), N/A was assigned for the side data field. Trees at the edge of parks were considered street trees.

# Tree Attributes

The following attributes were collected for each site:

- **Mapping coordinate.** X and Y coordinate locations (latitude and longitude). Additionally, each tree and planting site was located using GIS maps and/or GPS equipment.
- **Descriptive Location (Block side).** DRG documented the location of each street tree and planting site so that they can easily be identified for future work. Street trees and planting sites were located using a street name, side of lot, tree number, and blockside information (on street, from street, and to street).
- **Area 1 & 2.** Tree locations were identified by neighborhood as mapped in the City General Plan. The field Area 2 was used to designate the park name where applicable.
- **Location.** The trees physical location in relation to public ROW and/or public space were recorded.
- **Species.** Trees were identified by genus and species, and by common name.
- **Diameter.** Trunk diameter was recorded to the nearest one-inch.
- **Stems.** The number of stems was recorded. (2 ft. above grade)
- **Condition.** In general, the condition of each tree was recorded in one of the following categories adapted from the rating system established by the International Society of Arboriculture:

Excellent	100%
Very Good	90%
Good	80%
Fair	60%
Poor	40%
Critical	20%
Dead	0%

- **Maintenance need.** The following maintenance categories were collected:
  1. Priority 1 Removal. Trees designated for removal have defects that are not cost-effective or practical to treat. The majority of the trees in this category have a large percentage of dead crown and poses an elevated level of risk for failure. Any hazards that were seen as potential dangers to persons or property and/or seen as potential liabilities to the client are in this category. Large dead and dying trees that are high liability risks are included in this category. These trees are the first ones that should be removed.
  2. Priority 2 Removal. Trees that should be removed but do not pose a liability as great as the first priority will be identified here. This category would need attention as soon as "Priority One" trees are removed.
  3. Priority 1 Prune. Trees that require priority one pruning are recommended for pruning to remove hazardous deadwood, hangers, or broken branches. These trees have broken or hanging limbs, hazardous deadwood, and dead, dying, or diseased limbs or leaders greater than four inches in diameter.
  4. Priority 2 Prune. These trees have dead, dying, diseased, or weakened branches between two and four inches in diameter and are potential safety hazards

5. Large Tree Routine Prune. These trees require routine horticultural pruning to correct structural problems or growth patterns that would eventually obstruct traffic or interfere with utility wires or buildings. Trees in this category are large enough to require bucket truck access or manual climbing.
6. Small Tree Routine Prune. These trees require routine horticultural pruning to correct structural problems or growth patterns that would eventually obstruct traffic or interfere with utility wires or buildings. These trees are small growing, mature trees that can be evaluated and pruned from the ground.
7. Training Prune. Young, large-growing trees that are still small must be pruned to correct or eliminate weak, interfering, or objectionable branches in order to minimize future maintenance requirements. These trees, up to 20 feet in height, can be worked with a pole pruner by a person standing on the ground.
8. Stump Removal. This category indicates a stump that should be removed.

- **Plant Tree**. During the inventory, vacant planting sites were identified by street and address. The size of the site is designated as small, medium, or large (indicating the ultimate size that the tree will attain), depending on the growing space available and the presence of overhead wires.
- **Observations**. General observations referring to a tree's health, structure, and location were made
- **Clearance Required**. Trees which are causing or may cause visibility or clearance difficulties for pedestrians or vehicles will be identified, as well as those trees blocking clear visibility of signs, street lights or traffic signals.
- **Hardscape Damage**. Damage to sidewalks and curbs by tree roots are noted. Notes for potential fixes were recorded.
- **Overhead Utilities**. The inventory indicates whether overhead conductors or other utilities are present at the tree site that could result in conflicts with the tree.
- **Grow space**. The area within the growing space is categorized as:
 

<b>T</b>	Tree Lawn
<b>W</b>	Well/Pit
<b>M</b>	Median
<b>P</b>	Raised Planter
<b>O</b>	Open/Unrestricted
<b>I</b>	Island
<b>U</b>	Unmaintained Area
- **Space Size**. The narrowest dimension of the Grow Space, in feet.
- **Notes and Observations**. Additional information regarding mechanical damage, possible disease, codominant stems, previous failures, and insect presence was included in this field.

## Quality Control Procedures

Data was collected and verified with the following quality control measures.

- **Training** – Quality control procedures ensure quality data. The first step in DRG’s quality control is to provide proper training of qualified individuals. Our field personnel on this project were ISA Certified Arborists with up-to-date credentials.
- **Data Collections Specification** – A clear understanding of the data and the methods for collection and categorization ensure high-quality, standardized collection. DRG worked with the City of Pacific Grove to develop a detailed specification before actual data collection began.
- **Field Quality Check** – At the beginning of the project, 10% of each arborist’s information was checked for quality and completeness. All aspects of data collection were reviewed. As the project progressed, the percentage of quality-controlled information may have decrease based on an individual’s abilities. DRG’s supervisors provided quality control of collected information.
- **Quality Assurance Methods** – Quality assurance was completed electronically so that quality checks are a permanent record of the data collected. Errors were corrected as they were found.
- **Quality Assurance Reporting** – Quality assurance information was tallied by week ending date and is available upon request.
- **Tree Collection Interface (TCI)** – Inventory data was uploaded into DRG’s TCI data management system. TCI works concurrently with DRG’s ArcPad collection system to run real-time Quality Assurance algorithm checks on the data for an additional element to ensure data accuracy.

# Findings

Understanding species composition, condition, maintenance needs, and site issues helps managers to prioritize work based on multiple factors, and schedule work based on available resources. This information allows managers to anticipate funding needs for the coming years. The following findings provide the context for the recommendations provided later in this report.

## Species Composition

This inventory Report provides an overview of the species composition. The Pacific Grove Resource Analysis (2015) provides greater detail about the species composition of the entire urban forest, and the benefits provided by individual tree species. The brief summary presented here is included to provide context and an overview for the maintenance recommendations and planting plan suggestions provided in subsequent sections. A full species list is available in the appendices.

As a coastal community, the common native evergreen trees are an iconic part of the landscape, providing shelter, seasonal interest, wildlife habitat and economic and environmental benefits. The three most common species, including *Pinus radiata* (Monterey pine), *Quercus agrifolia* (coast live oak), and *Cupressus macrocarpa* (Monterey cyprus) comprise 76% of community tree population. Pacific Grove’s mild coastal climate is an ideal environment for evergreens, including both broadleaf trees and conifers, which together comprise 94% of the overall resource.

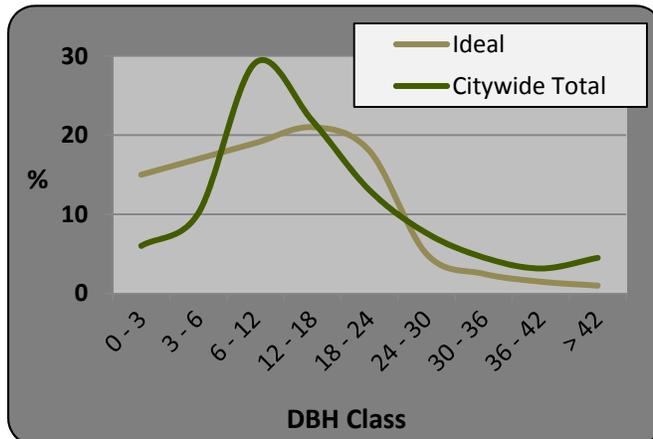
An industry-accepted rule is to distribute species composition such that the urban forest is diverse, not relying too heavily on a few species. Diverse urban forests are more resilient to impacts such as weather events, climate, disease, and pest outbreaks. Because the top three species are so prevalent, it will be wise to include a greater diversity of alternative species in the planting palette, so that over time, the species composition will become more diverse and less reliant on these few species.

**Table 1. Most Common Species**

Species	Number of Trees	% of Total Trees
<i>Quercus agrifolia</i>	2,190	29.62
<i>Pinus radiata</i>	1,866	25.24
<i>Cupressus macrocarpa</i>	1,533	20.73
<i>Eucalyptus globulus</i>	211	2.85
<i>Metrosideros excelsa</i>	147	1.99
<i>Eucalyptus ficifolia</i>	132	1.79
<i>Myoporum laetum</i>	104	1.41
<i>Pinus pinea</i>	97	1.31
<i>Prunus cerasifera</i>	82	1.11
<i>Pittosporum undulatum</i>	75	1.01
Other trees	957	12.94
<b>All Trees</b>	<b>7,394</b>	<b>100%</b>

## Condition and Relative Age Distribution

As trees establish, grow to maturity, and eventually decline, they require different levels of maintenance and inspection, depending on age. Thus, understanding the age distribution of the tree population can help managers anticipate how management needs will change over time. However, it is not feasible to track the exact age of every tree in the community tree resource. Fortunately, because most woody plants increase in stem diameter incrementally each year, the trunk diameter at breast height (DBH) is a reasonable approximation for age, known as the relative age. This distribution, shown in Figure 2, shows the tree population has three features that differ slightly from the ideal distribution of tree age classes.



**Figure 2. Relative Age Distribution**

1. Too few trees in the 0-6" DBH classes
2. A spike in the 6-12" DBH Class
3. A substantial population of trees in the 24" and over DBH classes.

The best way to address the low number of young trees is to develop a tree planting plan. With 623 stumps or vacant sites, and another 304 dead trees, there are ample opportunities to begin establishing new, vigorous trees and shift the age distribution to a younger population. At the same time, tree planting and maintenance of newly planted trees will shift the condition distribution toward good to excellent condition. Furthermore, many fair condition trees may improve to good condition with proper pruning and cultural improvements, such as adding mulch and aeration soil areas to reduce compaction.

Some small statured species stay in the 6-12" DBH class most of their mature lives, but with adequate maintenance, species disposed to attaining larger stature will shift out of this size class into the larger classes. Thus, the best way to address this spike is simply to provide adequate maintenance, allowing the trees to mature. In a coastal environment, this can take several years to occur, and some areas strongly impacted by salt spray and wind may always be somewhat limited.

Considering that the Pacific Grove tree population has a substantial number of mature large-stature trees, the condition distribution understandably has more trees in the poor to dead condition classes than a younger, vigorous urban forest would. This age and condition distribution indicates urban forest managers will need to prioritize removing dead and critical trees in the coming years. Furthermore, the population of established, mature trees will require maintenance so they can be preserved in the landscape at their mature large stature.

**Table 2. Condition Distribution**

Condition	Number of Sites	% of Pop.
Excellent	13	0.16%
Very Good	107	1.33%
Good	3,084	38.47%
Fair	3,226	40.24%
Poor	626	7.81%
Critical	34	0.42%
Dead	304	3.79%
Stump or Vacant	623	7.77%
<b>Total</b>	<b>8,017</b>	<b>100%</b>

## Stocking Level

Pacific Grove's community urban forest currently includes 623 available planting sites, including 351 vacant sites and 272 stumps. Considering the public tree inventory identified a total of 8,017 planting sites with 7,394 existing trees, the current stocking level of the community forest is 92.2%.

## Maintenance Priority

Maintenance priorities were assigned based on the most critical or important issue identified for each tree. As maintenance is performed, additional tasks may also be required based on the judgement of the tree pruning technician. Recently, drought has caused rapid decline in many trees, and contracted maintenance activities such as high priority removals have required all available funds, reducing the capacity for proactive maintenance. Based on this tree inventory, maintenance and removal needs are substantial. Addressing this will require increased program resources to provide for public safety as well as regular tree maintenance.

Maintenance domains including Pruning, Removal, and Planting are discussed separately in the following sections.

### Pruning

In considering tree maintenance priorities, managers must focus on public safety, and then address tasks of lesser priority intended to improve the health and structure of the urban forest. For this reason, *Priority 1* and *Priority 2* pruning categories were collected to indicate the trees that should be pruned as soon as resources allow.

The highest priority pruning sites include 356 trees with the majority of those (323) requiring the specific maintenance task of *Clean* (Table 3). Deadwood accumulates in trees over time through tree decline, or sometimes as a natural result of higher vigorous branches shading out lower branches. Crown cleaning is a simple pruning strategy to address this situation and reduce the likelihood of deadwood impacting targets below. An additional 876 trees are recommended for *Priority 2* pruning, and 803 of those require crown cleaning, followed by 37 requiring end weight reduction, a pruning technique that can reduce major limb failure and storm damage. For more details about specific pruning techniques, see the Methods section.

Routine pruning can be conducted in subsequent years after *Priority 1* & *Priority 2* concerns are mitigated. Typically, a pruning cycle of 3-5 years is recommended, however, with a mature, established urban forest like Pacific Grove's, regular inspections and cycle adjustments are advisable in order to identify potential problems quickly. This can be accomplished by conducting cursory "windshield" inspections of high-risk areas periodically and following storm events.

**Table 3. Pruning Needs by Priority**

Pruning Need	Priority 1 Prune	Priority 2 Prune	Large Tree Routine Prune	Small Tree Routine Prune	Training Prune	Grand Total
No Specific Maintenance Need	1	7	1,579	1462	9	3,058
Clean	323	803	1,147	404	1	2,678
Reduce End Weight	13	37	255	12		317
Structural Restoration		2	24	11	6	43
Other - see notes	3	5	21	18	3	50
(Young Tree) Structural Prune		5	13	160	50	228
Thin			2	2		4
Priority Clearance	1	3	1	3		8
Reduce	4	3	1			8
<b>Total</b>	<b>345</b>	<b>865</b>	<b>3,043</b>	<b>2,072</b>	<b>69</b>	<b>6,394</b>

### Ground Crew Maintenance

Ground crews, requiring little special equipment, can easily address issues with stakes, hardware, and young tree structural pruning. There are 282 tree sites that can likely be corrected by ground personnel with some basic training (Table 4). For example, 129 trees have established well and no longer require stakes, which can cause injury to bark if ties are left attached to the trees. Furthermore, 63 trees are recommended for root collar exposure, which can also be conducted by ground crews with minimal training. These sites were observed to have a buildup of mulch or shifting soils such that the trees have become buried. Buried root collars can lead to moisture and decay.

**Table 4. Ground Crew Tasks**

Ground Crew Task	Number of Trees
Remove Hardware	6
Treat Pest/Disease	5
Treat Stem Girdling Root	14
Expose Root Collar	63
Remove Stakes	129
Stake	7
Remove Nursery Stake	58
<b>Total</b>	<b>282</b>

## Tree Planting Opportunities

*Priority 1* removal was recommended for 174 trees and *Priority 2* removal was recommended for 544 trees, a combined total of 8.8% of the population. Twenty-three trees that are recommended for removal are also recommended for further inspection. Considering the stumps and vacant sites, there is a grand total of 1,341 tree sites that should be available for tree planting in the next 7 years (16.5% of the population). Consideration should be given to retiring tree sites that are too small, or ill-suited to support a tree, but most sites can support a new tree. In many cases, new, more appropriate species can be chosen, based on site conditions and lessons learned from the previous tree failure.

**Table 5. Planting Opportunities**

	Year 1-3	Year 4	Year 5-7	Total	% of Pop.
Stump	272			272	3.4%
Vacant site, large	26			26	0.3%
Vacant site, medium	40			40	0.5%
Vacant site, small	285			285	3.6%
Priority 1 Removal		174		174	2.2%
Priority 2 Removal			529	529	6.6%
Other Removal			15		
<b>Grand Total</b>	<b>623</b>	<b>174</b>	<b>544</b>	<b>1,341</b>	<b>16.7%</b>
<b>Tree Plantings per year</b>	<b>208</b>	<b>174</b>	<b>181</b>		

Among the recommended tree removals, 48% are *Pinus radiata* (Monterey pine), which comprises 25% of the tree population, indicating it is performing relatively poorly. In contrast, *Quercus agrifolia* (coast live oak) represents 25% of the population, so it is in proportion to the population that 23% of removals are of this species, and not an indication of especially poor performance. Another common tree, *Metrosideros excelsa* (New Zealand Christmas tree) represents 2% of the population (147 trees) and just three (3) of them are recommended for removal. Relative performance by species is discussed in more detail in the companion document to this report, the Pacific Grove Resource Analysis (2015).

**Table 6. Removals by Species**

Species	Priority 1 Removal	Priority 2 Removal	Total Removals	Percent of Removals
<i>Pinus radiata</i>	108	229	337	48%
<i>Quercus agrifolia</i>	16	148	164	23%
<i>Cupressus macrocarpa</i>	36	82	118	17%
<i>Myoporum laetum</i>		25	25	4%
<i>Acacia longifolia</i>	3	3	6	1%
<i>Maytenus boaria</i>	1	4	5	1%
<i>Pinus pinea</i>	1	4	5	1%
<i>Prunus cerasifera</i>	2	3	5	1%
<i>Ulmus americana</i>		4	4	1%
Other trees	7	42	49	5%
<b>Grand Total</b>	<b>174</b>	<b>529</b>	<b>718</b>	<b>100%</b>

## Hardscape Repairs

Trees provide landscape interest at a human scale that increases community walkability, however, unmitigated hardscape damage can have the opposite effect. Hardscape damage was recorded wherever sidewalks were disrupted by tree roots or trunks by greater than ½". Almost four hundred (395) sites had hardscape damage, 137 of those sites had previous sidewalk repair. Repairing sidewalk disruptions is an important task that increases walkability in neighborhoods, and reduces exposure to liability risk. It also allows for accessibility for wheelchairs, strollers, and recreational use.



*Trees Increase Community Walkability*

## Tree Observations and Notes

Inventory arborists often encounter special circumstances that are not covered by the collection data fields, yet merit recording since they help to provide additional context for maintenance needs of individual trees. These notes and observations become useful for urban forest managers to review and consider as individual trees receive follow-up care. In this inventory, almost 20% of site records had associated notes, and 55% had observations. Observations are collected in a drop-down menu and are thus more standardized, reflecting the most significant concern. Each tree can be assigned only one observation, while notes can be more extensive and unique.

Observations included major structural issues that could affect tree performance over time and may explain the recommendations for removal or pruning. The most common observation was co-dominant stems, occurring at 1,035 sites, 13% of the population. Eight percent of the population had notable cavities or decay (673 trees), and 304 trees (3.8%) had evidence of a previous failure. Table 4 provides a summary of the most common observations identified.

The notes field was used often to indicate when DBH was estimated, or taken at a non-standard height. The following provides a summary of the collected notes. This is not a complete list as many trees had multiple notes associated, creating overlapping groups:

- 186 trees were crowded or shaded by an adjacent larger tree.
- 155 trees had poison oak growing adjacent to them.
- 132 trees showed evidence of bark borers.
- 109 trees had pitch canker (Figure 3).



**Figure 3. Pitch Canker Noted in the Observations**  
(Photo Credit: Cal Poly Pitch Canker Task Force)

**Table 7. Observations**

Observations	Number of Sites
None	2,034
Other - see notes	1,629
Co-dominants	1,035
Cavity or Decay	673
Poor Structure	499
Thin Canopy	405
Previous failure	304
Deadwood < 4"	269
Signs of Stress	240
Serious Decline	181
Deadwood > 4"	154
Large Limbs/ scaffold defect	129
Leaning-Corrected	127
Mechanical Damage	124
Diseased	72
Improperly Pruned	47
Root Damage	42
Poor Location	31
Pest Problem	22
<b>Total</b>	<b>8017</b>

# Recommendations

With this inventory, the City has a better understanding about the maintenance needs of its 8,017 public tree sites. The schedule of caring for the City’s trees should be a priority-based approach with balanced consideration for public safety and operational efficiency. Over time, with maintenance and normal tree life cycles, the health and condition of trees change. As this occurs, the management framework may need to shift financial and labor resources accordingly. This will allow Pacific Grove’s urban forestry program to remain responsive to community needs as they develop.

From the information summarized in this report, DRG provides preliminary and strategies for managing the tree inventory. This includes prioritizing maintenance based on risk, keeping information current in the database, and reporting to administration. Over time, the City can adapt, and budget for urban forestry operations based on new information as it becomes available. As City goals change, the appropriate operational changes should be reviewed and change as well.

Public safety concerns are the first priority, including:

- Prioritize **Priority 1** removal of 174 trees and **Priority 1** pruning of 356 trees.
- Provide clearance pruning for 128 trees, especially for visibility and public safety.
- Repair hardscape damage at 395 tree sites.

Once priority issues are addressed, consideration should be given to the following:

- Develop a 3-5 year pruning cycle for **Priority 2** and routine pruning of the remaining trees.
- Develop a planting plan to increase stocking level and provide replacements for removals where appropriate, including up to 1,341 sites over the next few years.
- Address issues with tree stakes and hardware for 200 trees, and direct ground crews to perform maintenance on 63 trees to minimize root collar decay.

Beyond priority and other critical needs, managers may want to consider the following industry accepted best management practices:

- Maintain current inventory data by updating DBH, condition, and maintenance needs as tree care is performed.
- Track tree removal and planting annually with a goal of planting around 200 trees per year until optimal stocking is reached.
- Conduct a canopy study and set a canopy goal for public and private trees.
- Consider developing a management plan or master plan for the urban forest to increase health, expand canopy, and align management strategies with community values.

# Conclusion

With a mature, established urban forest with most trees in fair condition or better, Pacific Grove has a substantial community asset that is worth preserving and maintaining. Addressing maintenance priorities and planting opportunities will require dedicated resources in terms of funds, personnel, and administrative capacity. It will likely take up to 5 years to address all the recommended actions identified by the inventory.

This summary report provides a framework for developing work plans, but the inventory as a whole is also an important resource for understanding the unique circumstances, challenges, and opportunities facing the urban forest in Pacific Grove. Over time, with proactive management, routine maintenance, and prompt attention to emerging issues, the condition, diversity, and health of the urban forest can improve.

# Appendices

## Supporting Information

The following documents provide additional information about the Pacific Grove tree resource:

Davey Resource Group. [Pacific Grove Resource Analysis](#). 2015.

Davey Resource Group. [Pacific Grove Tree Inventory](#). 2015.

## Species Composition

**Table 8. Species Composition**

Species	Common Name	Number of Trees	% of Pop.
<i>Quercus agrifolia</i>	oak, coast live	2,190	29.62
<i>Pinus radiata</i>	pine, Monterey	1,866	25.24
<i>Cupressus macrocarpa</i>	cypress, Monterey	1,533	20.73
<i>Eucalyptus globulus</i>	eucalyptus, blue gum	211	2.85
<i>Metrosideros excelsa</i>	New Zealand Christmas tree	147	1.99
<i>Eucalyptus ficifolia</i>	gum, redflower	132	1.79
<i>Myoporum laetum</i>	mioporo	104	1.41
<i>Pinus pinea</i>	pine, Italian stone	97	1.31
<i>Prunus cerasifera</i>	plum, cherry	82	1.11
<i>Pittosporum undulatum</i>	box, Victorian	75	1.01
<i>Sequoia sempervirens</i>	redwood, coast	68	0.92
<i>Maytenus boaria</i>	mayten	47	0.64
<i>Liquidambar styraciflua</i>	sweetgum	43	0.58
<i>Phoenix canariensis</i>	palm, Canary Island date	41	0.55
<i>Platanus hybrida</i>	planetree, London	35	0.47
<i>Ulmus americana</i>	elm, American	34	0.46
<i>Eucalyptus sideroxylon</i>	ironbark, red	33	0.45
<i>Olea europaea</i>	olive	30	0.41
<i>Callistemon citrinus</i>	bottlebrush, lemon	29	0.39
<i>Heteromeles arbutifolia</i>	Christmasberry	27	0.37
<i>Acacia longifolia</i>	wattle, Sydney golden	27	0.37
<i>Ilex aquifolium</i>	holly	25	0.34
<i>Acacia melanoxylon</i>	acacia, black	22	0.30
<i>Pinus torreyana</i>	pine, Torrey	22	0.30
<i>Arbutus x marina</i>	strawberry tree, marina	22	0.30
<i>Magnolia grandiflora</i>	magnolia, southern	17	0.23
<i>Pittosporum crassifolium</i>	cheesewood, stiffleaf	14	0.19

Species	Common Name	Number of Trees	% of Pop.
<i>Arbutus unedo</i>	strawberry tree	13	0.18
<i>Syzygium paniculatum</i>	cherry, brush	13	0.18
<i>Washingtonia robusta</i>	palm, Mexican fan	12	0.16
<i>Betula pendula</i>	birch, European white	12	0.16
<i>Pyrus calleryana</i>	pear, callery	12	0.16
<i>Robinia x ambigua</i>	locust, purple robe	12	0.16
<i>Crataegus phaenopyrum</i>	hawthorn, Washington	11	0.15
<i>Cordyline australis</i>	giant dracaena	11	0.15
<i>Prunus X blireana</i>	plum, flowering	10	0.14
<i>Salix species</i>	willow	10	0.14
<i>Ulmus parvifolia</i>	elm, Chinese	10	0.14
<i>Podocarpus gracilior</i>	fern pine	9	0.12
<i>Ilex spp.</i>	holly, spp.	9	0.12
<i>Pinus species</i>	pine	9	0.12
<i>Malus species</i>	apple	8	0.11
<i>Callistemon viminalis</i>	bottlebrush, weeping	7	0.09
<i>Taxus baccata</i>	yew, English	7	0.09
<i>Cedrus atlantica</i>	cedar, atlas	7	0.09
<i>Acacia verticillata</i>	prickly moses	7	0.09
<i>Pinus canariensis</i>	pine, Canary Island	7	0.09
<i>Leptospermum laevigata</i>	coastal teatree	7	0.09
<i>Melaleuca quinquenervia</i>	cajeput	7	0.09
<i>Cedrus deodara</i>	cedar, deodar	6	0.08
<i>Eucalyptus nicholii</i>	gimlet, willow-leaved	6	0.08
<i>Cinnamomum camphora</i>	camphor tree	6	0.08
<i>Umbellularia californica</i>	laurel, California	6	0.08
<i>Prunus ilicifolia lyonii</i>	cherry, Catalina	5	0.07
<i>Acacia spp.</i>	acacia, spp.	5	0.07
<i>Lyonothamnus floribundus asplen</i>	ironwood, Catalina	5	0.07
<i>Acer palmatum</i>	maple, Japanese	5	0.07
<i>Araucaria heterophylla</i>	araucaria	5	0.07
<i>Melaleuca linariifolia</i>	cajeput tree	5	0.07
<i>Prunus serrulata</i>	cherry, Kwanzan	5	0.07
<i>Tristaniopsis laurina</i>	gum, water	4	0.05
<i>Leptospermum scoparium</i>	New Zealand teatree	4	0.05
<i>Pyrus kawakamii</i>	pear, evergreen	4	0.05
<i>Schinus molle</i>	peppertree, California	4	0.05
<i>Ulmus spp.</i>	elm, hybrid	4	0.05
<i>Alnus rhombifolia</i>	alder, white	4	0.05
<i>Betula nigra</i>	birch, river	4	0.05
<i>Trachycarpus fortunei</i>	palm, windmill	4	0.05
<i>Laurus nobilis</i>	sweet bay	4	0.05

Species	Common Name	Number of Trees	% of Pop.
<i>Ceanothus spp.</i>	ceanothus	4	0.05
<i>Eucalyptus species</i>	gum	4	0.05
<i>Arecastrum romanzoffianum</i>	palm, queen	3	0.04
<i>Pseudotsuga menziesii</i>	Douglas fir	3	0.04
<i>Pinus thunbergiana</i>	pine, Japanese black	3	0.04
<i>Schinus terebinthifolius</i>	pepper, Brazilian	3	0.04
<i>Cupressus spp.</i>	cypress, spp.	3	0.04
<i>Acer rubrum</i>	maple, red	3	0.04
<i>Ginkgo biloba</i>	ginkgo	3	0.04
<i>Nyssa sylvatica</i>	tupelo, black	3	0.04
<i>Washingtonia filifera</i>	palm, California fan	3	0.04
<i>Eucalyptus polyanthemos</i>	sliver dollar gum	3	0.04
<i>Other</i>	Other	3	0.04
<i>Eucalyptus conferruminata</i>	bushy yate	3	0.04
<i>Myrtus communis</i>	Myrtle	2	0.03
<i>Dodonaea viscosa</i>	hopbush, Florida	2	0.03
<i>Pyracantha species</i>	firethorn	2	0.03
<i>Robinia pseudoacacia</i>	locust, black	2	0.03
<i>Aesculus californica</i>	buckeye, California	2	0.03
<i>Myrica californica</i>	Pacific wax myrtle	2	0.03
<i>Calocedrus decurrens</i>	cedar, Incense	2	0.03
<i>Pyrus communis</i>	pear	2	0.03
<i>Sequoiadendron giganteum</i>	sequoia, giant	2	0.03
<i>Citrus limon</i>	lemon	2	0.03
<i>Acacia baileyana</i>	acacia, bailey	2	0.03
<i>Fraxinus uhdei</i>	ash, evergreen	2	0.03
<i>Grevillea robusta</i>	silk oak	2	0.03
<i>Pterocarya stenoptera</i>	wingnut, Chinese	2	0.03
<i>Morus alba</i>	mulberry, white	2	0.03
<i>Juglans nigra</i>	walnut, black	2	0.03
<i>Cercis canadensis</i>	redbud, eastern	2	0.03
<i>Eucalyptus citriodora</i>	gum, lemon-scented	2	0.03
<i>Ligustrum lucidum</i>	privet, Chinese	2	0.03
<i>Xylosma congestum</i>	xylosma, shiny	1	0.01
<i>Garrya elliptica</i>	silktassel, wavyleaf	1	0.01
<i>Prunus species</i>	plum	1	0.01
<i>Liriodendron tulipifera</i>	tulip tree	1	0.01
<i>Eucalyptus cinerea</i>	eucalyptus, silver dollar	1	0.01
<i>Salix babylonica</i>	willow, weeping	1	0.01
<i>Eucalyptus viminalis</i>	gum, manna	1	0.01
<i>Ulmus pumila</i>	elm, Siberian	1	0.01
<i>Platanus racemosa</i>	sycamore, California	1	0.01
<i>Albizia julibrissin</i>	mimosa	1	0.01

Species	Common Name	Number of Trees	% of Pop.
<i>Prunus ilicifolia</i>	cherry, hollyleaf	1	0.01
<i>Ficus carica</i>	fig, edible	1	0.01
<i>Ribes sanguineum</i>	flowering currant	1	0.01
<i>Fremontodendron californicum</i>	flannelbush, California	1	0.01
<i>Citrus sinensis</i>	orange	1	0.01
<i>Geijera parviflora</i>	willow, Australian	1	0.01
<i>Pinus sylvestris</i>	pine, Scotch	1	0.01
<i>Ligustrum japonicum</i>	privet	1	0.01
<i>Persea americana</i>	avocado	1	0.01
<i>Cunninghamia lanceolata</i>	Chinese fir	1	0.01
<i>Rhus lancea</i>	sumac, African	1	0.01
<i>Salix matsudana</i>	willow, corkscrew	1	0.01
<i>Abies pinsapo</i>	fir, Spanish	1	0.01
<i>Prunus domestica</i>	plum	1	0.01
<i>Agonis flexuosa</i>	peppermint tree	1	0.01
<i>Quercus species</i>	oak	1	0.01
<i>Prunus subhirtella</i>	cherry, weeping	1	0.01
<i>Cupressocyparis x leylandii</i>	cypress, Leyland	1	0.01
<i>Yucca elephantipes</i>	yucca, giant	1	0.01
<i>Prunus dulcis</i>	almond	1	0.01
<i>Cotinus coggygria</i>	smoke tree	1	0.01
<i>Aesculus species</i>	buckeye	1	0.01
<i>Casuarina cunninghamiana</i>	river-she oak	1	0.01
<i>Eriobotrya japonica</i>	loquat, Japanese	1	0.01
<b>Total</b>	<b>Total</b>	<b>7,394</b>	<b>100%</b>