

# **Survey of 5 and 10 Year Old Trees Planted by FUF (Survey Conducted 1997-2001)**

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## **Background**

Selecting an appropriate tree for planting in an urban environment can often be a challenge, due to the difficult conditions often found in urban settings: poor soils, environmental pollution, and increased risk of vehicular accidents or vandalism. Planting a street tree in San Francisco, with its unique conditions involving a myriad of distinct microclimates and soil conditions, adds additional challenges. This article describes a survey of 3,856 trees planted in San Francisco between 1987 and 1996, with the objective of systematically monitoring the growth, survival, health and appearance of street trees to evaluate species performance and inform the tree selection process.

The survey addressed trees planted through San Francisco's Friends of the Urban Forest (FUF), a nonprofit urban forestry organization that organizes community street tree plantings in San Francisco. FUF maintains detailed information concerning the tree species, address and date of planting for each tree planted through the organization. All of the trees planted were taken from 15 gallon containers, and all were planted in sidewalk conditions.

## **Process**

Late in 1996, I developed a list of the data that I wanted to obtain from the survey. After discussions with urban forestry professionals, I produced a one page form that would, when filled in following a tree visit, provide the following information:

1. The address and San Francisco neighborhood in which the tree was located.
2. The date the tree was planted. All trees were surveyed five years or ten years after the planting date, plus or minus one month.
3. The species of the tree (taken from FUF Records). Tree varieties within a species were not always available, and were not recorded.
4. Whether the tree was located in front of (1) a single family residence, (2) a multi-unit dwelling or (3) other (business, church, school, etc.).
5. A ranking of the tree's health, on a scale of 0 to 5, with 0 = dead; 1 = poor, with death apparently imminent; 2 = below average; 3 = average health and vigor; 4 = above average; and 5 = thriving; a healthy, vigorous tree performing at its full potential. (Obviously, this data allows calculation of survival rates, with all trees receiving a score other than zero

classified as living trees.) Structure and pruning were not considered in this ranking – a vigorous and healthy tree that had been poorly pruned (or never pruned) received as high a score as an appropriately pruned specimen. This ranking was intended to measure the tree's potential to thrive in the local environment.

6. A ranking of the tree's visual impact (what visual impression does the tree make? How does it look?), on a scale of 1 to 5, with 1 = poor; 2 = below average; 3 = average; 4 = above average; and 5 = superior. The health of the tree was one of the factors determining this ranking, and so a reasonably high degree of correlation between this ranking and the health ranking exists. However, other factors also affected the visual impact ranking, such as the structural condition of the tree (poor pruning or lack of needed pruning, severe lean, etc.). If one of the "bottom lines" for a successful street tree is aesthetics and an attractive appearance, this was intended to measure that "bottom line."
7. Measurements of the tree's height, crown breadth and trunk diameter. The height and breadth measurements were estimates done by the survey-taker, estimating to the nearest foot. Height was estimated at the highest point of the crown; breadth was estimated at the widest point of the crown. Trunk diameter was measured at breast height, approximately 4.5', measuring to the nearest half-inch. Trunk diameter was determined by measuring circumference with a tape measure, and then mathematically converting average circumference to diameter.
8. Whether the tree was located under utility wires, and whether the tree had been "topped" (i.e., severely pruned). The purpose of this data was to test the common wisdom that trees under overhead wires tend to be topped more often than others.

The survey covered a total of 3,856 trees planted in 1987, 1988, 1990 and 1991 (these trees were surveyed 10 years after the planting date) and 1992, 1993, 1995 and 1996 (surveyed five years after the planting date). Accordingly, the survey was done over a four year period in 1997, 1998, 2000 and 2001.

The trees surveyed represented all of the trees planted by FUF in the years indicated that were susceptible of being surveyed. In some cases, trees were not surveyed because data from FUF was not available or was not decipherable to the survey-taker. Accordingly, while the data is only a sample of the trees planted by FUF during the years indicated, it represents a random sampling and a high percentage (estimated to be more than 95%) of the trees planted through FUF in those years. Of course, trees planted through FUF represent only a portion of all trees planted in the city of San Francisco during the years surveyed.

The data intake was done to a large extent by the author of this article. Other individuals assisted with less than 5% of the surveys, and in these cases the subjective scores for health and visual impact were jointly agreed upon.

### Survival Rates – 5 and 10 Year Old Trees

<b>5 Year Trees</b>	<b>10 Year Trees</b>
<b>86.4%</b>	<b>67.9%</b>

The survey showed that 1,718 out of a total 1,987 trees planted in 1992-1996 had survived as of five years after their planting date - a survival rate of 86.4%. Out of the 1,869 ten-year old trees from 1987-1991, a total of 1,269 had survived – a survival rate of 67.9%. Whether this is a good or acceptable survival/mortality rate is no doubt in the eye of the beholder, although I find it encouraging that over two-thirds of the trees planted through FUF are still alive after 10 years. It is difficult to make any broader conclusions or generalizations from these statistics. However, the study suggests that tree mortality may be a gradual process in San Francisco. The decline from 100% to approximately 86% in the first five years roughly matches the decline from 86% to approximately 68% in the second five years. This suggests that the biggest causes of mortality may be those that can happen at any time – such as being hit by vehicles. (If, for example, lack of watering were a very significant cause of tree death, the survival rate would be expected to fall more rapidly in the first five years of life, when watering is critical to tree survival.) Anecdotal evidence from the survey also supports this idea – many neighbors encountered during the survey indicated that missing trees had been hit by vehicles.

**Survival Rates by Species – 10 Year Trees**  
(only species where 20 or more trees were surveyed)

Tree Species	Survival Rate	#Alive/Total
<i>Platanus x acerifolia</i> (London plane)	87.5%	28/32
<i>Tristaniopsis laurina</i> (small leaf tristania)	85.7%	78/91
<i>Schinus molle</i> (California pepper)	85.7%	18/21
<i>Ligustrum lucidum</i> (glossy privet)	80.4%	74/92
<i>Pittosporum undulatum</i> (Victorian box)	79.4%	93/117
<i>Prunus cerasifera</i> (purple leaf plum)	79.1%	76/96
<i>Pyrus kawakamii</i> (evergreen pear)	77.8%	21/27
<i>Ginkgo biloba</i> (maidenhair)	76.9%	50/65
<i>Melaleuca linarifolia</i> (flaxleaf paperbark)	75.0%	30/40
<i>Lophostemon confertus</i> (Brisbane box)	74.3%	58/78
<i>Eriobotrya deflexa</i> (bronze loquat)	73.5%	64/87
<i>Maytenus boaria</i> (mayten)	72.1%	57/79
<b>Average All Trees*</b>	<b>69.3%*</b>	<b>1234/1780</b>
<i>Ficus microcarpa</i> (ficus)	69.2%	108/156
<i>Prunus serrulata</i> (flowering cherry)	65.2%	58/89
<i>Acacia baileyana</i> (Bailey's acacia)	65.1%	41/63
<i>Geijera parviflora</i> (Australian willow)	65.0%	13/20
<i>Magnolia grandiflora</i> (southern magnolia)	64.4%	47/73
<i>Metrosideros excelsus</i> (New Zealand Christmas)	63.0%	111/176
<i>Eucalyptus ficifolia</i> (red flowering gum)	31.8%	7/22
<i>Agonis flexuosa</i> (peppermint willow)	26.8%	19/71

\* Note: This percentage of 69.3% varies from the average 67.9% survival rate for all trees in the entire survey. This is because in computing the survival rates for particular species in the above table, results from the Outer Sunset, Outer Richmond and Hunters Point areas (areas with significantly lower survival rates) were excluded.

**Survival Rates by Species – 5 Year Trees**  
(only species where 20 or more trees were surveyed)

Tree Species	Survival Rate	#Alive/Total
<i>Callistemon citrinus</i> (lemon bottlebrush)	100.0%	24/24
<i>Ficus microcarpa</i> (fig)	100.0%	22/22
<i>Ligustrum lucidum</i> (glossy privet)	100.0%	20/20
<i>Prunus cerasifera</i> (purple leaf plum)	98.1%	214/218
<i>Metrosideros excelsus</i> (New Zealand Christmas)	95.9%	47/49
<i>Schinus terebinthifolius</i> (Brazilian pepper)	95.8%	46/48
<i>Jacaranda mimosifolia</i> (jacaranda)	95.0%	19/20
<i>Tristaniaopsis laurina</i> (small leaf tristania)	94.1%	112/119
<i>Magnolia grandiflora</i> (southern magnolia)	92.0%	81/88
<i>Arbutus unedo</i> (strawberry tree)	91.7%	44/48
<i>Eriobotrya deflexa</i> (bronze loquat)	91.4%	32/35
<i>Pyrus calleryana</i> (deciduous pear)	89.7%	44/49
<i>Prunus serrulata</i> (flowering cherry)	89.5%	128/143
<i>Photinia fraseri</i> (photinia)	89.3%	59/66
<b>Average All Trees</b>	<b>89.1%*</b>	<b>1565/1756</b>
<i>Pyrus kawakamii</i> (evergreen pear)	88.9%	40/45
<i>Agonis flexuosa</i> (peppermint willow)	88.7%	47/53
<i>Ginkgo biloba</i> (Ginkgo)	88.6%	31/35
<i>Acacia baileyana</i> (Bailey's acacia)	87.8%	79/90
<i>Pittosporum undulatum</i> (Victorian box)	86.6%	97/112
<i>Maytenus boaria</i> (mayten)	84.9%	45/53
<i>Lophostemon confertus</i> (Brisbane box)	82.3%	93/113
<i>Geijera parviflora</i> (Australian willow)	74.6%	47/63
<i>Hymenosporum flavum</i> (sweetshade)	71.4%	15/21

\* Note: This percentage of 89.1% varies from the average 86.4% survival rate for all trees in the entire survey. This is because in computing the survival rates for particular species in the above table, results from the Outer Sunset, Outer Richmond and Hunters Point areas (areas with significantly lower survival rates) were excluded.

Perhaps my single greatest motivation to do this survey was to test which tree species were most likely to thrive in San Francisco. The data set forth above “controls” for those neighborhoods with unusually low survival rates – the Outer Sunset, Outer Richmond and Hunters Point neighborhoods were excluded, as otherwise their extremely low survival rates would have distorted the survival percentages of trees that had (in part by chance) been planted heavily in those neighborhoods. The data shows a great variety in survival rates by species. One factor to keep in mind in reviewing the results above is that San Francisco had a hard freeze in 1991 (the temperature dropped to 27°), that killed a large number of trees that are intolerant of sub-freezing temperatures, such as *Ficus microcarpa* (fig), *Eucalyptus ficifolia* (red flowering gum) and *Metrosideros excelsus* (New Zealand Christmas tree). This affected the results for the 10 year trees, but not for five year trees (since all five year trees in the survey were planted beginning after 1991).

Some conclusions from the data above:

***Tristaniopsis laurina* (small leaf tristania)** has an outstanding survival rate at both the 5 and 10 year levels – on a combined five and 10 year basis, this species has the best survival rate of any of the species that have been heavily planted by FUF.

***Prunus cerasifera* (purple leaf plum)** and ***Ligustrum lucidum* (glossy privet)** also had significantly above average survival rates at both the five and 10 year levels.

***Metrosideros excelsus* (New Zealand Christmas tree)** had an extremely high survival rate (95.9%) at 5 years, and extremely poor (63.0%) at 10 years. This likely reflects the fact that while in general the tree is well adapted to San Francisco, it will have above average mortality during the City's occasional hard freezes.

***Callistemon citrinus* (lemon bottlebrush)** had an excellent survival rate at 5 years (100%, though with a relatively small sample size of 24 trees). This tree had too small of a sample size at 10 years to measure. Nevertheless, the results suggest this is an excellent small tree for San Francisco.

***Agonis flexuosa* (peppermint willow)** has an extremely poor survival rate (26.8%) at the 10 year level. One hypothesis here (especially since the survival rate is much better at the five year level) is that homeowners are unhappy with the often awkward shape and growth pattern of this species and are voluntarily removing these trees.

**Survival Rates & Quality Scores**  
**Outer Richmond and Outer Sunset (extreme coastal conditions) Only**  
(5 Year Trees, 5 trees or more surveyed)

Tree Species	Survival Rate	#Alive/ Total	Health Score	Looks Score
<i>Crataegus phaenopyrum</i> (Washington thorn)	100.0%	8/8	2.13	2.25
<i>Maytenus boaria</i> (mayten)	100.0%	6/6	4.00	1.67
<i>Melaleuca quinquenervia</i> (cajeput)	100.0%	7/7	3.86	3.43
<i>Metrosideros excelsus</i> (New Zealand Christmas)	87.0%	20/23	3.80	3.25
<i>Melaleuca nesophila</i> (pink melaleuca)	83.3%	20/24	3.00	2.05
<i>Platanus x acerifolia</i> (London plane)	80.0%	4/5	1.75	2.75
<i>Rhamnus alaternus</i> (Italian buckthorn)	80.0%	8/10	3.00	3.00
<i>Olea europaeae</i> (olive)	80.0%	4/5	2.00	1.25
<i>Prunus serrulata</i> (flowering cherry)	78.6%	11/14	2.36	2.73
<i>Tristaniaopsis laurina</i> (small leaf tristania)	75.0%	6/8	2.50	3.00
<i>Prunus cerasifera</i> (purple leaf plum)	71.4%	15/21	2.27	2.80
<i>Agonis flexuosa</i> (peppermint willow)	71.4%	10/14	3.67	2.50
<i>Arbutus unedo</i> (strawberry tree)	71.4%	10/14	2.2	3.0
<b>Average All Trees</b>	<b>66.2%</b>	<b>153/231</b>	<b>2.65</b>	<b>2.49</b>
<i>Agonis flexuosa</i> (peppermint willow)	50.0%	6/12	3.66	2.50
<i>Melaleuca linarifolia</i> (flaxleaf paperbark)	50.0%	6/12	2.17	3.00
<i>Dodonaea viscosa</i> (purple hopseed)	25.0%	4/16	3.25	3.50
<i>Eucalyptus polyanthemos</i> (silver dollar gum)	25.0%	2/8	3.00	1.00
<i>Leptospermum laevigatum</i> (Australian tea)	0.00%	0/7	--	--

One of the greatest challenges in urban forestry in San Francisco is finding tree species that will thrive in the neighborhoods nearest the ocean. The maritime climate in the Outer Sunset and Outer Richmond neighborhoods – constant wind, sandy soil, salt air and fog – are very hard on most species. Accordingly, the data from this table may be some of the most useful in this entire work, from the perspective of species selection.

Three species that stand out in this table are *Metrosideros excelsus* (New Zealand Christmas Tree) *Melaleuca quinquenervia* (cajeput) and *Melaleuca nesophila* (pink melaleuca). All three had very high survival rates, excellent health scores, and average to very strong looks/appearance scores. *Maytenus boaria* (mayten) had a small sample size, but had an excellent survival rate (6/6, or 100%) and an excellent health score of 4.00. However, the looks/appearance score was very poor – almost the worst in this survey. Several species (*Dodonaea viscosa* (hopseed), *Eucalyptus polyanthemos* (red flowering gum) and *Leptospermum laevigatum* (Australian tea)) did very poorly, although the latter two species had small sample sizes.

**Looks Scores By Species (10 Year Trees)**  
(10 or more trees surveyed only)

Tree Species	Looks Score	# Trees Surveyed	Ranking
<i>Liriodendron tulipifera</i> (tulip)	4.28	14	1
<i>Trachycarpus fortunei</i> (windmill palm)	4.25	12	2
<i>Ginkgo biloba</i> (maidenhair)	4.18	50	3
<i>Lophostemon confertus</i> (Brisbane box)	4.06	63	4
<i>Prunus cerasifera</i> (purple leaf plum)	4.02	78	5
<i>Platanus x acerfolia</i> (London plane)	3.89	28	6
<i>Pyrus kawakamii</i> (evergreen pear)	3.86	21	7
<i>Schinus molle</i> (California pepper)	3.83	18	8
<i>Eriobotrya deflexa</i> (loquat)	3.76	87	9
<i>Tristaniaopsis laurina</i> (small leaf tristania)	3.72	78	10
<i>Acacia baileyana</i> (Bailey's acacia)	3.71	41	11
<i>Magnolia grandiflora</i> (southern magnolia)	3.60	47	12
<i>Ficus microcarpa</i> (fig)	3.59	108	13
<i>Crataegus phaenopyrum</i> (Washington thorn)	3.58	12	14
<b>Average All Trees</b>	<b>3.54</b>	<b>1269</b>	--
<i>Geijera parviflora</i> (Australian willow)	3.54	13	15
<i>Metrosideros excelsus</i> (New Zealand Christmas)	3.49	111	16
<i>Pittosporum undulatum</i> (Victorian box)	3.47	94	17
<i>Ligustrum lucidum</i> (glossy privet)	3.39	76	18
<i>Prunus serrulata</i> (cherry)	3.31	58	19
<i>Melaleuca linariifolia</i> (flaxleaf paperbark)	3.13	30	20
<i>Quercus agrifolia</i> (live oak)	3.11	17	21
<i>Callestimon viminalis</i> (weeping bottlebrush)	2.94	19	22
<i>Agonis flexuosa</i> (peppermint willow)	2.63	19	23
<i>Maytenus boaria</i> (mayten)	2.58	57	24
<i>Olea europaea</i> (olive)	2.50	14	25
<i>Prunus blireana</i> (flowering plum)	2.38	13	26
<i>Photinia fraseri</i> (photinia)	1.90	10	27

As described above, the “looks” score was a subjective scoring given to each tree as to its general appearance (what visual impression does the tree make? How does it look? Was it well-pruned?). Scoring was done on a scale of 1 to 5, with 1 = poor; 2 = below average; 3 = average; 4 = above average; and 5 = great. One conclusion that I immediately draw from this table is that trees with relatively low structural pruning/maintenance requirements end up looking better on our streets. Virtually all of the trees with the highest looks/appearance scores are species that require relatively little structural pruning (most notably, *Liriodendron tulipifera* (tulip), *Trachycarpus fortunei* (windmill palm), *Ginkgo biloba* (maidenhair) and *Lophostemon confertus* (Brisbane box). Many of the trees with below-average scores, on the other hand, are trees that require constant pruning in order to maintain an acceptable appearance (*Maytenus boaria* (mayten), *Ligustrum lucidum* (glossy privet), *Pittosporum undulatum* (Victorian box),

*Acacia baileyana* (Bailey's acacia), etc.). It is also interesting to note that *Agonis flexuosa* (Peppermint willow), in addition to having the worst of the survival rates at the 10 year level by far, also scores near the bottom in the looks/appearance category.

**Health Scores by Species (5 Year Trees)**  
(10 or more trees surveyed only)

Tree Species	Health Score	#Trees Surveyed	Ranking
<i>Ficus microcarpa</i> (figus)	4.46	24	1
<i>Lophostemon confertus</i> (Brisbane box)	4.43	93	2
<i>Eucalyptus polyanthemos</i> (silver dollar gum)	4.42	12	3
<i>Liquidambar styraciflua</i> (American sweetgum)	4.40	15	4
<i>Schinus terebinthifolius</i> (Brazilian pepper)	4.37	46	5
<i>Melaleuca quinquenervia</i> (cajeput)	4.33	12	6
<i>Pyrus calleryana</i> (deciduous pear)	4.20	44	7
<i>Olea europeae</i> (olive)	4.16	19	8
<i>Acacia baileyana</i> (Bailey's acacia)	4.11	80	9
<i>Ginkgo biloba</i> (maidenhair)	3.93	31	10
<i>Pittosporum undulatum</i> (Victorian box)	3.88	97	11
<i>Metrosideros excelsus</i> (New Zealand Christmas)	3.82	67	12
<i>Ligustrum lucidum</i> (glossy privet)	3.77	22	13
<i>Agonis flexuosa</i> (peppermint willow)	3.72	53	14
<b>Average All Trees</b>	<b>3.66</b>	<b>1718</b>	<b>—</b>
<i>Tristanopsis laurina</i> (small leaf tristania)	3.63	118	15
<i>Maytenus boaria</i> (mayten)	3.63	51	15
<i>Arbutus unedo</i> (strawberry tree)	3.62	54	17
<i>Jacaranda mimosifolia</i> (jacaranda)	3.53	19	18
<i>Prunus cerasifera</i> (purple leaf plum)	3.50	229	19
<i>Magnolia grandiflora</i> (southern magnolia)	3.50	82	19
<i>Prunus serrulata</i> (cherry)	3.45	139	21
<i>Pyrus kawakamii</i> (evergreen pear)	3.40	40	22
<i>Eriobotrya deflexa</i> (bronze loquat)	3.34	32	23
<i>Melaleuca linarifolia</i> (flaxleaf paperbark)	3.31	19	24
<i>Photinia fraseri</i> (photinia)	3.17	59	25
<i>Geijera parviflora</i> (Australian willow)	3.15	47	26
<i>Callistemon citrinus</i> (lemon bottlebrush)	3.15	27	27
<i>Syagrus romanzoffianum</i> (queen palm)	3.14	14	29
<i>Platanus x acerifolia</i> (London plane)	3.00	10	30
<i>Crataegus phaenopyrum</i> (Washington thorn)	2.83	12	32
<i>Hymenosporum flavum</i> (sweetshade)	2.67	15	32

Trees were scored as to health on a scale of 0 to 5, with 0 = dead; 1 = “nearly dead”; 2 = below average; 3 = average; 4 = above average; and 5 = thriving. Dead trees were excluded in coming up with the averages shown above.

### Survival Rates by Neighborhood

Survival rates were calculated by neighborhood. Some of the neighborhood sample sizes in the survey were very small – including some neighborhoods where as few as 12 trees were surveyed. Accordingly, the statistical significance will vary with the number of trees surveyed in each neighborhood. Here are the results, indicating the survival rates as a percentage as well as the actual numbers of total trees surveyed and the number of trees still alive (note: data below is only from neighborhoods where 25 or more trees were surveyed):

#### Survival Rates – 5 Year Trees (neighborhoods with 25 or more trees)

Neighborhood	Survival Rate	#Alive/#Surveyed
Glen Park	96.0%	48/50
Cole Valley	95.1%	116/122
Inner Sunset	94.1%	111/118
Potrero Hill	93.6%	103/110
Mount Davidson	90.9%	40/44
Richmond	90.6%	135/149
Bayview	89.3%	25/28
Portola	87.5%	42/48
Noe Valley	87.2%	123/141
<b>Average All Neighborhoods</b>	<b>86.5%</b>	<b>1718/1987</b>
Bernal Heights	85.7%	90/105
OMI	85.3%	87/102
Hayes Valley	84.5%	191/225
Russian Hill	82.8%	24/29
South of Market (SOMA)	81.4%	96/118
Outer Richmond	72.0%	108/150
Outer Sunset	55.6%	45/81

**Survival Rates – 10 Year Trees**  
(neighborhoods with 25 or more trees)

<b>Neighborhood</b>	<b>Survival Rate</b>	<b>#Alive/#Surveyed</b>
Castro/Eureka Valley	90.5%	57/63
Richmond	88.0%	22/25
Russian Hill	80.0%	80/100
Inner Sunset	76.6%	59/77
Pacific Heights	75.9%	41/54
Hayes Valley	74.1%	157/212
Telegraph Hill	74.1%	20/27
Marina	72.5%	50/69
Excelsior	72.1%	31/43
Sunset	70.0%	28/40
Glen Park	68.8%	44/64
Mission	68.0%	174/256
<b>Average All Neighborhoods</b>	<b>67.9%</b>	<b>1269/1869</b>
Bernal Heights	66.9%	115/172
Potrero Hill	66.7%	18/27
SOMA	66.7%	30/45
Noe Valley	63.9%	205/321
OMI	62.1%	36/58
Mt. Davidson	60.1%	17/28
Crocker Amazon	41.1%	23/56
Hunters Point	39.3%	35/89

What can one conclude from these results? Particularly with those neighborhoods where the sample sizes were relatively small, it is hard to generalize. However, the data does seem to support the common wisdom in San Francisco that the neighborhoods nearest the ocean – the Outer Sunset and Outer Richmond neighborhoods – have significantly lower survival rates than other neighborhoods.

**Survival Rates by Building Type – 5 Year Trees**

<b>Building Type</b>	<b>Survival Rate</b>	<b>#Alive/#Surveyed</b>
Single family dwelling	85.5%	922/1078
Multi-unit dwelling	88.3%	453/513
Business/Nonresidential	86.6%	343/396

## Survival Rates by Building Type – 10 Year Trees

Building Type	Survival Rate	#Alive/#Surveyed
Single family dwelling	67.9%	665/980
Multi-unit dwelling	73.7%	432/586
Business/Nonresidential	56.8%	172/303

The survey included information about the location of each tree: whether it was planted by a single family occupant, by the owner of a multi-unit dwelling, or in front of a nonresidential building (a business, school or church, for example). Of the 3,856 trees in the survey overall, 49.3% were planted in front of single family dwellings, 28.5% were planted in front of multiunit dwellings, and 18.1% were planted in front of nonresidential buildings. Common wisdom might suggest that trees planted in front of single family dwellings would have higher survival rates than multi-unit dwellings or businesses (non-residential buildings), since the “owner” of the tree is more likely to be present full-time and available to care for the tree. Surprisingly, the survey results show otherwise. Multi-unit building trees had *higher* survival rates than single family home trees, both for five year and ten year trees. Trees planted by owners of non-residential buildings had significantly lower survival rates at the 10 year level.

## Topped Trees and Overhead Wires

Location	% of Trees Topped	#Topped/Total
Under Wires	9.1%	148/1621
No overhead wires	3.7%	51/1366

**Percentage of trees under utility wires: 54.3%**

**Percentage of 5 year old trees topped: 4.5%**

**Percentage of 10 year old trees topped: 9.6%**

The survey asked whether trees had been “topped” – severely pruned -- and whether or not the trees were under overhead utility wires. Not surprisingly, trees that were under overhead wires were much more likely to be topped – 9.1% of trees under wires had been topped, compared to only 3.7% of trees without overhead wires. Advocacy of undergrounding overhead utility wires would be a positive development for San Francisco’s urban forest. Over half (54.3%) of the trees surveyed were located under overhead wires.

## 10 Year Average (Mean) Dimensions

	Height (ft.)	Breadth (ft.)	Circum. (inches)	# Records
<i>Platanus x acerifolia</i> (London plane)	23.6	15.9	5.7	28
<i>Lophostemon confertus</i> (Brisbane box)	23.4	12.3	6.2	63
<i>Liriodendron tulipifera</i> (tulip tree)	20.9	10.6	4.8	14

	Height (ft.)	Breadth (ft.)	Circum. (inches)	# Records
<i>Acacia baileyana</i> (Bailey's acacia)	20.5	16.5	6.0	41
<i>Geijera parviflora</i> (Australian willow)	20.0	14.0	5.6	13
<i>Olea europeae</i> (olive)	16.8	13.6	5.9	14
<i>Prunus cerasifolia</i> (purple leaf plum)	16.3	10.5	4.4	78
<i>Ginkgo biloba</i> (maidenhair)	16.0	9.7	3.8	50
<i>Magnolia grandiflora</i> (magnolia)	16.0	10.5	4.9	47
<b>Averages:</b>	<b>16.0</b>	<b>11.2</b>	<b>5.3</b>	1269
<i>Eriobotrya deflexa</i> (bronze loquat)	15.6	12.4	5.3	87
<i>Ficus microcarpa</i> (figus)	15.6	11.9	7.0	108
<i>Pittosporum undulatum</i> (Victorian box)	15.6	12.3	5.4	94
<i>Melaleuca linarifolia</i> (flaxleaf paperbark)	15.3	11.4	6.9	30
<i>Schinus molle</i> (California pepper)	14.9	14.5	7.2	18
<i>Metrosideros exelsus</i> (New Zealand Christmas)	14.8	9.3	4.8	111
<i>Ligustrum lucidum</i> (glossy privet)	14.7	10.9	5.6	76
<i>Pyrus kawakamii</i> (evergreen pear)	14.5	12.6	5.0	21
<i>Tristaniopsis laurina</i> (small leaf tristania)	14.2	9.3	4.3	78
<i>Agonis flexuosa</i> (strawberry tree)	13.9	11.9	6.6	19
<i>Prunus serrulata</i> (cherry)	13.7	9.3	4.6	58
<i>Callistemon viminalis</i> (weeping bottlebrush)	13.6	8.5	4.6	19
<i>Maytenus boaria</i> (mayten)	13.2	9.3	4.2	57
<i>Trachycarpus fortunei</i> (windmill palm)	9.5	7.2	--	12

Information concerning the size of various species after 10 years will be of interest to tree planters making species selections.

### Most Frequently Planted Trees: 5 Year Trees

Tree Species	Number of Trees (1992-1993)	Rank
<i>Prunus cerasifera</i> (purple leaf plum)	239	1
<i>Prunus serrulata</i> (cherry)	157	2
<i>Tristaniaopsis laurina</i> (small leaf tristania)	127	3
<i>Lophostemon confertus</i> (Brisbane box)	113	4
<i>Pittosporum undulatum</i> (Victorian box)	113	5
<i>Acacia baileyana</i> (Bailey's acacia)	91	6
<i>Magnolia grandiflora</i> (magnolia)	90	7
<i>Metrosideros excelsus</i> (New Zealand Christmas)	72	8
<i>Photinia fraseri</i> (photinia)	66	9
<i>Agonis flexuosa</i> (peppermint willow)	65	10
<i>Geijera parviflora</i> (Australian willow)	63	11
<i>Arbutus unedo</i> (strawberry tree)	62	12
<i>Maytenus boaria</i> (mayten)	59	13
<i>Pyrus calleryana</i> (deciduous pear)	49	14
<i>Schinus teribinthifolius</i> (Brazilian pepper)	48	15
<i>Pyrus kawakamii</i> (evergreen pear)	45	16
<i>Eriobotrya deflexa</i> (bronze loquat)	35	17
<i>Ginkgo biloba</i> (maidenhair)	35	17
<i>Melaleuca nesophila</i> (pink melaleuca)	33	19
<i>Callistemon citrinus</i> (lemon bottlebrush)	28	20
<i>Ficus microcarpa</i> (ficus)	26	21
<i>Melaleuca linarifolia</i> (flaxleaf paperbark)	25	22
<i>Jacaranda mimosifolia</i> (jacaranda)	25	23
<i>Eucalyptus polyanthemos</i> (silver dollar gum)	23	24
<i>Ligustrum lucidum</i> (glossy privet)	22	25
<i>Liquidambar styraciflua</i> (American sweetgum)	22	26
<i>Liriodendron tulipifera</i> (tulip tree)	22	27
<i>Hymenosporum flavum</i> (sweetshade)	21	28
<i>Dodonaea viscosa</i> (purple hopseed)	21	29
<i>Olea europaea</i> (olive)	20	30
<i>Rhamnus alaternus</i> (Italian buckthorn)	19	31
<i>Syagrus romanzoffianum</i> (queen palm)	14	32
<i>Leptospermum laevigatum</i> (Australian tea)	13	33
<i>Crataegus phaenopyrum</i> (Washington thorn)	12	34
<i>Platanus acerifolia</i> (London plane)	12	35
<i>Melaleuca quinquenervia</i> (cajeput)	12	36
<i>Leptospermum scoparium</i> (New Zealand tea)	12	37
<i>Cupianopsis anacardioides</i> (carrotwood)	11	38
<i>Eucalyptus ficifolia</i> (red flowering gum)	10	39

<i>Lyonothamnus floribundus</i> (Catalina ironwood)	9	40
<i>Crataegus laevigata</i> (English Hawthorn)	9	40
<i>Prunus blireiara</i> (flowering plum)	9	40
<i>Ceratonia siliqua</i> (carob)	6	43
<i>Callistemon viminalis</i> (weeping bottlebrush)	4	44
<i>Schinus molle</i> (California pepper)	4	44
<i>Laurus nobilis</i> (Italian bay)	4	44
<i>Malus floribunda</i> (crabapple)	4	44
<i>Ilex altaclarensis</i> (Wilson's holly)	4	44
<i>Trachycarpus fortunei</i> (windmill palm)	3	49
<i>Gleditsia</i> (honey locust)	3	49
<i>Acacia melanoxylon</i> (blackwood acacia)	2	51
<i>Michelia dotsopa</i> (michelea)	2	51
<i>Ulmus parvifolia</i> (Chinese elm)	1	53
<i>Cinnamomum camphora</i> (camphor)	1	53

### Most Frequently Planted Trees: 1987-1988

Tree Species	Number of Trees (1987-1988)	Rank (1987-1988)	Rank (1992-1993)
<i>Metrosideros excelsus</i> (New Zealand Christmas)	176	1	8
<i>Ficus microcarpa</i> (figus)	156	2	21
<i>Eriobotrya deflexa</i> (bronze loquat)	146	3	17
<i>Pittosporum undulatum</i> (Victorian box)	119	4	5
<i>Prunus cerasifera</i> (purple leaf plum)	98	5	1
<i>Ligustrum lucidum</i> (glossy privet)	95	6	25
<i>Lophostemon confertus</i> (Brisbane box)	94	7	4
<i>Prunus serrulata</i> (flowering cherry)	89	8	2
<i>Maytenus boaria</i> (mayten)	79	9	13
<i>Magnolia grandiflora</i> (southern magnolia)	73	10	7
<i>Agonis flexuosa</i> (peppermint willow)	71	11	10
<i>Ginkgo biloba</i> (maidenhair)	65	12	17
<i>Acacia baileyana</i> (Bailey's Acacia)	63	13	6
<i>Melaleuca linarifolia</i> (flaxleaf paperbark)	40	14	22
<i>Platanus x acerfolia</i> (London plane)	35	15	35
<i>Pyrus kawakamii</i> (evergreen pear)	27	16	16
<i>Eucalyptus ficifolia</i> (red flowering gum)	25	17	39
<i>Schinus molle</i> (California pepper)	21	18	44
<i>Liquidambar styraciflua</i> (American sweetgum)	21	18	26
<i>Olea europaea</i> (olive)	20	20	30
<i>Geijera parviflora</i> (Australian willow)	20	20	11
<i>Callistemon viminalis</i> (weeping bottlebrush)	19	22	44
<i>Liriodendron tulipifera</i> (Tulip)	17	23	27
<i>Prunus blireiara</i> (flowering plum)	17	23	40
<i>Photinia fraseri</i> (photinia)	16	25	9
<i>Trachycarpus fortunei</i> (Windmill Palm)	12	26	49
<i>Melaleuca quinquenervia</i> (cajeput)	12	26	36
<i>Crataegus phaenopyrum</i> (Washington thorn)	12	26	34

This data is interesting in that it shows that planting of certain species in FUF community tree plantings has changed dramatically over time. Certain species (e.g., *Eriobotrya deflexa* (bronze loquat), *Ficus microcarpa* (figus), *Photinia fraseri* (photinia), *Acacia baileyana* (Bailey's acacia)) experienced significant changes in "popularity." The survey also showed a greater diversity of tree species in the more recent 1992-1993 time period.

## Most Frequently Planted Trees: All Years

Tree Species	Number of Trees	Rank
<i>Prunus cerasifera</i> (purple leaf plum)	337	1
<i>Metrosideros excelsus</i> (New Zealand Christmas)	248	2
<i>Prunus serrulata</i> (cherry)	246	3
<i>Pittosporum undulatum</i> (Victorian box)	232	4
<i>Tristaniaopsis laurina</i> (small leaf tristania)	218	5
<i>Lophostemon confertus</i> (Brisbane box)	207	6
<i>Ficus microcarpa</i> (fig)	182	7
<i>Eriobotrya deflexa</i> (bronze loquat)	181	8
<i>Magnolia grandiflora</i> (magnolia)	163	9
<i>Acacia baileyana</i> (Bailey's acacia)	154	10
<i>Maytenus boaria</i> (mayten)	138	11
<i>Agonis flexuosa</i> (peppermint willow)	136	12
<i>Ligustrum lucidum</i> (glossy privet)	117	13
<i>Ginkgo biloba</i> (maidenhair)	100	14
<i>Geijera parviflora</i> (Australian willow)	83	15
<i>Photinia fraseri</i> (photinia)	82	16
<i>Pyrus kawakamii</i> (evergreen pear)	72	17
<i>Arbutus unedo</i> (strawberry tree)	70	18
<i>Melaleuca linarifolia</i> (flaxleaf paperbark)	65	19
<i>Pyrus calleryana</i> (deciduous pear)	57	20
<i>Schinus teribinthifolius</i> (Brazilian pepper)	55	21
<i>Platanus x acerifolia</i> (London plane)	47	22
<i>Liquidambar styraciflua</i> (American sweetgum)	43	23
<i>Olea europaea</i> (olive)	40	24
<i>Melaleuca quinquenervia</i> (cajeput)	40	24
<i>Eucalyptus ficifolia</i> (red flowering gum)	35	26
<i>Melaleuca nesophila</i> (pink melaleuca)	33	27
<i>Callistemon citrinus</i> (lemon bottlebrush)	31	28
<i>Schinus molle</i> (California pepper)	25	29
<i>Eucalyptus polyanthemos</i> (silver dollar gum)	24	30
<i>Crataegus phaenopyrum</i> (Washington thorn)	24	31
<i>Callistemon viminalis</i> (weeping bottlebrush)	23	33
<i>Hymenosporum flavum</i> (sweetshade)	22	34
<i>Jacaranda mimosifolia</i> (jacaranda)	21	35
<i>Dodonaea viscosa</i> (purple hopseed)	21	35
<i>Rhamnus alaternus</i> (Italian buckthorn)	20	37
<i>Syagrus romanzoffianum</i> (queen palm)	18	38
<i>Liriodendron tulipifera</i> (tulip tree)	17	39
<i>Trachycarpus fortunei</i> (windmill palm)	15	40
<i>Leptospermum laevigatum</i> (Australian tea)	13	41
<i>Leptospermum scoparium</i> (New Zealand tea)	12	42

<b>Tree Species</b>	<b>Number of Trees</b>	<b>Rank</b>
<i>Ceratonia siliqua</i> (carob)	11	43
<i>Lyonothamnus floribundus</i> (Catalina ironwood)	9	44
<i>Crataegus laevigata</i> (English Hawthorn)	9	44

Footnotes:

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