SAN FRANCISCO URBAN FORESTRY COUNCIL

ANNUAL REPORT, SEPTEMBER 2008

Submitted to Mayor Gavin Newsom and the Board of Supervisors
by the Department of the Environment, pursuant to San Francisco Administrative Code Article XXIII, Section 5.238

Executive Summary

This report of the Urban Forestry Council provides the Mayor and Board of Supervisors with information on the state of San Francisco's urban forest. Included is information on overall urban forest structure, overall urban forest value, street tree structure, street tree function and value, current management structure, and opportunities for improving our urban forest.

The Urban Forestry Council is making significant inroads to the historic areas of concern faced by San Francisco's urban forest, though many issues remain which need to be addressed. Most significantly, of the organizations that participated in the research for this report, the majority stated their number one challenge is an ongoing lack of adequate and consistent funding and staffing. Many cited concerns regarding the health and safety of trees under their jurisdictional management and lack of ability to address these concerns due to funding and staffing issues. The single city agency reporting adequate resources does not manage any trees within the physical boundaries of San Francisco proper.

There are approximately 700,000 trees in San Francisco. The most recent major report estimates the benefits provided by our urban forest to be worth $103,475,877, with the greatest benefits derived from property value and hydrology-related issues. Hydrological benefits alone are worth an estimated $4,444,309. The Bureau of Urban Forestry (BUF) maintained a log of trees planted from Arbor Day 2007-Arbor Day 2008 that shows 5167 new trees planted this year, which exceeds Mayor Gavin Newsom's goal of planting 5,000 trees this year. See **Appendix I** chart for planting numbers related to Mayor Newsom's "Trees for Tomorrow" program.

While San Francisco's estimated 106,000 street trees are on par with the statewide street tree average, there are many opportunities to increase the resource extent. With approximately 120,000 tree-planting sites available, San Francisco streets remain 47% unplanted. The most recent report on our city's street trees found that of these sites, affluent neighborhoods have an average rate of 28% empty sites, while underserved neighborhoods typically see empty rates of up to 74%. This inconsistent distribution of the urban forest is an important environmental justice issue. Recent tree planting efforts have focused on these areas but more work and resources clearly must be allocated. Of the 5167 planted trees, 4280 are street trees. See **Appendix II** for this year's total recorded planting numbers. For this report, SFUSD reported planting 500 trees, which were not included in the previously noted total, as these numbers were not reported to BUF. There may have been additional plantings that were not reported. While the Mayor's goal was met, the street tree count falls short of the Urban Forestry Council's Street Tree Action Plan of 5,000 new street trees annually.

The Urban Forestry Council adopted an Urban Forest Master Plan for the City in 2005; it was adopted as a living document to allow for adaptations as the conditions of our urban forest change. This plan provides city departments, nonprofits, and other urban forest managers with an in-depth picture of the size, health, stability and threats to San Francisco's urban forest. This plan is currently being expanded upon by the Planning Department with an expected completion of early 2009. At this time, the plan does not intend to include planning guidelines for Recreation and Parks Department land.

A follow up report may be sent for agencies and organizations that did not meet the deadline for inclusion in this report.

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The San Francisco Bay Area is a vibrant region that will continue to grow. As it grows it should also continue to invest in its tree canopy. This is no easy task, given financial constraints and the trends towards higher density development that may put space for trees at a premium. The challenge ahead is to better integrate the green infrastructure with the gray infrastructure by increasing tree planting, providing adequate space for trees, adopting realistic tree canopy coverage targets, and developing strategies, plans, programs, and municipal assessments to maximize net benefits over the long term, thereby perpetuating a resource that is both functional and sustainable.[1]

While current policies and programs are making inroads to the difficulties faced by San Francisco's urban forest, stakeholders continue to contend with many challenges. The management of trees, including raising funds for tree programs, is been split among various city, state, and federal agencies, non-profit groups, and private property owners. The result is an inconsistent tree care system and the historical absence of any comprehensive planning for a sustainable urban ecosystem. Acknowledgement of the need for collaborative plans motivated the completion and adoption of the existing Urban Forest Plan, which in turn prompted the two urban forest planning efforts that are underway. The Planning Department is adapting and expanding the Urban Forest Plan that was adopted by the Urban Forestry Council in 2006. The Planning Department's Urban Forest Plan does not intend to address the estimated 100,000 trees under the jurisdiction of the Recreation and Parks Department.

Mayor Gavin Newsom's continuing support of a five-year citywide effort to increase tree planting to 5,000 trees per year for a total of 25,000 trees, along with the adoption of Pruning Standards for public trees and adoption of the Landmark Tree Ordinance, has helped to increase partnering among urban forest stakeholders. However, an ongoing lack of coordination and funding among urban forestry groups has resulted in limited public involvement with trees and enforcement of existing laws. Consequently, the benefits of the urban forest are still not apparent to all our citizens.

The San Francisco Board of Supervisors passed the Urban Forestry Council Ordinance in 2001 to create an advisory and educational council, whose purpose is to guide the stewardship of San Francisco's trees by promoting a healthy and sustainable urban forest that benefits all San Franciscans while ensuring public health and safety.

As outlined in the Urban Forestry Council Ordinance, the Council is charged with:

- Development and adoption of a comprehensive urban forest plan;
- Educating the public on urban forest issues;
- Developing and adopting tree care standards;
- Identify funding and staffing needs and opportunities for urban forest programs;
- Reporting on the state of the urban forest;
- Helping secure and encourage commitment of adequate resources for tree programs; and
- Facilitating coordination among agencies with tree management responsibilities.

[1] Simpson, J. et al. 2007. *San Francisco Bay Area State of the Urban Forest report*. Center for Urban Forest Research USDA Forest Service, Pacific Southwest Research Station.

To that end, the Council has commissioned the previously mentioned Urban Forest Plan as well as two urban forest inventories in San Francisco: The *Urban Forest Effects Model* (*UFORE*) and the *Street Tree Analysis*. Additionally the UFC has adopted Pruning Standards and a Recommended Street List for the city.

The Urban Forest Plan identifies five major goals and details individual steps to accomplish each of these goals. These goals are:

1. Maintain and conserve the existing urban forest.
2. Expand the urban forest through new planting.
3. Foster a shared set of values about the urban forest through education and action.
4. Manage the urban forest in a coordinated, responsible and effective manner.
5. Identify sustainable approaches for the funding and implementation of urban forest initiatives.

In addition, the plan identified nine steps as priority action items that require immediate consideration. These Action items are:

1. The City of San Francisco should develop a citywide set of standards and best management practices for tree selection, purchase, installation and care.
2. The City of San Francisco should protect existing trees from and during development.
3. The City of San Francisco should establish a goal of no net loss of trees on public and private property.
4. City of San Francisco departments should institute a comprehensive reforestation program in City parks and public institutions.
5. The City of San Francisco should allocate and secure funding for tree planting and maintenance from public and private sources including partnerships.
6. The City of San Francisco should establish one or more goals for the urban forest and monitor the results periodically.
7. The City of San Francisco should update the list of recommended trees.
8. Elected and community leaders in San Francisco should implement tree planting programs targeting underserved neighborhoods in order to achieve more environmental equity and accessibility.
9. The City of San Francisco should engage the SF Unified School District, Parent Teacher Associations and community groups to develop tree planting and care programs.

Many of these items have subsequently been addressed through the adoption of ordinances, resolutions, plans, and internal city agency polices: development and adoption of San Francisco's Pruning Standards, adoption of the Significant Tree and Landmark tree ordinances, a Tree Protection Plan related to development, and the list of Recommended Street trees.

Continuing work towards partnership and policy adoption among city departments, nonprofits, and other stakeholders is needed to enhance the value of the work that has been completed and to advance the completion of additional priority tasks.

The Planning Department's forthcoming Urban Forest Master Plan will integrate the ideas, information, and vision of the existing Urban Forest Plan into a larger document meant to address future city planning with heightened specificity. The new plan will utilize and

integrate other UFC efforts as well, including expansion of the Recommended Street Tree List and incorporation of the adopted Pruning Standards.

There are two current estimates for the number of trees and the percentage of canopy coverage in San Francisco. The 2005 *UFORE* report suggests canopy coverage of 11.9% with 669,000 trees; while the 2007 *San Francisco Bay Area State of the Urban Forest Report* estimates canopy coverage of 16.1%. These reports used differing methodologies to gather and quantify data, which can explain the differences in their estimates. To better understand these differences, completion of a second *UFORE* analysis five years after the completion of the original study is recommended. The planning for this second *UFORE* report is currently being discussed among urban forest stakeholders for completion in 2010.

The *UFORE* report surveyed and analyzed the tree population on various land types (e.g. residential, parks, open space, street) across San Francisco by gathering data on sample plots and extrapolating from these samples the overall state and condition of the urban forest. This report found that 51.5% of all the City's trees have a diameter of less than 6" and that of the approximately 115 species, 10 species account for 46.2% of all the City's trees. This shows that many of the City's trees are very young, demonstrating the importance of increasing the level of tree care provided to the few large trees and of providing adequate care to the young trees so that they are able to reach maturity. It is important to note that a diverse population allows reductions to the overall effect of losses due to blights or unusual weather events.

The *State of the Urban Forest Report* utilized remote sensing data to determine the changes in canopy cover and impermeable surfaces in urbanized areas from 1984-2002 by analyzing data sets taken periodically over that set of years. San Francisco had little undeveloped area in 1984 and nowhere to otherwise expand to. While population density has increased, tree canopy coverage has not. This report assumed a 16.4' (5 m) canopy for each tree. Breaking down the 16.1% canopy coverage into a tree estimate based on this sample tree size resulted in a count of 940,002 trees, far higher than the *UFORE* report's 669,000 estimate. In an effort to understand this difference, the report's creators increased the canopy size estimates by 3', to a 19.4' (5.9 m) assumed canopy spread per tree, which reduced the estimated number of trees to 670,000.

The *Street Tree Analysis* (2003) focused on city street trees. As a result, there is data on tree population, age distribution, tree species, tree condition and associated benefits for the entire city.

Additionally the Council's social survey of 1100 city residents helped to gain perspective on public opinion of urban trees. The survey found that while the majority of residents believe that there are too few trees on their own streets they're satisfied with the general condition of open space and street trees, and supportive of dedicated and stable funding for urban trees.

The 2008 Annual Report intends to describe the current state of urban forest management in San Francisco and is divided into the following four sections:

I. i. Total Tree Structure
ii. Total Tree Function and Value
Looking at all trees in the city, how many trees do we have? How are they distributed? How healthy are they?
What are the benefits associated with these trees and how much are they worth?

II. i. Street Tree Structure
ii. Street Tree Function and Value
How many street trees do we have? How healthy are they?
What are the benefits associated with these trees and how much are they worth?

III. Urban Forestry Management and Funding
Which agencies have jurisdiction over each portion of the resource and how well is the resource managed?

IV. Urban Forest Policies
What initiatives has the Council worked on?

Agencies and Organizations that chose to participate in the 2007-2008 UFC Annual Report survey:

- California Department of Forestry and Fire
- Department of Public Health through-
  - San Francisco General Hospital
  - Laguna Honda Hospital
- Department of Public Works
- Friends of the Urban Forest
- Golden Gate National Recreation Area
- Public Utilities Commission
- San Francisco Port Authority
- San Francisco Municipal Transportation Agency
- San Francisco Airport
- San Francisco Unified School District
- University of California at San Francisco

Agencies and organization that chose to not participate:

- City College of San Francisco
- San Francisco Housing Authority
- San Francisco Planning Department
- Presidio Trust
- Recreation and Parks Department
- Redevelopment
- Treasure Island Development Authority

A follow up report may be sent for agencies and organizations that are not included in this report, if these agencies provide reporting information to the UFC.

I. i. Total Tree Structure: What do we have?

1. Numbers, Diversity, Age, Health

Both of the most recently created reports detailing San Francisco's urban forest and its benefits offer an estimate to the number of trees in the city and the level of canopy coverage. They also individually offer information that the other report is unable to.

The first comprehensive survey of San Francisco's urban forest includes trees in street right-of-ways, backyards, parklands, and other open space. The *Urban Forest Effects Model* (*UFORE*) analyzed field data collected throughout San Francisco to provide an overview of the urban forest. The subsequent data analysis describes the economic, ecological and social benefits of trees. The report includes information on canopy cover, tree species, tree size, available planting locations, and economic values for ecosystem services.

The *UFORE* study states that:

- San Francisco has 669,00 total trees (both public and private).
- The tree canopy cover is 12%.
- 51% of trees are less than 3 inches in diameter at breast height (DBH).
- The most common tree species throughout the city are blue gum (*Eucalyptus globulus*), Monterey pine (*Pinus radiata*), Monterey cypress (*Cupressus macrocarpa*), karo (*Pittosporum crassifolium*) and Chinese privet (*Ligustrum sinense*).

The *UFORE* model indicates that San Francisco has a large number of small and young trees. In order for these young trees to reach a mature size with good health and structure, they will need consistent care. As well, we need these small trees to replace large aging trees that are declining. Many cities encounter this situation, which requires long-term planning and sustainable funding.

Another aspect of the *UFORE* report is biodiversity. The data collection for *UFORE* included 104 tree species. In fact, San Francisco has 115 known tree species, which was previously measured by a USDA Forest Service street tree study. The top ten most common species comprise 57% of the total tree population. Increasing the population distribution over more tree species would result in a more resilient urban forest. In the event of pest or disease outbreak that targets a certain tree species, the presence of many unaffected tree species would allow the forest to persist and recover.

Based on the existing tree distribution, the *UFORE* report identified two potential pest problems: Asian longhorned beetle (*Anoplophora glabripennis*) and gypsy moth (*Lymantria dispar*). The Asian longhorned beetle is a recently introduced invasive insect that infests hardwood trees. Chicago, New York and Toronto have dealt with the beetle by removing thousands of these trees and restricting the species for new plantings. The gypsy moth is an established pest in the eastern United States. A robust and diverse urban forest is the best defense against these insects while it also contributes to wildlife habitat and resident satisfaction. Recent tree planting projects have made efforts to incorporate ecological considerations, such as ecological linkages and ecological place.

A second comprehensive study, The *San Francisco Bay Area State of the Urban Forest Report***,** was completed in December of 2007. This report was created by extrapolating information from remote sensing data. The study includes information on the changes to the impervious surfaces in urbanized regions of the Bay Area and increases to the urban extant.

It also examines changes to the canopy coverage of these areas from 1984-2002, the current canopy coverage, and gives an estimate to the number of trees in each given area. This report performs a more in-depth study of the benefits than the *UFORE* report, but does not account for the differences in levels of benefits that different species can provide as it makes estimates based on canopy coverage and not individual tree counts as *UFORE* does.

The *State of the Urban Forest report* finds that:

- San Francisco has between 670,000 and 940,00 trees (both public and private)
- The tree canopy coverage is 16%
- San Francisco experienced very little change in urban extent, impermeable surfaces and canopy coverage between 1984-2002.

This more recent report found a 43% higher property value for each tree than the 2003 *Street Tree Analysis* estimate of $77 per tree. The estimate of $110 used by the *State of the Urban Forest Report* is possibly explained by the similar increases in overall property values in San Francisco in the length of time that passed between the creation of the two studies.

In 2008, city agencies and nonprofit organizations reported planting 5167* trees. There were 4280 street trees planted and 887 open or public space trees planted.

For a complete list of participating agencies and trees planted, please see **Appendix II**.

I. ii. Total Tree Function and Value: What are the benefits?

The *UFORE* model generates economic values for natural services and functions provided by trees. For instance, trees offset some of the problems associated with climate change. Trees filter air pollutants such as ozone (O_3), particulate matter, sulfur dioxide (SO_2), nitrogen dioxide (NO_2) and carbon monoxide (CO). The annual filtration of air pollutants in San Francisco is valued at $1.3 million. Another important benefit that *UFORE* measures is carbon sequestration and storage. San Francisco trees sequester 5100 tons of carbon each year, which is valued at $94,000. The total carbon storage in San Francisco is valued at $3.6 million.

The *UFORE* report states, “Large healthy long-lived trees are best for improving air quality.” This holds true for other benefits that trees provide such as ultraviolet radiation reduction, building energy use reduction, air temperature reduction, stormwater filtration, and wildlife habitat.

There are many additional benefits of urban forests that *UFORE* does not measure. Trees provide wildlife habitat for birds, mammals, insects and invertebrates. Wildlife habitat in San Francisco can be linked to open space across North and South America, which is crucial for migratory birds considering the current levels of deforestation and habitat destruction.

As well, humans benefit from the presence of trees. Numerous studies have found that trees enhance individual and community well being. The presence of trees in an area

* San Francisco Unified School District reported planting 500 trees that were not included in the 5167 total because this planting report was made to the SF Environment for the *Annual urban Forest* report and not to the agency that maintains the list of all trees planted each year for their annual reporting. See Appendix II.

encourages more outdoor activity and interaction among residents.[2] In fact, neighborhoods and buildings with greener surroundings report fewer property and violent crimes.[3] In addition, trees provide human health benefits. Urban trees play a role in blocking UV radiation, and thus reduce human exposure and skin cancer risk.[4] In terms of psychological benefits, children with Attention Deficit Disorder (ADD) express fewer symptoms and function better than usual after exposure to green play areas that include trees and vegetation.[5]

In addition to enhancing health, trees have a positive economic influence since consumers value their presence. A study found that consumers assign high ratings for amenities, customer service, product quality and aesthetics to businesses with landscaping and trees. As a result, they are willing to travel farther and spend more time and money in such areas.[6] Furthermore, trees are associated with higher property values; the presence of trees results in a 3.5 to 6 percent price increase.[7] All these tree-related benefits contribute to a stronger community.

An inventory of the existing urban forest is the first step in long-term planning and management. The *UFORE* report reinforces the importance of consistent tree care in order for young trees to reach maturity and provide more benefits.

Through a partnership with the USDA Forest Service Northeast Research Station, the *UFORE* study was completed at a nominal cost to the City. The Department of the Environment provided eight intern stipends at a cost of $8000 and in-kind support through the Urban Forest Coordinator.

The *San Francisco Bay Area State of the Urban Forest Report* details the benefits provided by our urban forest broken down by area use type (i.e. high density residential areas, low density residential areas, commercial/industrial, institutional, open space, and transportation) and quantifies these benefits using two different metrics: resource units and dollar value. Resource units are the engineering units of meters, kilograms, BTUs and watts of the energy, water, and carbon saved by the urban forest. The dollar value of these benefits is derived from an assessment of the resource units. The greatest benefit by far was increased property value. As noted above, San Francisco's relativity mild climate reduces the urban forest's carbon benefits related to energy savings as compared to cities with warmer climates. The *State of the Urban Forest Report* finds that the largest use-value benefit that San Francisco's urban forest provides is in hydrological function.

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[2] Kuo, Frances. 1997. Trees, Aggression and Urban Violence. *City Trees: The Journal of the Society of Municipal Arborists*, Volume 33, Number 6.
[3] Kuo, Frances E, Sullivan, William C. 2001. Environment and crime in the inner city: does vegetation reduce crime? *Environment and Behavior*, (33) 3: 343-367.
[4] Society of American Foresters. 2002. Tree cover may be the newest weapon against skin cancer. *The Forestry Source*.
[5] Taylor, Andrea Faber, Kuo, Frances E., Sullivan William C. 2001. Coping with ADD: the surprising connection to green play settings. *Environment and Behavior*, (33) 1: 54-77.
[6] Wolf, Katherine L. 1998. Trees in business districts: positive effects on consumer behavior! *Human Dimensions of the Urban Forest Fact Sheet #5*. Center for Urban Horticulture, University of Washington.
[7] Wolf, Katherine L. 2001. Tree investment brings cities many happy returns. *Environmental Outlook*.

San Francisco County (existing canopy cover=16.1 percent)

Benefit	Residential Low	Residential High	Commercial / Industrial	Institutional	Transportation	Open space	Total	Units
				Benefits (engineering units)				
Hydrology	88,159	784,065	102,606	182,322	539,867	1,361,807	3,058,825	(m^3)
Property Value	259,169	1,728,745	139,318	237,506	0	2,198,856	4,563,594	(m^2)
Ozone dep	2,030	18,051	2,020	3,496	10,761	28,885	65,242	(kg)
NOx dep	948	8,436	947	1,636	5,035	13,525	30,528	(kg)
PM10 dep	1,575	14,012	1,577	2,720	8,370	22,489	50,743	(kg)
SOx dep	192	1,711	192	332	1,022	2,745	6,194	(kg)
NOx avoided	92	357	214	0	0	0	663	(kg)
PM10 avoided	32	137	43	0	0	0	213	(kg)
SOx avoided	24	102	0	0	0	0	126	(kg)
VOC avoided	7	28	14	0	0	0	49	(kg)
BVOC	-1,200	-10,672	-937	-2,535	-11,353	-20,194	-46,892	(kg)
Net VOCs	-1,193	-10,644	-923	-2,535	-11,353	-20,194	-46,843	(kg)
Net Air Quality	3,701	32,161	4,070	5,650	13,835	47,448	106,865	(kg)
CO_2 sequestered	633,863	5,637,443	563,307	1,047,956	2,848,142	8,247,691	18,978,403	(kg)
CO_2 Decomp	76,031	676,203	80,378	163,399	515,607	1,097,553	2,609,172	(kg)
CO_2 Maint	13,581	120,784	10,459	16,790	58,482	161,575	381,670	(kg)
Net CO_2 sequestered	544,252	4,840,456	472,471	867,767	2,274,053	6,988,563	15,987,561	(kg)
CO_2 avoided	595,701	2,682,151	514,127	0	0	0	3,791,978	(kg)
Natural Gas	433,598	1,753,938	2,593,561	0	0	0	4,781,097	(kBtu)
Electricity	326,141	1,410,975	353,371	0	0	0	2,090,486	(kWh)

Benefit	Residential Low	Residential High	Commercial / Industrial	Institutional	Transportation	Open space	Total	% of Total
				Benefits (dollars)				
Hydrology	128,090	1,139,204	149,081	264,903	784,398	1,978,633	4,444,309	4.3
Property Value	5,580,973	37,226,967	3,000,080	5,114,487	0	47,350,372	98,272,878	95.0
Ozone dep	2,903	25,817	2,888	5,001	15,391	41,311	93,310	
NOx dep	1,357	12,065	1,355	2,340	7,202	19,343	43,661	
PM10 dep	695	6,180	695	1,200	3,692	9,919	22,382	
SOx dep	748	6,652	748	1,291	3,972	10,672	24,083	
NOx avoided	132	510	306	0	0	0	948	
PM10 avoided	46	196	62	0	0	0	305	
SOx avoided	92	397	0	0	0	0	488	
VOC avoided	3	12	6	0	0	0	22	
BVOC	-529	-4,707	-413	-1,118	-5,008	-8,907	-20,684	
Net VOCs	-526	-4,695	-407	-1,118	-5,008	-8,907	-20,662	
Net Air Quality	5,446	47,121	5,647	8,714	25,249	72,339	164,516	0.2
CO2 sequestered	2,117	18,829	1,881	3,500	9,513	27,547	63,388	
CO2 Decomp	254	2,259	268	546	1,722	3,666	8,715	
CO2 Maint	45	403	35	56	195	540	1,275	
Net CO2 sequestered	1,818	16,167	1,578	2,898	7,595	23,342	53,398	0.1
CO2 avoided	1,990	8,958	1,717	0	0	0	12,665	0.0
Natural Gas	7,487	30,285	44,782	0	0	0	82,553	0.1
Electricity	69,514	300,735	75,317	0	0	0	445,566	0.4
Total	5,795,317	38,769,437	3,278,203	5,391,002	817,242	49,424,686	103,475,887	
Percent benefit	5.6	37.5	3.2	5.2	0.8	47.8	100	
Benefits/tree ($)	197	148	113	107	5	119	110	

Source: Simpson, et al., 2007

A five year follow up *UFORE* report will help us to understand the difference in the two most recent studies on San Francisco's urban forest. Preliminary planning for this report has begun, with an expected completion date of 2010.

II. i. Street Tree Structure: *What do we have?*

A. Numbers, Diversity, Age

There are an estimated 106,000* street trees in San Francisco today. Publicly managed trees account for roughly 1/3 of the total; private property owners are responsible for the care of the remaining trees.

While San Francisco is on par with the statewide average of 104 trees per street mile, there are many opportunities to increase the number of street trees. Approximately 120,000 sites, or 47% of all street tree-planting sites, are unused. It is important to note that the 4280 street trees planted through DPW, FUF and Capital Improvement projects fall short of the UFC Street Tree Action Plan annual goal of 5,000 new street trees.

Species Diversity

Citywide, the resource represented 115 different tree species—indeed a healthy diversity. However, several districts were dominated by a few species and this lack of diversity in certain areas should be of concern to managers. With the greatest population, leaf area, and canopy cover, Victorian box and London plane are the two most common street trees in San Francisco.

San Francisco's most common street trees and percentage contribution to canopy cover

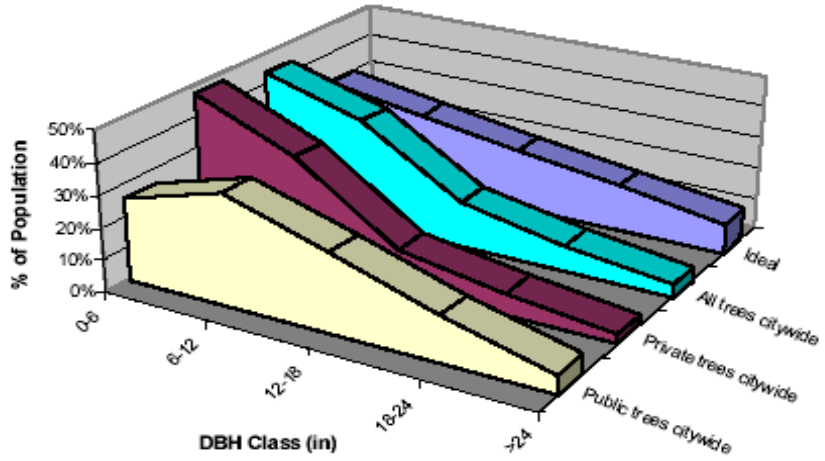
Species	# of trees	% of Tot.	Leaf area (m2)	% of Tot.	Canopy cover (m2)	% of Tot.	IV
Victorian box	8,500	11	692,346	10	204,856	10	10
London plane tree	6,514	8	880,537	13	441,686	21	14
Indian laurel, ficus	6,042	8	409,118	6	151,812	7	7
New Zealand Christmas tree	4,873	6	347,836	5	100,885	5	5
cherry plum	4,537	6	158,821	2	35,315	2	3
red-flowering gum	3,508	5	493,348	7	146,895	7	6
blackwood acacia	3,429	4	683,484	10	166,490	8	7
Japanese flowering cherry	3,413	4	166,627	2	34,243	2	3
Brisbane box	3,366	4	283,545	4	70,272	3	4
mayten tree	2,890	4	147,173	2	41,783	2	3
small-leaf tristania	2,852	4	70,630	1	24,013	1	2
Arbutus 'Marina'	2,731	4	21,789	0	8,875	0	1
lemon bottlebrush	2,157	3	81,273	1	26,907	1	2
evergreen pear	2,151	3	82,553	1	38,707	2	2
maiden hair tree	2,140	3	25,066	0	7,222	0	1
Chinese elm	2,040	3	661,778	10	135,051	6	6
Monterey pine	2,035	3	570,766	8	172,794	8	6
myoporum	1,992	3	194,189	3	61,569	3	3
southern magnolia	1,914	2	61,908	1	24,367	1	2
Australian peppermint willow	1,645	2	95,798	1	27,751	1	2
cajeput tree	1,549	2	33,582	0	7,742	0	1
olive	1,423	2	89,557	1	24,138	1	1
Indian hawthorn	1,415	2	4,986	0	2,552	0	1
Monterey cypress	1,292	2	317,522	5	117,388	6	4
glossy privet	1,258	2	57,764	1	21,793	1	1
karo	1,206	2	121,241	2	37,825	2	2
Total	76,872	100	6,753,236	100	2,132,934	100	100

* The Urban Forestry Council did not have the resources to perform a street tree study this year. The broad estimated of 106,000 is an extrapolation based off the number of planting locations identified in the 2003 *Street Tree Analysis* and the number of reported street trees planted since the completion of that study, with rough adjustments for losses. The *Street Tree Analysis* estimated 98,534 street trees and 127,500 available street tree planting locations; this estimate meant 56% of available street tree locations were unplanted.

Source: Maco et al., 2003

Age Distribution

Age distribution varies by district, but citywide the street tree population is immature, lacking adequate numbers of functionally mature trees. The following chart shows the breakdown of San Francisco's tree age (as DBH or trunk diameter at breast height) vs. an idealized age breakdown.



Source: Maco et al., 2003

B. Street Tree Distribution: *An important environmental justice issue*

Street trees—and their associated benefits—are not distributed evenly among residents. Of the approximately 127,500 potential planting sites that were identified when the *Street Tree Analysis* was created in 2003, affluent neighborhoods had an average rate of 28% empty sites, while underserved neighborhoods typically saw empty rates of up to 74%. This inequitable distribution of the urban forest is an important environmental justice issue; specifically, the street tree population appeared to be least established in Districts 10 and 11.

The following chart offers an overview of resident and street tree populations in San Francisco. Although this chart identifies District 3 (North Beach) as the district with the fewest street trees, it is the physically smallest district. However, the more important point is that District 11 (OMI/Excelsior) has the largest resident population and ranks 7th in the street tree population; thus it should be a first priority for action.

Human Population vs. Street Tree Population

District	Name	#People* (% of pop.)	Pop. rank	#ST (%ST pop.)	ST rank	People/Tree	**Priority**
1	Richmond	69978 (9.01)	9	6988 (7.1)	9	10.01	**4**
2	Marina	67272 (8.66)	11	10624 (10.8)	3	6.33	**9**
3	N.Beach	70150 (9.03)	7	3623 (3.7)	10	19.36	**1**
4	Sunset	70672 (9.1)	5	7115 (7.2)	8	9.93	**3**
5	W.Addition	71217 (9.17)	3	8841 (9)	6	8.06	**5**
6	SOMA	70197 (9.04)	6	9496 (9.6)	5	7.39	**7**
7	Merced	68877 (8.87)	10	11457 (11.6)	2	6.01	**10**
8	Castro/Noe	70029 (9.02)	8	13140 (13.3)	1	5.33	**11**
9	Miss/Bernal	71061 (9.15)	4	10546 (10.7)	4	6.74	**8**
10 total		73209 (9.43)	2	9491 (9.6)	5	7.71	**6**
10(a)	Potrero Hill			3827 (3.9)			
10(b)	BVHP			5664 (5.7)			
11	Excels/OMI	74121 (9.54)	1	7214 (7.3)	7	10.27	**2**
Total		776783 (100)		108026 (100)		7	

*http://sfgov.org/site/uploadedfiles/redistricting/download/sfproposal/sf_stats_new_districts_41502.xls (2000 data)

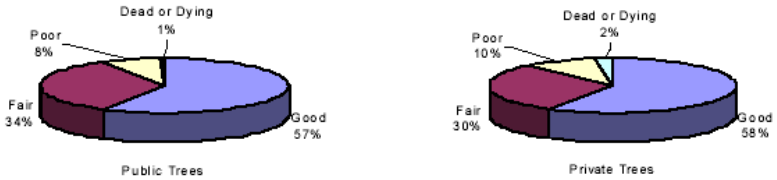
KEY	
#People	Number of people living in that district
(% of pop.)	Percentage of City's total human population
Pop rank	Population rank (1 being largest)
# ST	Number of street trees growing in that district
(%ST pop.)	Percentage of City's total street tree population
ST rank	Street tree ranking (1 being district with the largest street tree population)
People/Tree	Amount of people for every one tree
Priority	This is the action priority (1 being district that is in the worst situation and in greatest need of city attention)

C. Street Tree Health

Two studies were examined to determine the health of San Francisco's street trees. Michael J. Sullivan conducted a series of studies on tree health and survival rates. Sullivan examined trees planted through San Francisco's Friends of the Urban Forest (FUF). 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 survey showed that 1,718 out of a total of 1,987 trees planted in 1992-1996 had survived as of **5 years** after their planting date--**a survival rate of 86.4%**. Out of the 1,869 **10 year**-old trees from 1987-1991, a total of 1,269 had survived--**a survival rate of 67.9%**. It is encouraging that over two-thirds of the trees planted through FUF are still alive after 10 years (Sullivan, 2004).

The 2003 CUFR (Center for Urban Forestry Research) street report considered tree health on both public (DPW) and private (FUF/property owner) maintained trees. Survey

techniques and health indicators differed somewhat from the Sullivan study, so the two data sets are not compared here. However, results of the CUFR report do not suggest a significant difference in the health of public versus privately maintained trees.



Source: Maco et al., 2003

This chart indicates the condition of public and private street tree population by district (%).

	Public Trees				Private Trees			
Zone	Good	Fair	Poor	Dead or Dying	Good	Fair	Poor	Dead or Dying
1	47	45	9	0	42	50	6	2
2	69	24	7	0	76	16	7	1
3	59	31	6	3	27	42	31	0
4	-	-	-	-	54	39	4	3
5	54	35	9	2	61	31	6	1
6	50	50	0	0	85	12	3	0
7	64	32	4	0	67	25	4	3
8	36	57	7	0	50	38	10	1
9	61	25	14	0	50	28	19	3
10a	22	61	17	0	61	30	7	3
10b	0	43	57	0	25	44	24	7
11	76	23	0	1	72	22	5	1

Source: Maco et al., 2003

DISCLAIMER: District 4 has public trees on par with other districts; however, the CUFR street tree report does not include a health rating for District 4 trees.

II. ii. *Street Tree Function and Value: What are San Francisco's street trees "worth"?*

We recognize the many ways in which trees improve the aesthetics of the community and enhance the mental and emotional states of San Francisco residents. However, in this section, we choose to focus on the benefits in energy savings, air quality improvements, storm water containment, and property value increase.

Benefit	Public			Private			All		
	Total ($)	$/capita	$/tree	Total ($)	$/capita	$/tree	Total ($)	$/capita	$/tree
Energy	23,749	0.03	1.30	61,993	0.08	0.77	85,742	0.11	0.87
CO_2	10,218	0.01	0.56	27,689	0.04	0.34	37,907	0.05	0.38
Air Quality	17,740	0.02	0.97	24,978	0.03	0.31	42,718	0.05	0.43
Stormwater	117,415	0.15	6.44	349,139	0.45	4.35	466,554	0.60	4.73
Property Increase	1,802,240	2.32	98.84	5,106,898	6.57	63.60	6,909,138	8.90	70.12
Total benefits	1,971,362	2.58	107.62	5,570,697	7.29	69.11	7,542,059	9.87	76.54
Total costs	4,777,190	6.25	261.99	2,704,276	3.54	33.68	7,481,466	9.79	75.93
Net benefits	- 2,805,828	- 3.67	- 154.38	2,866,421	3.75	35.43	60,593	0.08	0.61
Benefit-cost ratio	0.41	0.41	0.41	2.06	2.06	2.05	1.01	1.01	1.01

Source: Maco et al., 2003

1. Energy Savings
Because of San Francisco's moderate summer weather, potential energy savings from trees are lower than those that would be found in warmer inland locations. Electricity and natural gas saved annually from both shading and climate effects total 651 MWh and 1,646 Mbtu, respectively, for a total retail savings of $ 85,742 ($0.87/tree).

2. Greenhouse Gas Sequestration
Citywide, public trees sequestered 611 tons of the greenhouse gas carbon dioxide (CO_2). At the same time, energy plant emissions declined by 71 tons. Private trees have an annual net sequestration rate of approximately 1,660 tons and reduced emissions by another 186 tons. The combination of these savings is valued at $37,907 ($0.38/tree) annually.

3. Air Pollutant Uptake
Annual air pollutant uptake by tree foliage (pollutant deposition and particulate interception) was 12.5 tons combined. The total value of this benefit for all street trees is $189,375, or about $1.92/tree.

Because of the relatively small avoided hydrocarbon emissions benefit at power plants due to energy savings, and the fact that many species have high biogenic volatile organic compound (BVOC) emission rates, trees had a negative net impact on avoided pollutant emissions—causing more harm than good. The *net cost* of avoided and BVOC emissions was valued at approximately $135,000, or $1.37/tree.

4. Storm Water Abatement
The ability of San Francisco's street trees to intercept rain—thereby avoiding storm water runoff—is substantial, estimated at 13,270,050 ft^3 annually. The total value of this benefit to the city is $467,000. These values ranged by district and population subset. Citywide, the average street tree intercepted 1006 gallons, which is valued at $4.73 annually. Thus, street trees were found to provide a particularly important function in maintaining environmental quality of San Francisco's important water resources.

5. Property Value Increase
The estimated total annual benefit associated with property value increases and other less tangible benefits is approximately $6.9 million, or $70/tree on average. London plane ($146/tree), blackwood acacia ($110/tree), and Chinese elm ($361/tree) are on the high end, while New Zealand Christmas tree ($40/tree), evergreen pear ($23/tree), and maidenhair tree ($23/tree) average the lowest benefits.

Overall, annual benefits are determined largely by tree size, where large-stature trees typically produce greater benefits. For example, average small (lemon bottlebrush), medium (New Zealand Christmas tree), and large (blackwood acacia) broadleaf evergreen trees produce annual benefits totaling $16, $44, and $125 per tree, respectively.

6. Benefit to Cost Ratio

The street tree resource of San Francisco is a valuable asset, providing approximately $7.5 million ($77/tree) in total annual benefits to the community. However, approximately the same amount is spent on its upkeep (see below). With a Benefit-Cost Ratio (BCR) of 1.01, managers are faced with a fragile resource that requires strategic care to increase the BCR as the resource matures.

III. Urban Forestry Management and Funding:
Opportunities and Challenges

Currently, street trees in San Francisco are comprised of two distinct populations, those managed by the Department of Public Works (DPW) and those managed by private property owners. A significant majority of street trees are the responsibility of private property owners, but the level of care varies greatly. Some property owners actively tend their trees with help from Friends of the Urban Forest (FUF) while other people neglect or damage their trees. The trees in San Francisco's open spaces are managed in part by several other agencies, including Recreation and Parks Department, Golden Gate National Recreation Area, The Port of San Francisco, San Francisco Municipal Railway (MUNI), City College of San Francisco (CCSF), University of California (UCSF), and others. Trees on private property are the responsibility of property owners.

This section provides an overview of the activities, accomplishments and challenges of government agencies and nonprofit organizations working on urban forestry in San Francisco, based on information that participating agencies and organizations provided for this report.

* These agencies did not participate in this year's survey. Reports on these agencies were created using alternate sources of information, described at the beginning of each section.

Department of Public Works, Bureau of Urban Forestry (BUF)

Total bureau budget: **$8,821,030**
Total urban forest budget: **$4,914,445**

The Department of Public Works, Bureau of Urban Forestry has jurisdiction over all trees in the public right of way and actively manages about 40,000 trees.

BUF's six major programmatic activities associated with urban forestry are:

1. Tree planting and establishment
2. Tree maintenance and emergency response
3. Issuing tree planting and removal permits, and sidewalk landscaping permits
4. Tree and sidewalk inspections and evaluations
5. Landscape maintenance
6. Sidewalk maintenance around trees

These 6 programmatic activities are divided between three working groups: Trees, Landscape, and Cement. Each group has three class I supervisors, and one class II supervisor who develop plans for the group with input from the Urban Forester, Assistant Superintendent, and Superintendent.

Currently the Department has a total of 145 staff working for the Bureau of Urban Forestry. However, this includes numerous part-time or temporary employees, as well as a significant number of staff in the cement shop; it is important to note that though the cement shop is housed within the Bureau of Urban Forestry they also perform work that is not Urban Forestry related. There are only 12 full time arborists for tree maintenance work, 3 positions for inspections of trees and all permit issuance, and 10 full time watering and young tree establishment staff.

Tree maintenance and planting
From Arbor Day 2007 through Arbor Day 2008, DPW directly planted 648 trees and contracted the planting of 1341 trees. About 40,000 street tree locations are maintained and planted by DPW Arborists, Laborers, and Environmental Service Workers. Maintenance includes pruning and removal. Planting includes weekly watering, weeding and adjusting stakes to ensure survival until trees are established. Tree crews also provide services to other agencies through interdepartmental work orders.

Landscape maintenance and installation
There are over 200 acres of landscaped medians, other right-of-way locations, and civic plazas that are maintained by crews of Gardeners, Laborers and Environmental Service Workers. Maintenance includes trash pickup, weeding, hedging and pruning, and irrigation as needed. Landscape installation includes planting, installation of irrigation systems, weed fabric and mulch. Landscape crews also provide services to other agencies through interdepartmental work orders.

Inspection, permitting and education
DPW is responsible for processing all permits for street tree planting and removal, as well as significant and landmark tree removal and sidewalk landscaping permits, and inspection for tree maintenance and sidewalk repair needs. The Urban Forester and Arborists inspect locations, update and track databases for tree work and permits, distribute educational

materials, and attend community meetings to better inform the public and decision makers regarding street tree maintenance and planting.

Sidewalk repair
DPW crews of Cement Masons, and Laborers repair sidewalks lifted by tree roots of DPW-maintained street trees. Cement crews also provide services to other agencies through interdepartmental work orders.

DPW is required to implement and enforce multiple municipal, state and federal codes.

- Article 16 of the Public Works Code, which includes permitting for street tree planting and removal, and enforcing fines for tree damage and unauthorized removals.
- California State Title 24 and the American with Disabilities Act (ADA) requirements regarding pedestrian accessibility of sidewalks in regard to street trees and tree related sidewalk damage.
- Planning Code Section 143 requiring a street tree for every 20 feet of sidewalk in certain land use and permit situations.
- DPW Order 169,946 and ISCOTT guidelines for street tree placement and maintenance.

Funding
The DPW urban forestry budget comes from a variety of sources including the city's general fund, sales tax from Prop K, state gas tax, and fees and fines. In fiscal year 2007-2008, BUF received:

Source	Funds
General Fund for planting and maintenance	$1,472,306
Sales Tax (Prop K) for planting and maintenance	$974,000
Sales Tax (Prop K) for sidewalk repairs	$768,139
Gas Tax for tree maintenance	$1,700,000
In-lieu fees for trees not planted and fines for damaging trees	$30,000 (anticipated)

BUF's fiscal year 2007-2008 urban forestry related activities funding use:

Use	Funds
Tree planting and establishment	$1,529,566
Mature tree maintenance	$2,674,000
Sidewalk repairs	$768,139

Additional expenses relating to the operation and overhead portion of staffing hours dedicated to tree inspection and evaluation was not itemized.

Challenges
The main challenge is securing reliable and adequate funding sources for maintenance of street trees and landscaped medians to ensure proper levels of long-term maintenance. BUF would like to reduce the years between routine maintenance to three years and would like to see the City assume care for all trees in the public right of way. BUF currently lacks the funding to provide the level of care to the trees under their jurisdiction that they would like to be able to and are concerned that they do not have the staffing levels necessary to assume the care of the tree planted in the ongoing Trees for Tomorrow campaign, which will result in a total of 25,000 tree planted in the city over a five year period ending in 2010. BUF requires two and a half times their current arborist staff of 12 to care for these additional trees as well as an increase to their tree evaluation and inspection staff.

Recreation and Parks Department (RPD)

Although the Recreation and Parks Department did not contribute to this year's report, certain information regarding their resources, concerns, and constraints was made available in a presentation at a Board of Supervisors committee hearing on July 3, 2008.

Tree planting and management
RPD maintains an estimated 100,000 trees in San Francisco. They have performed studies on three sites[*]: Stern Grove, Park Presidio, and Washington Square. These studies assessed a total of roughly 2,400 trees. At the meeting, the RPD representative cautioned that assessment studies are useful for a limited span of time following their completion. If the necessary resources to create an action plan and perform work based on the information that an assessment study provided weren't available, the study would have little use value.

RPD currently has 32 dedicated tree care staff broken into 5 crews: three tree care crews and two reforestation crews. The tree care crews are comprised of a supervisor, two or three climbers, and a laborer. The reforestation crew assigned to Golden Gate Park has a supervisor and seven other staff, while the Neighborhood Parks reforestation crew has a supervisor with four additional staff members.

Funding
Voters passed the Clean and Safe Recreation and Parks General Obligation bond earlier this year. This bond has a set aside of four million dollars for urban forest work, which will be made available to RPD after two bond sales; one in August of 2008 and one at the end of 2009.

Challenges
Recreation and Parks does not have adequate staffing to properly manage their trees. Each member of the tree care crews is needed to operate the crew safely and effectively. If one member of a crew is unable to work due to sickness or other leave, the crew may not be able to work on trees that day. To address this, RPD would need to increase the size of each crew to ensure that they are able to adhere to their work schedules regardless of a staff member's absence. Additionally, RPD reported unmet equipment needs.

[*] The Botanical Gardens at Strybing Arboretum, which is located on RPD land, reports that they have also completed an assessment report of all trees in the area they manage.

Golden Gate National Recreation Area (GGNRA)

Total urban forest budget: **$30,000**

The National Park Service manages the Golden Gate National Recreation Area. This 2675 acre area encompasses Fort Mason, Presidio Area A (coastal), Land's End, Sutro Heights Park and Fort Funston. As a federal agency, GGNRA is required to complete project planning under NEPA, the National Environmental Policy Act.

Tree planting and maintenance

GGNRA's urban forestry work is currently focused on emergency tree care, which is assigned as needed to groundskeepers and trail crew workers.

Funding

Golden Gate National Recreation Area has a $30,000 budget for urban forest management in San Francisco. In fiscal year 2007-2008, GGNRA required $20,000 for emergency tree care, routine care, and special projects. An Additional $10,000 was dedicated to public programs.

Challenges

GGNRA has no dedicated urban forestry staff or funds for professional tree management services. Their greatest concern is lack of funds for proper management of trees in their jurisdiction. A specific concern is the aging stands of Monterey Pine and Monterrey Cypress that require attention in the form of thinning, pruning, and replacement. Ability to hire a crew of 2-4 dedicated tree workers would be a good start to proper stewardship of the trees on their lands.

Department of Public Health

The Department of Public Health did not participate directly through the greater administrative body, though two individual facilities choose to participate.

Laguna Honda Hospital (LHH)

Total urban forest budget: **$20,000**

The Laguna Honda Hospital is located at the approximate geographic center of San Francisco on 62 acres; roughly half of this area is open space. The 1200 bed hospital has provided long-term care for over 135 years and is surrounded by aesthetically appealing mature vegetation. At present, the vegetation at LHH is comprised of eucalyptus forest, grasslands, manicured lawns and horticultural plantings. The hospital maintains approximately 3,000 trees, 80% of which are located in open space areas. The hospital campus offers safe and beautiful trails to staff and the public, which are accessible by mass transit and private vehicles. The hospital is required to issue Environmental Impact Reports.

Funding

Tree work is generally focused on emergency tree care. LHH contracts with the Recreation and Parks Department to manage the majority of the care provided to their trees; typically contracting one week of full time work for one RPD crew per year costs LHH $20,000-$25,000.

Challenges

The greatest need is manpower and funding to maintain existing trees and improve open space. Mature trees, particularly the large eucalyptus tree groves, are approaching the end of their average life spans. Basic forest management, such as selective thinning and hazardous tree removal would enhance and protect the existing forest and wildlife communities, as well as the recreational experience on the site. In addition, there are many ecological restoration possibilities for the woodland, grassland and creek areas. Historically, this area (Florida Valley) supported a creek and riparian habitat. Possible projects range from small and inexpensive to large and costly. Finally, trail improvements could include linkages between disconnected trails, additional landscaping, signs and/or paved surfaces. LHH trees require professional evaluation and future planning efforts, though the hospital lacks the expertise and financial resources to do so. LHH estimates that they would need $200,000-$300,000 to properly manage their trees.

General Hospital (SFGH)

General Hospital comprises a total of 23 acres, with trees located throughout.

Tree planting and maintenance

SFGH has two full-time garden staff and three as needed garden staff; they contract large tree work with BUF and assign garden staff to perform work on smaller trees as needed.

Challenges

Gardener staffing levels are inadequate and there are no arborists on staff. In the past, the hospital has had 7 gardening personnel. Though the management area has not decreased, the number of staff has.

The Port of San Francisco

The Port of San Francisco is responsible for managing 7.5 miles of the San Francisco shoreline stretching from Hyde Street Pier in the north to India Basin in the south. The Port's responsibilities include promoting maritime commerce, navigation, fisheries, restoring the environment and providing public recreation. Within the Port's management framework, the Maintenance Department is responsible for the care of all street and park trees within the Port's jurisdiction.

The Port adheres to the following policies

1) City and County of San Francisco, Department of the Environment - Integrated Pest Management Program (Legislation Chapter 39, Section 39.6)
2) Bay Conservation Development Commission Guidelines – Objective number 3
3) Department of Public Works Bureau of Urban Forestry – Tree planting and removal Policies 169 and 946.

Also note: Bay Conservation Development Commission Regulation Number 3 mandates that large trees (over 20 ft tall) cannot obstruct the view of park waterfront.

Tree planting and maintenance
The Port has two gardeners on staff; one of the gardeners is a certified arborist. The Port contracts with DPW for major tree work including evaluating tree condition, recommending tree removals as needed, recommending species for planting, and providing general pruning and maintenance services as required.

Funding
The Port Authority did not provide urban forestry budget information for fiscal year 2007-2008.

Challenges
Port of San Francisco trees and vegetation face severe health challenges. Considering the harsh environment, especially along the south waterfront, most trees planted cannot survive the winds, sea salt, pollution, lack of irrigation, and vandalism. The Port would like to develop an urban forestry plan that includes pruning, watering and planting cycles. The acquisition of additional staff, materials and supplies is necessary to support urban forestry and greening related activities.

San Francisco Planning Department

Although the Planning Department did not contribute to this year's survey, we have included some information from the most recently submitted *Annual Urban Forest* report, with minor additions.

The San Francisco Planning Department's mission is "To guide the orderly and prudent use of land, in both the natural and built environments, with the purpose of improving the quality of life and embracing the diverse perspectives of those who live in, work in, and visit San Francisco." While the department does not directly plant or maintain the urban forest, this resource is key to much of their work.

General Plan and Policy Development
The Planning Department maintains and administers the city's General Plan, which identifies community objectives upon which some level of consensus has been reached. This document not only outlines these community objectives, but also provides a framework for decision making when there are conflicting community objectives. The Urban Design Element and the Recreation and Open Space Element contain policy direction specifically concerning the city's urban forest. Many specific Area Plans in the General Plan and Implementation Plans (such as the Downtown Streetscape Plan) articulate the high value of trees in the San Francisco.

Evaluating Development Proposals
During the course of project application review, the Department considers all aspects of the project; including landscaping improvements and changes to the public right-of-way to ensure full compliance with the City's Planning Code.

Community Planning and Education Initiatives
The Department is engaged in on-going comprehensive planning that if completed and implemented will provide guidance for the design of the built environment and serve as a catalyst for further investment in the public realm. The Planning Department recently published a draft of the Better Streets Plan and has begun work on an Urban Forest Plan.

Funding
The Planning Department has no budget for street tree planting or for maintenance, though they are currently involved with two city-wide planning efforts that will affect the urban forest. A draft of the Better Streets Plan was recently completed and is now open for public review and comment; work on the Urban Forest Plan is underway.

San Francisco Public Utilities Commission (PUC)

Total urban forest budget: **$329,800**
The Public Utilities Commission maintains approximately 1,000 acres of land in San Francisco.

Funding
The total urban forest program budget was $329,800 plus one forester position, and supervisory staff and gardening staff as needed. The PUC works with RPD to maintain trees under their jurisdiction. There are no outside sources of funding.

Challenges
The PUC doesn't have adequate resources to maintain proper staffing levels. They have one staff position dedicated to urban forest work, who has been on leave since November 2007. The PUC many has aging stands and trees affected by Pine Pitch Canker. They are concerned with tree failure in publicly accessed areas. To begin an appropriate level of maintenance they require a full-time tree crew and equipment.

San Francisco Municipal Transportation Agency (SFMTA)

SFMTA maintains trees in the following public areas: Street trees and landscaped areas adjacent to Muni facilities and rights of way: Forest Hill station, Woods Division Metro, Metro annex, West Portal, Keith Sub-station, Potrero yard, Quintara, Presidio yard, Kirkland yard, Illinois Sub-station, La Playa terminal, Flynn facility, Scotts garage, 700 Pennsylvania Ave, 1580 Burke Ave, Cable car landscape, Carl & Cole landscape area, Geneva –Munich landscape area, J- line landscape area, Russia-landscape Sub-station, Metro Maintenance East (MME) LRV yard, Embarcadero LRV and F-line rights of way.

Challenges
SFMTA is currently understaffed; in the past they have had four staff with the same workload that two staff positions are now required to do. They are concerned with safety in maintaining clearance of cantenary power lines and with providing young tree care. They are also concerned with coordinating maintenance with other city departments and agencies. They require additional staff and supervisors.

San Francisco Unified School District (SFUSD)

Total urban forest budget: **$50,000**
The San Francisco Unified School District maintains approximately 430 acres with 2,873 trees at locations throughout the city.

Tree planting and maintenance
SFUSD's primary tree care goal is to care for their trees in an aesthetically pleasing way that also addresses the needs of safety, accessibility, and visibility; with safety as their highest priority. SFUSD works with Friends of the Urban Forest at the request of neighborhood groups to increase the canopy cover at their sites whenever possible.

Funding
SFUSD has a static budget of $50,000 dedicated to urban forestry work. This funding level is inadequate to cover their current needs. To address the care of trees affected by Pine Pitch Canker alone would cost an average $1,500 per tree for 383 trees with a minimum estimated need of $400,000.

Challenges
SFUSD is highly concerned with the safety of trees in their jurisdiction. As noted above, they faced great funding challenges to proper management. Beyond their current staff of 14 gardeners, one truck driver and one manager, they require an additional 16 gardeners, 4 tree climbers, tree crew equipment, an increase in their urban forestry budget to $100,000, and $50,000 in other equipment needs.

University of California, San Francisco

Total urban forest budget: **$200,000**
The Facility Management Department is responsible for planting new trees, and pruning and removing hazardous trees and limbs. This is done for public street trees in and adjacent to campus sites, campus open spaces, and Mount Sutro Open Space Reserve.

Tree planting and maintenance
UCSF identified two primary priorities: removing hazardous trees and limbs in accordance with the Mount Sutro Open Space Management Plan; and planting trees and shrubs at the new Mission Bay campus. Currently, their greatest concern is with the overall health of the eucalyptus forest and with potential for wildfire in this area.

UCSF adheres to three separate policies and guidelines: 1) the Mount Sutro Open Space Management Plan; 2) a street tree removal public notice policy; and 3) Mission Bay Campus Master Plan and Design Guidelines in which landscaping for the new campus is addressed.

Funding
UCSF receives money from the State of California under the Operations and Maintenance Funding for Grounds Budget and part of this funding is used for tree maintenance.

Challenges
UCSF has no dedicated urban forestry staff and believes it is not possible to meet sufficient funding levels, even with outside grants, to adequately address hazards from both falling trees and wildfire.

San Francisco Airport (SFO)

Total urban forest budget: **$20,000**
The current landscape at the airport includes the area directly west of the International Terminal, which is composed mainly of Sequoia sempevirons, Cercis Canadensis, Podocarpus gracilior and various shrubs such as Rhododendron varieties and Carpenteria californica. Additional areas include landscaping on the east side of Route 101 between the Airport entrance roadways and the San Bruno Avenue interchange, the entire cloverleaf area of the interchange and the new Bay Trail landscaping north of San Bruno Avenue.
Other urban forest areas are spread throughout the airport property including a residential area in Millbrae, 6-acre Bayfront Park in Millbrae and the 180 acre site west of Bayshore which is forested with Eucalyptus, Cottonwood, Willow and various other species. This is the environmentally sensitive area that is home to the San Francisco Garter Snake and the Red Legged Frog.

SFO is responsible for over 2,200 trees in approximately 500 acres of variously maintained grounds including, parklands, medians, freeway rights-of-way, wild and/or protected areas and airfields.

Tree planting and maintenance
The airport's urban forest related activities vary, since the landscaping ranges from well designed, high maintenance locations with irrigation, to natural areas that only require monitoring for disease or hazards and the resulting response. In general the airport oversees its urban forest using pruning and maintenance standards set by the San Francisco Urban Forestry Council. SFO currently has 19 full-time garden staff that includes urban forestry related activities in their daily work schedules.

Challenges
In the past, SFO contract work needed on their large trees to DPW. DPW's current work load and staffing levels do not allow them to continue to provide service to SFO, who must now seeks outside contracting partnerships to meet this need.

SFO is the only participating organization or agency who reported that they have the resources they need to properly manage the trees and landscaping under their jurisdiction.

Friends of the Urban Forest (FUF)

Total organizational budget: **$1,200,000**

Friends of the Urban Forest is a nonprofit volunteer-oriented organization that coordinates neighborhood plantings and provides young tree maintenance, as well as various training and educational programs.

Tree maintenance and planting
In fiscal year 2007-2008, Friends of the Urban Forest planted 783 trees and tended to 3,800 trees in the public right-of-way. FUF offers technical support and advice to help the individual San Francisco property owners who are responsible for maintaining roughly 2/3 of the estimated 106,000 public right-of-way trees in the city.

In addition to their planting goals, they have other annual responsibilities in relation to the urban forest. FUF is committed to complete the following:

- 783 two-month maintenance visits
- 1,000 eighteen-month maintenance visits
- 1,500 three-year maintenance visits
- 550 emergency tree calls + other random pruning/tree staking visits
- 3,500 tree care reminders (postcard mailings)
- 60 educational seminars & meetings to promote urban forestry
- 8 pruning workshops (open to public)
- 1,500 advice line phone calls
- 15 tree care establishment leaders trained (for community plantings & tree care events)
- 36 members of Youth Tree Care Program (education, training, employment)
- 8 tree tours for the public

Tree basin expansion and sidewalk landscaping program
FUF requires additional funding to continue its tree basin expansion program, which became very successful in 2007. FUF brings communities together to create sidewalk gardens helping to improve the health of the existing street trees by producing additional planting area around the truck, decreasing current and future sidewalk disturbance. Additional clear benefits include: increased ground water recharge, increased habitat for insects and critters, potential for native SF plant species in street tree under-story, and improving the streetscape for residents and visitors.

Funding
Friends of the Urban Forest's annual budget is based on the calendar year (January-December 2007), though the individual sources listed below generally correlate with the fiscal year allotments. FUF's 2007 annual budget was $1,200,000:

DPW - for street tree programs	162,000
State of California	155,500
Foundation Grants	85,500
Corporate Grants	185,355
Individual Donations	611,645

Management Challenges

With the continued loss of municipal funding, Friends of the Urban Forest has had to increase the property owner's cost of planting a tree to $150.00 per tree. The organization is seeking ways to increase their funding to make it possible for them to reduce the property owner's planting cost to $75.00 per tree; Lowering the individual per-tree cost of planting may enable expansion of the program in lower-income areas (see I.a.2. Street Tree Distribution: An important environmental justice issue.) Additional funding would also allow for improved tree maintenance efforts, an important concern in consideration of the increased planting efforts of the past two years.

California Department of Forestry and Fire (Cal Fire)

The California Department of Forestry and Fire administers Prop 40 and Prop 84 funds. Cal Fire does not directly care for or plant any trees in San Francisco, though they do provide grant funding for tree planting and urban forest research programs and projects to local organizations and stakeholders. Cal Fire currently has open grants worth $584,890 and a pending grant for $250,000 that benefits San Francisco's trees.

Cal Fire's greatest concerns address statewide issues and are not necessarily particular to San Francisco: that urban trees are not always considered to be part of a city's infrastructure and that plans to protect trees during development may be inadequate. They are also concerned with the level of care public trees receive, confusions over who is to provide care for public trees, and whether or not the trees within each department's jurisdiction are being properly cared for by that department.

IV. Urban Forest Policies

Landmark Tree Ordinance

In 2006, the Board of Supervisors passed the Landmark Tree Ordinance and the Significant Tree Ordinance.

Significant trees are automatically protected trees on private property that are within 10 feet of the public right of way and have reached one of three size requirements: it is at least 15' tall, it has a canopy of 20' or greater, or it has a DBH of at least 12". Because these trees are of a notable size and are close to the street or sidewalk, even though they are on private property, they require permits to remove.

The Landmark Tree Ordinance allows for the greatest level of protection enjoyed by any tree in the city. Trees are landmarked by the city through passing individual ordinances for each tree after an extensive process that ensures the high value and benefits of each tree for the city. Trees can be nominated by five different sources: the Board of Supervisors, the owner of the property where the tree is growing, the Landmarks Preservation Advisory Board, the Planning Commission, and the heads of city departments and agencies. After a nomination is made, the Urban Forestry Council will hold two public hearings. If the tree is accepted, the Board of Supervisors will also hold a series of public hearings before the ordinance is given to the Mayor to sign. This year, the Landmark Tree Ordinance was amended to create noticing requirements and lengthen the temporary protection period that the trees benefit from during the nomination process. These protections allow civil, criminal, and judicial penalties for non-compliance.

Permeable Landscaping

The Board of Supervisors passed the Permeable Sidewalk Landscaping Permit in 2006. The ordinance created a method by which individual property owners can increase the green space around their homes by allowing garden installations in sidewalk areas. The Urban Forestry Council recognizes the potential benefits these spaces have for the health and size of the urban forest and have begun work on Council sponsored sidewalk garden project installations.

Pruning Standards

The adopted professional pruning standards for San Francisco are based on tree care standards developed by the American National Standards Institute (ANSI) and the International Society of Arboriculture (ISA). Research on pruning standards in other cities yielded examples and templates that were applied to the San Francisco standards. Certain concepts are highlighted due to their importance and practicality; for example, 25% is the maximum amount of live foliage to be removed from a tree each year.

An easy to use public pruning brochure with adopted pruning standards information was first published in 2005. Department of the Environment staff created the booklet in consultation with Urban Forestry Council members and Friends of the Urban Forest staff. It includes pruning concepts and instructions, pruning equipment, and the importance of hiring a professional arborist. The document underwent revisions in fiscal year 2007-2008, was reprinted in August of 2008, and is now available in hard copy or on-line through the Department of the Environment.

PG&E Utility Undergrounding

Pacific Gas & Electric (PG&E) is in the process of moving aboveground utility wires to below street level. One consequence of this process has been the loss of tree planting sites. The installation of sidewalk boxes and underground utility wires has resulted in the loss of potential planting locations due to the minimum distance requirements for allowable street tree planting locations, which were designed to reduce tree/infrastructure conflicts. The addition of these utilities also displaces soil volume for trees. Although this is avoidable, it decreases the number of trees that can be planted in the future. To address this, the Urban Forestry Council and the Board of Supervisors passed resolutions recommending that tree planting sites be preserved during the undergrounding process. Though there were no enforcement details in the Board of Supervisors resolution, but the Department of Public Works (DPW) has the legal authority to direct PG&E on where to place its utilities.

Since the resolutions passed, PG&E has preserved some street tree planting sites and displaced others. The resolution was successful in that many contractors and subcontractors have contacted DPW's Bureau of Urban Forestry for walkthroughs and advice on retaining planting sites; prior to the BOS resolution, few contractors consulted DPW on tree planting sites. Unfortunately, there is no comprehensive information on the number of planting sites preserved and lost.

Recommended Street Tree List

In 2006, the Urban Forestry Council worked with DPW, FUF and private arborists to develop a list of recommended trees for San Francisco, which they then adopted at the end of that year.

This list is broken into three sections:

- The "A" list of proven species choices
- The "B" list of trees, which are good for some locations in the city but not appropriate for all microclimates.
- The "C" list of trees, which are experimental and require further study before a judgment on whether or not they will be good species can be made.

The Urban Forestry Council reviews this list annually and updates it as new information and research becomes available.

Better Streets Plan

A draft of the Better Streets Plan is now available for review and comment. This plan recognizes the importance of including natural elements into the built environment for aesthetic, economic, and safety reasons. As such, the plan recommends many uses for right-of-way tree planting and landscaping. The plan does not detail or discuss species choices related to site specifics, as the forthcoming Urban Forest Plan is expected to address this need. The commenting period for the BSP closes on September 5th, 2008.

Urban Forest Plan

As noted earlier in this document, the Planning Department is leading an effort to update and expand upon the Urban Forest Plan completed by the Urban Forestry Council and submitted to the Board of Supervisors and the Mayor in 2006. Many other city departments are participating. This plan intends to be a working document that will provide guidelines for future planning efforts. It has an expected completion date of early 2009.

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Appendix I

Trees For Tomorrow Program
Table of Trees Planted 2004-2008

Tree Planting Totals to Date*	
2007-2008	
Street Trees Total	4280
Additional Trees Total	887
Grand Total 2008	5167
2006-2007	
Street Trees Total	3637
Additional Trees Total	2275
Grand Total 2007	5912
2005-2006	
Total Street Trees	3411
Additional Trees Total	1894
Grand Total 2006	5305
2004-2005	
Total Street Trees	2392
Additional Trees Total	2653
Grand Total 2005	5045
Looking Ahead	
Mayor's Goal of 25,000 Trees in 5 years	25000
Trees planted past four years	21429
Trees remaining	3571

* Based on reports provided to DPW by the listed departments, agencies, and organizations. Does not include trees reported by SFUSD for this report. See **Appendix II** for more information.

Appendix II

Table of Street and Open Space Trees Planted 2007-2008

Tree Planting for 2008: Arbor Day 3/11/07 to Arbor Day 3/8/08* Updated March 10, 2008				
	Agency or Project	**No. to Date**	**No. Remaining**	**Total Projected**
Street Trees	DPW: Contracted 06-07	801	0	801
	DPW: Contracted FY 07-08	540	510	1050
	DPW: In-house (various locations)	588	-238	350
	Alemany Blvd.	60	20	80
	DPW: Property owner permits	815	-165	650
	SF Giants Empty Basin Planting	582	190	772
	FUF	894	106	1000**
	Recreation and Parks	0	250	250
	Public Utilities Commission	0	150	150
	Unified School District	0^	150	150
	Presidio Trust	0	0	0
	Street Trees Total	4280	1438	5718
Other Trees	Recreation and Parks: Reforestation	887	913	1800**
	Port of San Francisco: Reforestation		150	150**
	Public Utilities Commission		0	0
	Presidio Trust: Reforestation		200	200**
	Airport		75	75**
	Additional Trees Total	887	1338	2225
Total Trees	Total planted to date	5167	2776	7943
	Total by Arbor Day '08	5167		

* Based on reports provided to DPW by the listed departments, agencies, and organizations.

** Numbers estimated based on previous years' plantings.

^ SFUSD reported planting approximately 500 trees in fiscal year 2007-2008 to SF Environment for the creation of this report. The **Appendix I** & **II** charts do not include trees from the report made to SF Environment for the following reasons: it is unknown how many of these trees are street trees; it is unknown how well these reported plantings correlate to this chart which records the number of trees planted from Arbor Day 2007 through Arbor Day 2008 and the report from SFUSD is for the fiscal year from July 2007 through June 2008.

It is important to note that these approximately 500 trees are *in addition* to the 5,167 “Total Trees” number recorded on the chart.