

Mount Sutro Open Space Reserve Management Plan September 2001



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Prepared for the University of California, San Francisco

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EXECUTIVE SUMMARY

In 1997, the University of California, San Francisco (UCSF) revised the Long Range Development Plan (LRDP). In the process, members of the Community Advisory Group (CAG) pointed out that the Mount Sutro Open Space Reserve (the Reserve) eucalyptus forest posed numerous safety risks to and recreation opportunities for the surrounding neighborhoods. The LRDP included recommendations to investigate an appropriate maintenance and restoration program for vegetation and to improve hiking trails on Mount Sutro: these became the impetus for this management plan (the Plan).

The Plan blends ecologically sustainable resource management with various community interests to achieve acceptable solutions. It is the product of considerable community involvement, particularly by the Parnassus CAG Action Team (PCAT). Seven planning principles, or goals, established by the PCAT provide direction to meet conflicting interests and concerns of different groups. The goals are intended to: 1) Ensure public safety and property protection; 2) Improve the health of the forest; 3) Protect and expand native plants; 4) Enhance wildlife habitat values; 5) Maintain scenic quality; 6) Improve public access; and 7) Implement the resource management plan. The Plan responds to these and to the natural and cultural conditions on the Mount Sutro.

Developing the plan incorporated cultural factors, such as neighborhood interests and UCSF concerns, with an evaluation of natural conditions, such as topography, exposure, and vegetative health. Numerous PCAT and public meetings were held to discuss all of the important factors for consideration and to review all proposals related to management options and methods. Initially it was proposed to do extensive eucalyptus thinning. However the PCAT considered the first proposal too extensive and recommended a more methodical approach. Ultimately, the principles of adaptive management were incorporated into the plan such that small areas were selected to demonstrate and measure the viability of the proposed management actions. If successful, the management action could be

expanded to broader areas in the Reserve after the initial ten year period covered by the Plan.

The Plan proposes five near term management actions for the Reserve over the next ten years. According to the principles of adaptive management, the management actions will be undertaken so that the effect of the actions can be measured and evaluated. Results of the evaluations will be incorporated into a longer term management plan addressing the Reserve's needs for an additional twenty years.

1. Hazardous Tree Removal will occur near pavement and buildings where trees could fall and cause property damage or injury, including trees that have poor branching structure and are leaning, damaged, rotting, or dead. This action will be the least visible of the five management actions but will occur over the largest area, of 18 acres. Approximately 15 trees per acre will be removed from an average of nearly 280 trees (over 12 inches in diameter) per acre.

2. Eucalyptus Thinning is proposed in two demonstration areas totaling about two and a half acres. The thinning is intended to improve the health of the eucalyptus forest by reducing the density of the trees and increasing the access of remaining trees to more moisture and sunlight. Thinning will also produce more robust understory growth, increasing the diversity of plants and food supply for wildlife. In addition, fuel loads in these areas will be reduced. Individual trees and some stands will be preserved based on their age, health, and distribution.

3. Conversion Planting to native species will occur in seven demonstration areas totaling 5.3 acres. An eighth demonstration area of 1.3 acres will be converted to Monterey cypress. The plant community conversions include coastal sage scrub at the summit, oak woodland on the south ridge, buckeye, toyon, and madrone on the south slope, redwood in the east facing bowl, and willow/bay in the east facing drainage. Some existing eucalyptus trees will be retained in order to maintain a forested canopy as viewed from afar.

4. Native Plant Enhancement will occur around three existing native plant communities. Invasive species will be removed from around these plant populations to increase sunlight and reduce competition. Additional native plantings and natural regeneration will encourage these plant populations to spread beyond their current extent.

5. Trail System Improvements include: new trails down the north ridge to the Parnassus campus; new switchbacks on the Belgrave Connector (east of the Chancellor's residence); rerouting the South and West Ridge Trails; and completing the summit loop.

Implementing the first phase of the Plan is expected to cost nearly six million dollars. This estimate includes UCSF maintenance and oversight of contracts, a 3% escalation factor over time, and contingency fees.

Initial efforts include:

 Establishing UCSF management responsibilities;
Setting up community involvement programs and communicating the goals and benefits of Reserve management to community organizations;

3) Pursuing internal funding and matching grants from agencies, non-profit organizations, and corporate sponsors; and

4) Implementing the first five management priorities in the Reserve, listed below:

- Area A Removing hazardous trees along Crestmont and Christopher Avenues;
- Area B Planting a visual screen along Clarendon Avenue in front of Aldea;
- Area C Removing a patch of blackberry shrubs at the summit;
- Area D Planting the summit with coastal scrub; and
- Area E Enhancing the Pacific reed grass community at the summit.

INTRODUCTION

NEED, PURPOSE, AND SCOPE

Mount Sutro is a tree-covered hill that rises about 900 feet above sea level in the center of the San Francisco Peninsula less than three miles from the Pacific Ocean. The Mount Sutro Open Space Management Reserve (the Reserve) is a largely undeveloped area of approximately 61 acres owned by the Unversity of California, San Francisco (UCSF).

The purpose of the Mount Sutro Open Space Management Plan (the Plan) is to provide a management framework for protecting, enhancing, and, in some places, restoring the vegetation in the Reserve. The goal is to create a long-term, comprehensive management plan with phased sitespecific actions and costs spread out over the life of the Plan. The Plan addresses a number of potentially conflicting community concerns, campus interests, and implementation within budgetary constraints.

The Plan is intended to help the Reserve regain the qualities that made Mount Sutro a special place for people to enjoy. The Plan details the initial phase (Phase I) of a long-term management program. Phase I is a ten-year management strategy to reduce vegetation hazards, improve the health and biodiversity of the vegetation, and provide more valuable wildlife habitat. The Plan includes an incremental approach to converting some small areas of the eucalyptus stands to native plants to



Satellite photo of the San Francisco Bay Area. Mount Sutro is located in the middle of the City of San Francisco.

demonstrate future possibilities for long-term management, while retaining large areas of eucalyptus with which the community has familiarity. The Plan also addresses the existing trail network and the potential for new trail linkages.

Aspects of the Plan fit within the larger context of a network of "natural areas," small fragments of naturally occurring indigenous plant communities that existed prior to the arrival of Europeans, with similar conditions to those of Mount Sutro, which are owned by and located throughout the City of San Francisco. These Significant Natural Resource Areas (SNRAs) are part of the Natural Areas Program of the City of San Francisco's Department of Parks and Recreation. They function as natural islands within the built urban environment. This fragmentation has many effects which threaten their continued existence. With appropriate management and continued stewardship, the Reserve can help lessen these effects and augment the City's program. See Figure 1: City and County of San Francisco Significant Natural ResourceAreas near Mount Sutro.

BACKGROUND Brief History of Mount Sutro

Mount Sutro is named after Adolph Sutro, a successful mining engineer during the mid-1800s. After retiring from his mining career, Sutro moved to San Francisco, invested successfully in real estate, and ultimately became Mayor. One of his holdings was Mount Parnassus, later changed in name to Mount Sutro in his honor.

In the 1800s, like most of San Francisco's hills, Mount Parnassus was covered predominantly with coastal scrub chapparal, consisting of native grasses, wildflowers, and shrubs that provided habitat for a wide variety of wildlife. Redwoods and other trees may have grown in the protected ravines of the hill, as a sawmill once existed near the southeast corner of Laguna Honda and Clarendon (according to Bob Falcone, former Senior Superintendent, UCSF Physical Plant).

In 1886, in celebration of San Francisco's first Arbor Day, Sutro started planting the hill with blue gum eucalyptus imported from Australia, Monterey pine, Monterey cypress, and possibly fruit trees and other species. Sutro had planned to replace the eucalyptus with more valuable lumber species, but died in 1898 before accomplishing that goal.

The eucalyptus trees were the most successful trees in adapting to the site conditions, and they soon shaded out smaller trees of other species. Unchecked, the eucalyptus "plantation" grew thicker and came to dominate the mountain. The native understory succumbed to the invasive eucaluptus trees, as well as to non-native vines and shrubs. By the turn of 20th century, the entire mountain was covered with trees, and it became commonly known as Sutro Forest, in addition to Mount Sutro. Although not technically a true native forest, the term "forest" is used herein.

UCSF Reserve History

In 1895, Sutro donated 13 acres on Parnassus Avenue to the Regents of the University of California



1906: Mount Sutro in the background.



1942: Parnassus Heights campus and Sutro forest.



Figure 1: City and County of San Francisco Significant Natural Resource Areas near Mount Sutro.



(the Regents). This property was developed for the UCSF Parnassus Heights campus. In 1953, UCSF purchased a 90-acre parcel to the south, including Mount Sutro. This land has remained largely undeveloped, and most of it is now designated as the Mount Sutro Open Space Reserve (the Reserve). See *Figure 2: Site Map*.

In 1973, in response to community concerns about campus expansion, the Regents designated 50 acres of Mount Sutro as an open space reserve for a period of at least 25 years. The Regents approved the Long Range Development Plan (LRDP) that incorporated this designation in October 1975. In May 1976, the Regents, again in response to neighborhood concerns about the future of Mount Sutro, approved a special resolution with the State legislature that amended the LRDP to include, among other things, a reduction of the campus boundaries, a commitment to limit further expansion of the Parnassus campus site, and a commitment to expand the 50 acres of the Reserve on Mount Sutro to 58 acres and to make that designation permanent. The Reserve was affirmed in the 1982 LRDP as well as the 1996 LRDP, which resurveyed the area and found it to encompass a total of 61 acres.

The campus LRDP is similar to a city Master Plan — it describes UCSF's development plans for a specified period.



1987: Aerial View.

The 11-acre Aldea San Miguel Student Family Housing development (Aldea), the Chancellor's residence, and the 5-acre Woods parcel with two buldings and two parking lots, were excluded from the Reserve, although they are located within its boundaries.

Long Range Development Plan Goals

During the development of the 1997 LRDP, several members of UCSF's Community Advisory Group (CAG), a diverse group of San Francisco neighborhood, labor, ethnic, and business leaders, expressed their concern that the Sutro Forest, nearly 100 years old, was showing signs of distress. UCSF



Distressed eucalyptus forest.

campus officials were also concerned about the health of the forest because storms had posed numerous safety risks associated with falling trees and limbs. In addition, recreational use of Mount Sutro received discussion. Because of these UCSF and community concerns, the 1997 LRDP contained several recommendations related to the Reserve:

- Maintain the Reserve as permanent open space and investigate an appropriate maintenance and restoration program for trees and vegetation.
- Propose improvements to encourage recreational use of appropriate areas of the Reserve while maintaining the open space character of the area.
- Improve the hiking trails on Mount Sutro.

These LRDP recommendations served as the impetus for the Plan.

Table 1: PCAT Planning Principles

Goal 1: Ensure Public Safety and Property Protection.

- 1.1 Eliminate and minimize tree and limb hazards to people, cars, buildings, and other structures within and immediately surrounding the Reserve.
- 1.2 Minimize fire hazards and reduce fuel accumulation.
- 1.3 Minimize runoff and soil erosion.
- 1.4 Minimize adverse impacts on the City's adjacent watersheds and reservoir water quality.
- 1.5 Minimize windthrow potential.

Goal 2: Improve the Health of the Forest.

- 2.1 Protect and preserve existing healthy mature trees and tree stands, where needed and/or desirable (primarily by removing strangling vines), consistent with 2.3.
- 2.2 Improve regeneration, where desirable and as is feasible (primarily by thinning trees competing to survive and controlling invasive understory growth).
- 2.3 Increase the diversity of tree species and age throughout the Reserve, where desirable and suitable (primarily by removing eucalyptus trees and promoting forest regeneration in some areas AND replacing eucalyptus in other areas with more favorable species native to the Bay Area/extended environs).

Goal 3: Protect and Expand Native Plants.

- 3.1 Protect and preserve existing native plant communities to the extent practicable.
- 3.2 Restore native plant communities, where desirable and suitable.

Goal 4: Enhance Wildlife Habitat Values.

- 4.1 Preserve trees used for nesting by raptors and other special status wildlife species.
- 4.2 Preserve a sufficient number of dead and alive trees suitable for cavity nesting.
- 4.3 Expand native plant communities that provide food (e.g., non-invasive berry-producing species and oak), where desirable and suitable.
- 4.4 Remove invasive non-native understory vegetation; maintain some to provide cover, where appropriate.
- 4.5 Increase biodiversity in general with native species.
- 4.6 Create a greater number of small forest clearings and remove trees to allow sunlight to reach the understory, where beneficial and practicable.

Goal 5: Maintain Scenic Quality.

- 5.1 Maintain the overall forest character and visual backdrop of the hilltop Reserve.
- 5.2 Avoid noticeable, sudden reductions in the forest cover as seen from off-site.
- 5.3 Create small vistas of off-site features and forest openings, where desirable and practicable.

Goal 6: Improve Public Access.

- 6.1 Improve hiking trails (without impacting native plant species).
- 6.2 Protect important natural (e.g., rock outcrops) and cultural (e.g., Ishi's Cave) resources of public interest.
- 6.3 Minimize noise, lighting, parking, traffic, and other potential environmental impacts on nearby residents and employees and the Reserve itself.

Goal 7: Implement Resource Management Plan.

- 7.1 Implement incrementally over 30-year period in response to resource management plan priorities and to natural changes caused by wind, insect infestation, fire, and other natural and unnatural events.
- 7.2 Provide adequate funding for implementation.
- 7.3 Develop collaborative partnerships with community groups, regional organizations, academic institutions, governmental agencies, and others willing to provide volunteer labor, materials, equipment, and funding for implementing and monitoring proposed actions, or to otherwise share resources and experience.
- 7.4 Promote public education about management goals and objectives (pamphlets, docent-led walks).

The Plan incorporates the seven planning principles for the Reserve (see *Table 1: Proposed PCAT Planning Principles*) established by a small group of individuals who helped develop the Plan. The planning principles establish overall goals that seek to balance safety requirements with the desire for more native and appropriate plants, better wildlife habitat, higher quality trail system, and limited disruption of the forest cover as seen from afar. To these ends, the Plan establishes a series of management actions and provides a schedule to implement them.

Approach

Six elements comprise the approach used to develop the Plan:

- 1. Review Existing Information.
- 2. Integrate Public Interests Throughout the Planning Process.
- 3. Evaluate Existing Conditions, Issues, and Opportunities.
- 4. Initiate Management Actions Methodically.
- 5. Monitor and Measure Effectiveness of Management Actions.
- 6. Employ Most Effective Actions to Refine Long-Term Management Vision.

1. Review Existing Information.

The Plan integrates information from the *Mount Sutro Open Space Reserve Maintenance and Restoration Plan*, prepared in July 1999 by HortScience, Inc. with the assistance of two subconsultants. HortScience conducted a resource inventory and assessment to:

- Characterize the composition and health of the Reserve's forest;
- Evaluate the condition and structure of trees growing in heavily used areas;
- Survey for the presence of native plant species; and
- Make preliminary recommendations for the pruning and/or removal of hazardous trees.

In general, the 1999 study discovered that saplings were in poor health because of competition with larger trees for sunlight and rients. The regeneration and recruitment of eucalyptus into the high forest canopy was found to be further impeded by the rampant growth of English ivy, Himalayan blackberry, poison oak, and other invasive, mostly non-native weedy plants. English ivy, which can kill trees if not controlled, was observed growing up the trunks of large trees throughout the forest, and particularly on west- and north-facing slopes. The study suggested that the continuity and density of the tree canopy would degrade over time unless steps were taken to actively nurture tree regeneration and recruitment, and that pro-active management was needed to keep the forest healthy and to minimize safety risks.

In addition to the 1999 HortScience findings, the planning team reviewed the findings of vegetation management plans from major urban open spaces nearby, since the challenges of managing the Reserve are similar. The Presidio, Golden Gate Park, Angel Island, and University of California property in Berkeley have all undergone recent planning processes to address the decline of forests of eucalyptus, Monterey cypress, Monterey pine, and other species. Like Sutro Forest, these forests were planted in the late 1800s, and are now mature and potentially hazardous. The plans and studies related to these sites offered informative lessons applicable to the Reserve, as discussed in *Table 2: Findings of Other Vegetation Management Plans*.

2. Integrate Public Interests Throughout the Planning Process.

Neighbors, representatives of a variety of environmental organizations, and other interested citizens were actively involved in the development of the Plan. Many interests and concerns addressed in the Plan came to light through the community planning process, which involved frequent meetings of the Parnassus CAG Action Team (PCAT), a group of neighbors who provide input to planning and development at the Parnassus Heights campus (see Table 3: Parnassus CAG Action Team). The PCAT guided the planning process and provided feedback on preliminary proposals. It was through numerous discussions that the PCAT and others developed the seven planning principles presented in Table 1, which served as the framework for the Plan.

Table 2: Findings of Other Vegetation Management Plans

1. Appropriate methods of forest management.

Each of the plans and studies contain recommendations for the management of over-mature eucalyptus forests and the removal of individual trees. They generally conclude that clearcutting is not advisable because it leads to increased surface erosion and, after replanting, creates another even-aged stand of vegetation that lacks diversity. In addition, clearcuts are likely to be visually unsettling to the public, which has become accustomed to the aesthetic qualities of eucalyptus forests in these parks. For these reasons, the plans recommend the use of cutblocks (i.e. cutting down the eucalyptus in a series of small areas around the forest) to manage the forests. The Golden Gate Park Forest Management Plan suggests that cutblocks can be sited systematically throughout the forest, or opportunistically around the sites of individual treefalls (Department of Forestry 1980). The plan also states that the cut area should be at least twice as wide in diameter as the height of the nearest neighboring trees to allow enough light for new growth to thrive. These areas can also be visually unappealing to some members of the public, and it is recommended that the cutblocks be sited away from public access areas such as trails, meadows, and roads. It is also recommended that the cutblocks be logged on a staggered schedule to prevent mass decadence in later decades. If raptors or other nesting birds are present, logging in their vicinity should not occur between March 15 and July 15.

2. Erosion control after tree removal.

After trees are cut, proper precautions must be taken to minimize soil erosion. This is especially true when felling eucalyptus, since there is usually very little understory growth and, therefore, the soil may be completely exposed when the tree is cut down. The Focused Environmental Study for Angel Island points out that erosion can be minimized through the use of water bars, application of mulch to bare areas, and the use of hay bale check dams at points of water accumulation (DPR 1988). Erosion is an important consideration at Mount Sutro because of the steep slope of much of the land on the site. Replanting vegetation as quickly as possible after cutting trees would limit the amount of time that bare ground is exposed to wind and rain.

3. The effect of wind on forest management.

The Golden Gate Park Forest Management Plan found through reforestation experiments that wind was the major limiting factor to tree seedling survival on the west side of the park (Department of Forestry 1980). Trees that were planted behind brush, fences, or other windbreaks or in the forest survived, while those planted in exposed locations did not. March through May is the windiest period of the year and, if possible, planting should be avoided during those months. Windbreaks and regular watering are necessary in order to reforest in a very windy location. Mount Sutro can be very windy and forest replanting strategies should account for the effect of wind on seedling survival and include irrigation.

4. The control of invasive exotic species.

The Presidio Vegetation Management Plan takes an aggressive approach to the management of invasive exotic species. The most invasive species, including French broom, which also is found on Mount Sutro, are to be eradicated "wherever they are found" on the Presidio (GGNRA 1999, p. 30). The plan also recommends the use of buffer areas around the native species restoration areas. These buffers can be composed of native plants and shrubs and serve as a protection against the incursion of non-native tree species. The plan recommends that the buffer areas be between 50 and 100 feet wide.

5. Wildlife benefits of eucalyptus removal.

The 1988 Focused Environmental Study on the Restoration of Angel Island Natural Areas Affected by Eucalyptus documents the wildlife benefits of removing eucalyptus stands and replacing them with native vegetation. On the island, eucalyptus stands were found to be relatively unsuitable for use by deer, and most raptors and migratory birds, compared to other forest types. The report found that even the two raptor species (red-tailed hawk and great horned owl) that were nesting in the eucalyptus would benefit from eucalyptus removal because they could easily find other nest sites and populations of their prey species would dramatically increase as other vegetation types took over.

Table 3: Parnassus CAG Action Team (PCAT)

Community Advisory Group (CAG) members:

Dennis Antenore—Parnassus neighbor; former member, City Planning Commission.

Sue Bierman—Parnassus neighbor; former member, Board of Supervisors.

Craig Dawson—Parnassus native; Inner Sunset Merchants Association representative.

Agar Jaicks-Parnassus neighbor.

Beatrice Laws-Parnassus neighbor.

Other Participants:

Carolyn Blair—member, San Francisco Tree Council. Greg Gaar—Parnassus neighbor; San Francisco historian.

Ruth Gravanis—member, Sierra Club.

Pinky Kushner—Parnassus neighbor; member, Inner Sunset Park Neighbors.

Ben Pease-member, Bay Area Ridge Trail Council.

John Rizzo-member, Sierra Club.

Jake Sigg-member, California Native Plant Society.



PCAT members on a site visit to Mt. Sutro.

The community planning process involved a variety of public interactions, including PCAT meetings, community workshops, presentations, a field trip, and public review and comments on the draft Plan. For an overview of that process see the diagram entitled, *Community Planning Process*. Details of that process follow below.

During 1998 and 1999, three PCAT meetings open to the public were held by UCSF to receive input for and feedback on the HortScience *Maintenance*



Community Planning Process

and Restoration Plan. In June 1998, the first meeting was held to identify issues. In December 1998, a number of vegetation management options were presented to the PCAT for discussion and in March 1999, preliminary costs for these options were presented.

During the year 2000, six meetings were held by UCSF. The two PCAT meetings held in March and May were intended to introduce the new consultants and lay the groundwork for the remaining planning process. Because of the importance of the Plan to the broader community and polarized interests among PCAT members, it was decided that broader public input was necessary. See *Table 4: Summary of Public Meetings*.

3. Evaluate Existing Conditions, Issues, and Opportunities

A planning level analysis of existing conditions was conducted based on the 1999 HortScience study, reconnaissance-level site analysis, and public input. The conditions addressed included natural factors, cultural factors, and trail use. The natural factors included climate, wind, aspect, geology, soils, slope, vegetation, and wildlife. The cultural factors included areas of special interest, views, UCSF interfaces, neighborhood interfaces, community concerns, and safety. In addition, the existing trail network was evaluated.

Through this process, issues and opportunities were identified which led to an understanding of the potential new plant communities, areas of public concern, and trail opportunities. This understanding informed the Plan throughout the planning process.

4. Initiate Management Actions Methodically

One of the most important messages received from the public meetings was to proceed with management of the Reserve cautiously, with measured actions. For this reason, this Plan has been written as the initial ten-year phase of a long-term management program.

In this first phase, four vegetation management actions are proposed as a pilot project in a series of demonstration areas. These include:

- 1. Hazardous Tree Removal.
- 2. Eucalyptus Thinning for Forest Health.
- 3. Conversion Planting.
- 4. Native Plant Enhancement.

The vegetation management actions will be tested in multiple demonstration areas, each of which will be adequately sized to evaluate their effectiveness and public acceptability.

In addition, the Plan includes a fifth management action related to trail development and maintenance.

5. Monitor and Measure Effectiveness of Management Actions

The Plan is based on an adaptive management approach that provides for the scientific and public evaluation of the success of proposed actions in the demonstration areas and allows for necessary adjustments before application to other areas of the forest in future phases of management. To determine the effectiveness and public acceptability of the management actions, each of the areas will be monitored throughout the maintenance period and measured against established criteria of success.

6. Employ Most Effective Management Actions to Refine Long-Term Management Vision

Only ecologically successful and publicly acceptable management actions will be advanced and developed in future plans. The Plan is the initial phase of a long-term management program. A vision for the long-term mangement plan is provided at the end of this document. It builds on the assumed successes of the recommended management actions. However, after pursuing an adaptive management evaluation, some actions may need to be modified or deleted from the long-term program.

Table 4: Summary of Public Meetings

After intensive consultation with the Parnassus CAG Action Team (PCAT) during 1998 and 1999, the first widely publicized community workshop was held on **June 20**, **2000**. The purpose of the meeting was to inform the broader public about the project, obtain feedback on the draft planning principles, and identify other planning issues. Over 150 community members attended, partly in response to a front page article in the *San Francisco Chronicle*. Approximately 50 participants filled out cards in which they were asked to comment on the planning issues of safety, forest health, native plants, wildlife, scenic quality, public access, and Plan implementation. Following were the primary areas of general agreement among the participants:

- Structures should not be built in the Reserve.
- ✤ Trees and other plants should not be indiscriminately cut.
- The forest should be "cleaned" but not clearcut.
- The forest should not have any obvious gaps when viewed from a distance.
- Native and non-native plants and trees can co-exist in the Sutro Forest.

The public was invited to the next PCAT meeting held on **August 15, 2000**. This was the first of two working sessions to get input on a draft phased management strategy. The purpose of the meeting was to review the draft planning principles, discuss natural and cultural resource management considerations, potential plant communities, vegetation control strategies, management approaches, and trails. The participants did not object to the draft planning principles nor the recommended plant and tree species. Participants did express concern, however, about recent summit maintenance work and the use of herbicides to manage the re-sprouting of cut eucalyptus trees and to control undesirable understory growth.

On **October 2, 2000**, UCSF held a second PCAT planning session, also open to the public. The purpose of the meeting was to formally approve the planning principles, review a draft phased management strategy, and discuss interim procedures for major maintenance projects in the Reserve. The participants resoundingly disapproved of any action to massively thin most of the Reserve. Overall, the participants felt that more gradual thinning of a smaller portion of the forest would be a better management strategy.

The following recommendations summarize the community response:

- Reduce the proposed pace of thinning the eucalyptus forest, focusing on areas with greatest safety hazards.
- Focus more effort on wildlife restoration, especially when selecting new tree species.
- Designate a demonstration area as part of the first phase to display the proposed levels of forest thinnning.
- Revisit the proposed selection of new and re-introduced plant species in protected areas, especially oak, buckeye, toyon, and madrone.

At the community meeting on **December 5, 2000**, the UCSF team presented the revised phased management strategy and recommended management actions. Overall, public response to the management strategy and specific proposals was positive and supportive. Workshop participants were in substantial agreement about the following points:

- * Be precise and clear in determining hazardous tree removal and forest thinning requirements.
- Consider expanding the proposed amount of native plant restoration.
- Begin to consider what levels of funding, potential partnerships, and community resources would be available in support of implementing the Plan.

On **March 27, 2001**, UCSF held a PCAT planning session to get feedback on the preliminary draft Plan. Participants requested that imagery (pictures, maps) illustrating proposed changes to the Reserve be included in the main body of the report. Participants also indicated that more visual displays of proposed management actions from a variety of vantage points would help to illustrate the potential visual impacts of the actions. Some participants expressed concern about perceived contradictions among recommendations of the draft Plan. Project team members and PCAT members indicated that such contradictions are necessary in trying to balance conflicting planning principles to meet the desires of a broad realm of public viewpoints. Also, the varied natural and cultural conditions of Mount Sutro require tailored management intervention so that what may be appropriate for one area may not work for another.

At the community meeting on **June 12, 2001**, there was broad consensus and enthusiastic support for the Plan and planning process. Some participants remained concerned about planting redwoods and cypress. Posting trail signs within the Reserve was opposed by some neighbors concerned they would attract visitors and increase parking demand on local streets. With the approval of those in attendance, Vice Chancellor Spaulding decided to remove signage from the Plan.

EXISTING CONDITIONS: MANAGEMENT ISSUES AND OPPORTUNITIES

INTRODUCTION

In the public involvement process, management issues and opportunities as viewed from the social perspective were identified and discussed. What neighbors and others want to see happen or not happen in the Reserve is of paramount importance, but must be tempered by and reconciled with what the "mountain is telling us." In other words, existing natural conditions and cultural interests set limits on what management actions should be considered, and which will be the most successful in any given area of the Reserve.

A successful management plan must be ecologically sustainable and practical to implement, which requires having adequate and reliable resource information. Because of limited funding for and the planning level nature of this Plan, it was not possible to conduct detailed field investigations for such resources as soils and wildlife. Therefore, the analysis relied upon available cartographic and written information, as well as field observations and the vegetation studies of HortScience.

NATURAL RESOURCE CONDITIONS

This section describes the existing conditions that influence management of the Reserve's vegetation and other resources.

Climate, Wind, Sun, and Aspect

Mount Sutro is within three miles of the Pacific Ocean and has a coastal climate with seasonally varied precipitation in the form of both rain and fog. Rainfall is concentrated in the October-May period, a regime that promotes high runoff and potentially high erosion hazard. Vegetation captures moisture through fog drip during much of the year. This fog drip may amount to 8 to 12 inches of annual precipitation.

This coastal climate, along with exposure to sun and wind (as well as other conditions such as soils), affects the types of vegetation that can grow in the Reserve. Plants that are more sensitive to fungus and mildew, which are supported by summer moisture, do not do well in this kind of climate. Other plants are not appropriate because they thrive only in warmer, drier climates.

Because Mount Sutro is a peak with various aspects or orientations, there are different microclimates (see *Figure 3: Aspect*). North facing slopes are less exposed to the sun, have predominant northwest winds from the ocean, and hence retain the highest levels of humidity and moisture in the soil. Eucalyptus and other forest vegetation tends to be the most vigorous on the north and east facing slopes. Trees that require more moisture such as redwoods and willows have the greatest chance of success in these areas. Conversely, slopes facing south tend to be the warmest and driest, and are more suitable for plant species such as coast live oak and California bay. West facing slopes are also dry, as much from wind exposure as sun exposure.

It is most difficult to establish new plants where they are particularly exposed to wind, and even the existing eucalyptus tend to be shorter and smaller on the western slopes of Mount Sutro. The strong storm winds that blow from the south and southwest also are limiting, and are the primary cause of fallen trees in the Reserve. Trees on the periphery of the forest, such as along streets, are the most susceptible to failure, as are trees with structural defects and decay. Individual trees that suddenly become more exposed to high winds are also more likely to fall. For this reason, any thinning of the forest that is considered must not be so extensive that it will subject remaining trees to increased windfall.

Blue gum eucalyptus are also affected by hot, dry weather. Heavy, horizontal branches are known to fall during such weather even when there is no wind. These hazardous branches need to be managed in areas where they can cause damage to property or harm to people.





Downed tree at the Aldea complex.

Occasionally, and most commonly in September through early November, when the semi-permanent low pressure system of the southwestern United States weakens and the Pacific high pressure system shifts inland, hot, dry, high intensity winds blow in from the northeast. These winds, in combination with unusually high air temperatures and low humidity, increase the vulnerability of the forest to wildfire generally up to ten days in the autumn. This vulnerability is increased by the excessive fuel load of dead trees both standing and lying on the forest floor and dry woody debris on the ground. Wind speed and type of vegetation affect how fast a wildfire will spread and wind direction determines where it will spread. With even a light wind, a wildfire would spread quickly in the Reserve because it is dominated by eucalyptus, which have excessive oil, and because the forest is so dense. Also, a wildfire could ignite more readily on south facing slopes, which have less moisture in the air, soil, and woody materials. Through good fortune, a wildfire has not occurred to date at Mount Sutro, although the hazard is present.

Geology, Soils, and Slope

There are many exposed rock outcrops of the underlying Franciscan formation chert, which are visually interesting. Dense mats of English ivy and Himalayan blackberry cover many of the outcrops and should be removed so they can be better seen. The roots of trees can penetrate cracks within the chert and, as the roots grow, the width of the cracks can increase and lead to rock failure. Because this is a concern to the public, these roots should be controlled.

Chert is hard, dense sedimentary rock. Franciscan chert is a thin-bedded green or red rock formation containing silica-rich chert. The bedding and close fracture of the rocks leave it susceptible to failure.

In general, soils on Mount Sutro are thin, sandy material. The soil complex is mapped as Candlestick fine sandy loam – Kron sandy loam – Buriburi gravelly loam, on 30 to 75% slopes (SCS 1991). The constituent soil types of this complex are likely to occupy different areas. The Candlestick fine sandy loams are usually from 20 to 40 inches thick over bedrock, whereas the Buriburi gravelly loam and the Kron sandy loam are usually from 10 to 40 inches thick over bedrock. Many slopes have less than six inches of soil depth.

Because soils throughout the Reserve are relatively shallow and not rich in nutrients, they are limited in their ability to support plant life. Soil depth is especially important for species that have deeper roots, require abundant soil for anchoring, and need more moisture in the soil to survive. Shallow soils contribute to the volume of eucalyptus that fall in the Reserve. Many native plant species are well adapted to the shallow, poor soils of the Reserve (with other natural conditions such as ample sunlight). The summit was scraped of most of its soil in the mid-1960s and consequently may be the most challenging in sustaining new plant growth.

Aside from the summit area, steep slopes in excess of 25% grade characterize the site (see *Figure 4: Slopes*). In fact, over 60% of the Reserve has slopes in excess of 30%, as displayed in the chart entitled *Slope Characterization*. In general, shallower soils are on steeper slopes. Soils on steeper slopes are more vulnerable to slope failure and surface erosion, especially where exposed when vegetation is removed. Because of the generally steep terrain and UCSF policies, most of the site is not accessible to vehicles.

A two-acre clearing occupies the summit and is the only relatively level area in the Reserve. The clearing's location at the summit of Mount Sutro makes it a natural destination for hikers. Its open character provides a striking contrast to and respite



This 12 year old photo shows the more open character of the vegetation before ivy and eucalyptus invaded. Notice the steep slopes that characterize the site.



from the shaded, wooded interior of the Reserve. The microclimate of the clearing is particularly suitable for passive and informal outdoor recreation (i.e., no facilities), as the site is protected from prevailing winds by surrounding trees and captures sunlight throughout the day.



Summit clearing after removal of invasive broom in 2000.

Vegetation

With the exception of the summit clearing, the Reserve is covered by a dense stand of trees, most of which were planted 115 years ago. The forest is dominated (82%) by blue gum eucalyptus (*Eucalyptus globulus*). The other tree species are Monterey pine (*Pinus radiata*), Monterey cypress (*Cupressus macrocarpa*), blackwood acacia (*Acacia melanoxylon*), coast redwood (*Sequoia sempervirens*), plum (*Prunus domestica*), cherry



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Redwood and acacia along Johnstone Drive.

(*Prunus spp.*), and Bailey's acacia (*Acacia baileyana*). Most trees are less than 12 inches in diameter. It is estimated that there are approximately 45,000 or more trees in the Reserve, most of which are very young, small trees.

The summit clearing was dominated by non-native French broom (*Genista monspessulana*) until it was removed in the summer of 2000. A small area of Himalayan blackberry (*Rubus discolor*) remains on the north side of the summit, as does native blackberry and California reed grass (*Calamagrostis nutkaensis*).

The forest understory is composed mainly of the following shrubs: Himalayan blackberry, California blackberry (*Rubus ursinus*), elderberry (*Sambucus spp.*), French broom, snowberry (*Symphorio-carpus albus*), holly (*Ilex spp.*), myoporum (*Myoporum lactum*), toyon (*Heteromeles arbutifolia*), cotoneaster (*Cotoneaster lacteus*),



Dense understory is dominated by blackberry.

Victorian box (*Pittosporum undulatum*), and currant (*Ribus spp*.). The most common groundcovers include: English ivy (*Hedera helix*), poison oak (*Toxicodendron diversilobum*), fern (*Polystichum spp*.), and vetch (*Vicia spp*.). In all, 93 species of plants have been identified on Mount Sutro, with most of the diversity created by herbaceous perennials that grow low to the ground.

Only remnant patches of native plants remain on Mount Sutro, including 40 species native to California. Of these, eleven are woody (versus herbaceaous) plants, eight of which may be indigenous to the site: California sagebrush (*Artemisia californica*), madrone (*Arbutus menziesii*), coyote bush (*Baccharis pilularis*), poison oak, coast live oak (*Quercus agrifolia*), elderberry, California blackberry, and coast redwood. Monterey pine and Monterey cypress, while native to California, were unlikely part of the pre-1880s vegetation (UCSF 1999).

The greatest concentration of native plants, aside



Limited remaining areas of native plants.

from the poison oak, sword fern, and elderberry distributed throughout the site, are located in four distinct areas on Mount Sutro. There are areas of coastal terrace communities encircling the Chancellor's residence and at the north edge of the summit clearing. Another native plant community consisting of several species of ferns is located in the northwest area of the Reserve on a north-facing embankment along lower Medical Center Way. Very small populations of California sagebrush and coyote bush are found in the summit clearing. In order to restore these areas, nearby eucalyptus would have to be removed and full sunlight provided.

Forest Health

The regeneration and spread of blue gum eucalyptus has been prolific in recent years because the trees are very adaptable to the conditions of the site, they re-sprout vigorously, and they suppress the growth



Coyote bush.



Elderberry.



Leather fern on rock outcrop.

of other plant species. The oils in the foliage and bark inhibit the seed germination and early plant growth of many other plants. Currently, the general condition of the Reserve's trees is only fair to good, but the prevalent small trees throughout the forest are generally in worse condition than the large trees that dominate the forest canopy, as determined by HortScience. The overall condition of eucalyptus saplings was assessed as poor, and most of the standing dead trees observed by HortScience were less than six inches in diameter. The regeneration and recruitment of eucalyptus into the forest canopy is now quite limited, and little regeneration is occurring even when trees fall and create gaps in the canopy. The rampant growth of English ivy, Himalayan blackberry and other invasive exotic species further impedes regeneration. Ivy threatens not only young trees, but also mature trees and other vegetation. Without healthy regeneration through proactive management, the forest will continue to decline, and may eventually be overtaken by the invasive understory of shrubs and ivies. Remnant native plant communities also will disappear.

As with any monocultural (i.e., single species) forest, the trees of the Reserve are particularly prone to widespread disease and wildfire. Their vulnerability will increase as more trees become stressed from greater competition with one another and as more die. The denser and more stressed the trees become, the more they are susceptible to infestation by pests such as the long-horned borer (*Phoracantha spp.*), a relatively new pest to the Bay Area, the snout beetle (*Gonipterus scutellatus*), and the red gum



Invasive ivy understory climbs eucalyptus trunks and robs trees of essential sunlight.



Sparse canopy indicates unhealthy forest.

lerp psyllid (*Glycaspis brimblecombei*), all of which defoliate eucalyptus trees.

In addition, wildfire spreads more rapidly in a diseased forest than a healthy one. Compared to redwood, cypress, coast live oak and most other tree species, eucalyptus are considered more hazardous because their oils are conducive to fire ignition, their curly strips of lightweight bark and leaves can carry sparks considerable distances (i.e., miles), and they create excessive debris (i.e., fuel load) on the forest floor. In addition, the dense forest of the Reserve will burn more quickly and intensely than one where trees are more spread out. The vines growing up the trunks act as "fuel ladders," and will send a ground-level wildfire up into the tree canopy where it will spread more rapidly. French broom, another invasive shrub found in the forest, is also considered to be a high fire hazard species.

At least three fires have been documented in the forest. The last one occurred in 1999 and was started by a campfire that UCSF staff spotted soon after it began to spread. The UCSF Campus Fire Marshal (Katie Shyppert) is "very concerned" that a future wildfire will spread rapidly to nearby houses. In the event of a wildfire in the Reserve, which would likely go immediately to a second alarm fire (according to Captain Li of the San Francisco Fire Department [SFFD]), both Station 12 (at Stanyan and Parnassus Avenues) and Station 20 (near the elementary school on Clarendon Avenue) would respond. If it increased to a third alarm fire, Station 5 (at Turk and Webster Streets) would also respond.



Young saplings are excessively dense and compete for sunlight.

The SFFD has not prepared a fire load management plan for its neighboring parcel, but recognizes that the eucalyptus pose a relatively higher fire hazard than other species, and that the forest is excessively dense.



Shaggy eucalyptus bark increases fire potential, even in healthy trees such as these.



Falling trees have damaged property, such as this car in the Woods parking area.



Uprooted trees throughout the forest.

The primary vegetation issues are:

- Young trees compete for sunlight and nutrients and are dying throughout the forest.
- English ivy on tree trunks overloads and shades out trees, especially mature ones.
- Heavy accumulation of forest debris is fuel for wildfires.
- Hazardous leaning trees and heavy lateral branches could fall.

To improve the health of the forest and minimize its vulnerability to disease and wildfire, the forest should be thinned. Thinning will reduce competition and discourage disease and mortality, promote the vigorous growth and health of the remaining trees, and minimize wildfire hazards. The removal of the non-native understory and ivies will also help achieve these objectives. In addition, different tree species should be introduced to the forest to create greater biodiversity and uneven aged stands to ensure a healthier forest over time.

Wildlife

There is little wildlife and species diversity in the Reserve. Skunks, raccoons, and possums, as well as red-tail and red-shoulder hawks and other birds, have been documented. Many factors limit wildlife on Mount Sutro, including the Reserve's isolation in an urban environment, dominant eucalyptus forest, lack of native plant habitat, lack of diversity of plant species, limited openings in the forest, and extensive cover of invasive understory plants. The songbird population is limited due to predation by feral cats and the lack of food species, particularly native shrubs.

Habitat conditions on the Reserve could be improved to provide more suitable food and refuge for birds, butterflies, and other small species by removing eucalyptus competition, planting appropriate native species, providing more sunlit clearings, and managing predators. Potential bird species that could be attracted with suitable vegetation include: Allen's hummingbird, Anna's hummingbird, Bushtit, Bewick's wren, Chestnut-backed chickadee, Downy woodpecker, Hairy woodpecker, Hutton's vireo, Orange-crowned warbler, Pacific-slope flycatcher, Spotted towhee, California towhee, White crowned sparrow, Golden crowned kinglet, and Dark eyed junco.



The bushtit is attracted to coastal scrub and oak woodland plant communities.

Cultural Conditions

This section describes existing cultural conditions that influence management of the Reserve's vegetation and other resources. See *Figure 5: Cultural Factors* for the diagrammatic location of each of these factors.

Areas of Special Interest

Ishi's cave

Ishi was the name given to the lone survivor of the northern California tribe of Yahi Indians. Ishi gained notoriety in 1911, at about age 50 after spending the previous three years alone in the foothills surrounding Mount Lassen. Prior to 1908, Ishi had been hiding in the wilderness with the four other remaining Yahi Indians and lived a purely Native American existence without western influence. After his surrender, Ishi was held at the Oroville jail, where other Native Americans were brought to communicate with him, but Ishi spoke a unique language unknown to them. Thomas Waterman, an anthropologist from Berkeley, was finally able to communicate with Ishi using a somewhat similar Yana language. Ishi was brought to the Anthropology Museum on the UCSF Parnassus campus where he lived for the next four years. Anthropologists interviewed and observed Ishi closely to learn about Native American belief systems, lifestyles, and reactions to western culture. Ishi was dubbed "the last wild Indian in North America" and became famous before dying of tuberculosis in 1916.

Two sites within the Reserve traditionally are associated with Ishi. One is a large rock formation creating an overhang located on the south side of the Chancellor's residence. Perhaps the more historically significant site is the "cave" believed to be frequented by Ishi, located along a trail to the northeast of the Chancellor's residence. The public has expressed interest in protecting these sites and having interpretive information.

Rock outcrops

As discussed in the previous section, rock outcrops of the underlying Franciscan formation chert are found on Mount Sutro. These sites are popular among hikers and serve as frequent destination points. Efforts are required to keep them free of low-growing non-native vegetation and invasive tree roots. Ishi is supposed to have visited many of these sites.

Views

Views to Mount Sutro

The visual and aesthetic appearance of the densely forested mountain as seen from the campus, the surrounding neighborhoods, and cities as far away as the East Bay, is of significant importance to the public. Mount Sutro provides a dense visual backdrop of green to the encircling urban development, and the public has expressed interest in maintaining it. The forest screens the campus buildings from the surrounding neighborhoods and conceals the Aldea housing complex. It also helps to mitigate noise generated on campus. Any removal of trees must be sensitive to these concerns.



View from the Presidio at Arguello.



View from Golden Gate Park.



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Views from Mount Sutro

As a high summit located in San Francisco, Mount Sutro has great potential for panoramic views encompassing downtown San Francisco, the Pacific Ocean, San Francisco Bay, Golden Gate Park, the Golden Gate Bridge, and points to the east. The dense forest vegetation generally limits most of the views that would otherwise be seen from the Reserve. Some notable views are visible from the Chancellor's residence (not accessible to the public) and from the Woods parking lot. The potential exists for more views along some of the trails, with the removal of selected trees.

Interface with Campus Facilities

Aldea San Miguel Student Family Housing Development (Aldea) – Aldea contains student apartments and is located at the south end of the Reserve. It includes 14 buildings, as well as



View to downtown San Francisco.



View to the Marin Headlands from near the Chancellor's residence.

associated parking lots and support facilities. Aldea is surrounded on three sides by eucalyptus forest, and has mature eucalyptus trees within the complex. Landscaping is currently being installed, which includes native plants in response to community interest and compatibility with Reserve planning principles. In the past, trees and large branches have fallen on some of the buildings and cars parked in the lots. While many of the more hazardous trees were removed when the apartments were rebuilt, remaining trees continue to pose hazards. In addition, the spread of wildfire is a concern to UCSF and residents.

Chancellor's Residence – The Chancellor's residence is on a knoll in the northeast part of the Reserve near Aldea. Trail access points lead in two directions from the end of the driveway. One trail leads down to Belgrave Avenue and the other parallels Medical Center Way to the Surge/Woods area. The partially cleared knoll provides limited views of the city and is attractive to visitors. The loop trail below the residence is also popular. Conflict between public and private use, and security overall, is a concern to UCSF.

Surge, Woods, and EH&S Facilities – These are UCSF-owned buildings and parking lots within the Reserve. The LRDP calls for their eventual removal but, until then, susceptibility to fire and falling trees remains a concern.

Parnassus Heights Campus – The core of the Parnassus Heights campus is north of the Reserve. It currently has limited access to the Reserve via two steep stairways. One stairway leads to the Surge parking lot. The other connects to lower Medical Center Way, which is considered dangerous to pedestrians because there is no sidewalk or trail, the road is quite narrow, and blind curves block the views of on-coming drivers.

Neighborhood Interface

Edge Conditions

Members of the community living on the edges of the Reserve have expressed concerns about the following issues:



Residential edge - east.



Residential edge - west.

Safety – Safety for people, houses, and cars was a primary concern expressed at the community meetings and by PCAT members. Issues related to safety included the following:

- Hazardous trees: heavy lateral branches can drop and trees have been blown over. Trees are weakened by climbing vines and some are reaching full maturity.
- Fire danger from high fuel loading due to dense understory and climbing vines creating vertical fuel ladders. If a fire were to break out in the forest, the dense vegetation on the edges could send flying embers and carry a wildfire into the residential neighborhoods. Similarly, a residential fire could spread into the forest.
- Overgrown trails have limited visibility, and user safety is an issue.
- Limited night visibility contributes to a perceived crime potential.

- Poison oak and blackberry are annoyances to passersby.
- Steep slopes can be unstable and some trails are unsafe (rockfalls, erosion, and inaccessibility); and
- Illegal camping (including campfires) is a nuisance to neighbors and a potential hazard.

Additional concerns and interests expressed by some of those attending the PCAT meetings included:

Visual Changes – Concern about the loss of the forest appearance from any thinning as well as the visibility of potential forest "cutblocks" on Mount Sutro slopes.

Neighborhood Privacy – Concern that improved trails would attract a larger number of visitors who would impinge on the privacy of residents.

Trail Access – Interest in additional access and the removal of overgrown vegetation on the trails.

Parking – Concern about UCSF improving trails and/ or promoting trail use, including providing public parking.

Leaf Litter – Concern about excessive leaf and branch litter accumulating on homes and cars.

Invasive Vegetation – Concern that invasive, exotic species (such as ivy) may continue to spread into the Reserve if adjacent homeowners are not aware of the continued potential impact of planting such exotics.

Modified Weather – Concern that eucalyptus vegetation shades neighborhoods and causes additonal localized fog drip, and that excessive forest removal could cause undesirable microclimatic changes.

Adjacent Land Use

City and County of San Francisco Property

The City owns the property to the east of the site, which lies just below the Chancellor's residence. The parcel is dominated by eucalyptus at a density that is generally higher than in the Reserve, and of similar questionable health. These factors, combined with direct exposure to hot, dry, northeast autumn winds and surrounding urban development suggest that it is at a high risk for wildfire and poses a direct threat to the Reserve.

The parcel is in the Interior Park Belt of the City's Natural Areas Program. This program prioritizes open space parcels within the City for resource management funding. This particular parcel has a 'C' rating, which places it at the bottom of the list because of its small size and degraded native habitat. It would be beneficial to both the City and UCSF if the City were to raise the parcel's priority for management. Both parties could help each other qualify for matching funds and coordinate management activities. Fostering this potential partnership is an important opportunity for the Reserve.

Two trails into the Reserve originate on this parcel, but UCSF has no maintenance authority over these trail segments.

Private Property

Westlake Development and Holson, Inc., each own a parcel on the west side of the Reserve. One of the parcels is surrounded by the Reserve on three sides. The properties are steep and are zoned for multi-family residential development. A proposal to develop one of the parcels has been submitted to the City. The status of that proposal is not known. Vegetation management on the private parcels is subject to the owner's discretion. One of the Reserve's trails crosses this property, but UCSF has no maintenance authority over this segment.

TRAILS

In the 1970s when trails in the Reserve were first informally mapped, there was a fairly extensive unimproved dirt trail system. Trails were maintained by UCSF until several years ago when maintenance funding became unavailable. Since then, a number of trails have become overgrown with poison oak, blackberry, and other low-growing plants and littered with forest debris including fallen trees, rendering passage difficult. Beginning in 1999, UCSF renewed trail maintenance efforts on most of the trails. At present, there are two main trail systems that wind their way through the Reserve (see *Figure 6: Existing Trails*). The lower trail network connects the main UCSF Parnassus campus with Aldea housing, Farnsworth Lane, Edgewood Avenue, Belgrave Avenue, Crestmont Drive, and Fifth Avenue, all below the elevation of Medical Center Way. These heavily used trails include a portion of the Medical Center Way roadway and the Surge parking area. The upper trail network includes trails to the summit of Mount Sutro from the Aldea housing complex and from Medical Center Way. The Nike Road trail between the summit and Aldea is a narrow paved road closed to vehicular use.



Nike Road trail to the summit.

The Mount Sutro trails are used primarily by local residents. There is no public parking, signage, or other development at the trail access points and no publicly available maps to guide hikers.

UCSF has no maintenance authority over three trail segments. The trail from Medical Center Way to Crestmont Drive (at the northwest edge of the Reserve) crosses private property to the west. The lower segment of the Ishi Trail (at the end of Edgewood Avenue) and the trail between Johnstone Drive and Belgrave Avenue pass through property under the jurisdiction of the City and County of San Francisco.

The trails vary considerably in quality. Some are well traveled while others are steep, narrow, and




Uncleared trail.

overgrown. Trees and branches occasionally fall onto trails throughout the Reserve, posing risks to hikers and blocking access. Poison oak and blackberries growing near the trails are hazardous for hikers and children who cannot identify these plants. Dense, low growing vegetation reduces the sight lines of hikers and increases safety concerns.

Several concerns and interests regarding trail development came out of the community discussions at the PCAT:

- 1. Improve the trail system to ensure safety and accessibility.
- 2. Create a more complete trail network with connections between key points of access.
- 3. Minimize impacts to neighbors if trails are improved.
- 4. Protect existing native species during trail development, maintenance, and ongoing trail use.
- 5. Avoid trails through the Aldea area to ensure greater privacy and security for the residents.
- 6. Ensure privacy and security at Chancellor's residence.
- 7. Create some access for those with disabilities per the Americans with Disabilities Act.
- 7. Close and obliterate certain segments to prevent erosion, protect sensitive habitat, and reduce trail steepness.

The Bay Area Ridge Trail is proposed to pass approximately a quarter of a mile from the southeast corner of the Reserve but is not directly connected to the Reserve. Bay Area Ridge Trail users could use Mount Sutro trails if they were improved by:



Cleared trail.

1) new trail segment development and strategic connections to create better linkages; 2) improved signage with maps and trail descriptions; and 3) regular maintenance, including clearing vegetation and debris, leveling the ground, and diverting runoff in steeper sections.

Surrounding neighborhood residents and UCSF students, faculty, and staff would also benefit from improved trails. These benefits could help strengthen the relationship between UCSF and the community and likely foster cooperative trail maintenance efforts. In addition, trail development offers the opportunity for discrete signs regarding education about native plants and other aspects of the management plan.

SUMMARY

The existing conditions, issues or actions to be undertaken, and opportunities or benefits of the actions discussed above have been summarized relative to the PCAT planning principles in *Table 5: Resource Management Matrix*, which forms the basis for the management program described in the following chapter.

Planning Principles	Existing Conditions	Issues/Actions	Benefits			
1. Ensure public safety and property protection.	 Wildfire hazard. Falling trees and limbs. Perceived crime risk. 	 Address neighborhood concerns. Minimize use of herbicides. Manage the forest for improved safety 	 Responds to public concern by removing hazards near neighborhoods and in public access areas. Reduces wind-fall and fire hazards (open views). 			
2. Improve the health of the forest.	 Dominant eucalyptus near end of lifespan. Low forest regeneration and tree diversity. Invasive vines threaten mature trees and other plants. 	 Thin trees. Control invasive understory. Promote forest regeneration. Careful tree preservation and removal. 	 Improves regeneration of trees. Slows the decline of maturing trees. 			
3. Protect and expand native plants.	 Native plants only in isolated locations. Dominant non-native eucalyptus with invasive understory of broom, blackberry, and ivy Little available habitat for native plant species. 	 Protect and restore native plant communities where possible. Reduce dominance of invasive species and ornamental vegetation from adjacent neighborhoods. Coordinate management of adjacent City-owned land. 	 Protects existing native plant communities. Expands are and diversity of native species. 			
4. Enhance wildlife habitat values.	 Low native biodiversity and limited wildlife value. Few small forest clearings (limited sunlight to forest floor). 	 Preserve existing trees and understory with wildlife value. Improve biodiversity using native plants. Carefully preserve and remove trees. Retain snags for nesting. 	 Enhances wildlife habitat. Restores existing native plant communities constrained by invasive plant species. Provides forest clearings for sunlight penetration and species diversity. 			
5. Maintain scenic quality.	 Eucalyptus obstructs neighbors' views but forms forest character. 	 Retain forest canopy and character. Selectively remove trees. 	 Improves views (as an indirect action). 			
6. Improve public access.	 Incomplete and unmanaged trail system. 	 Improve trail system. Protect special natural and cultural resources. Minimize impacts on neighbors. Consider amenities. Maintain existing trails. 	 Improves existing trails. Improves hiking experience with minor trail additions. 			
7. Implement resource management plan.	 No existing resource management plan. 	 Develop management plan and implement it over time. Provide funding for management. Develop partnerships and volunteer opportunities. Utilize adaptive management practices. 	 Cooperate and increase funding opportunities. Demonstrate effectiveness through initial management actions. 			

MANAGEMENT ACTION PROGRAM

INTRODUCTION

Public input and the natural and cultural resource conditions, issues, and opportunities described in the previous chapters, along with the PCAT's planning principles (presented in *Table 1*) guided the development of the Plan and the management actions contained in it.

The management actions evolved over the past year through an iterative process involving community feedback and are designed to respond to the expressed interests and concerns of the community. The actions meet all of the stated goals of the PCAT (see *Table 6: PCAT Planning Principles and Corresponding Management Actions*), and based on public input are believed to be generally supported by the community at large. The resulting management actions are described below.

Phase I Ten-Year Management Plan

The Management Plan for the Reserve is focused on the first ten years of pro-active UCSF management. The primary reason why this shortterm strategy was adopted is because the community members involved in the planning process did not support a long-term management plan until some management actions had been implemented in small, relatively unseen demonstration areas of the forest. With time they will be able to see the effects of the management actions. Pending the outcome, the community would feel more comfortable supporting application of the actions to additional areas of the Reserve.

The short-term strategy also is consistent with UCSF's need to phase in the Plan because of financial constraints.

Pl	anning Principles	Management Action Types								
		Hazardous Tree Removal	Eucalyptus Thinning	Conversion Planting	Native Plant Enhancement	Trail Improvements	Plan Preparation			
1.	Ensure public safety and property protection.	*	*	*						
2.	Improve the health of the forest.	*	*	*	*					
3.	Protect and expand native plants.		*	*	*					
4.	Enhance wildlife habitat values.		*	*	*					
5.	Maintain scenic quality.		*							
6.	Improve public access.					*				
7.	Implement resource management plan.	*	*	*	*	*	*			

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Table 6: PCAT Planning Principles and Corresponding Management Actions

In response to the preceding, the planning team has developed a detailed Phase I plan and will delay a definitive long-term plan. It is acknowledged that lessons will be learned in the process of implementing the Phase I actions and that both physical conditions and public sentiment could change significantly after another decade.

Ten years was determined to be a reasonable minimum amount of time needed to assess management actions for application elsewhere in the Reserve. While ten years was selected as the Phase I timeframe, this period of time may get extended depending on the availability and timing of funding, level of volunteer efforts, and potential for partnering with interested local organizations and agencies.

Although the Plan addresses the first ten years, it also includes a long-term management vision extending beyond the initial phase. The planning team believes it is important to have such a vision, or generally defined plan, in order to give direction to the Phase I plan since the purpose of the demonstration areas, discussed below, is to illustrate what can be done at a larger scale in the future.

MANAGEMENT PRIORITIES

Setting priorities helped the planning team identify the relative importance of individual management actions and spread costs relatively evenly throughout the ten-year period. As the planning team discussed priorities, it became clear that they clustered into three levels of priority, as illustrated in *Figure 7: Ten Year Management Priorities*. Priority 1 areas are shown in yellow; Priority 2 areas in green, and Priority 3 areas in brown.

Priority 1 Areas

At the top of the list of management priorities is safety. Many residents living adjacent to the Reserve have expressed concern about trees leaning toward their houses or branches threatening to fall on yards and parked cars. Since UCSF had already removed numerous hazardous trees and branches near the Edgewood properties along the northeast side of the Reserve, the first priority responds to residents on Crestmont and Christopher Drives near the southwest end of the Reserve.

A survey completed in 1997 resulted in the identification and tagging of a number of hazardous trees and branches along Medical Center Way from the Parnassus Avenue upslope to the Aldea housing complex. In the summer of 2000, 17 of these trees were removed, but another 77 tagged trees still need to be felled, along with hazardous branches on additional trees. The lower portion of Medical Center Way, where most of the hazardous trees are concentrated, is also assigned first priority. The third area to be given first priority is the summit clearing where broom and other invasive non-native shrubs were removed in the summer of 2000. While public safety is not a priority issue in this area, for years, native plant advocates have asked UCSF to restore the summit clearing to its original native coastal scrub plant community. In response, UCSF sets a priority on completing that work and clearing the Himalayan blackberry remaining at the summit.

Priority 2 Areas

Continued removal of hazards around UCSF's buildings in the northeast area of the forest are given second priority. Management actions that achieve other goals, such as diversifying the forest ecology with other tree species and improving the forest health through thinning, are included in priority two since it will be a number of years before their success can be evaluated. The south ridge is selected for these management actions because of its accessibility and low visibility from outside the Reserve, and because the spread of a wildfire in the forest would pose the greatest threat to the surrounding residential neighborhoods.

Priority 3 Areas

Before the end of Phase I, the safety work along upper Medical Center Way and around the remaining UCSF buildings in the forest is expected to be completed. Also, additional tree species could be introduced in the central/eastern area of the Reserve and given some time to grow before evaluating the potential for converting other parts of the forest to these species.



The management priority areas are as follows:

PRIORITY 1

	Area A	Crestmont-Christopher Hazardous Tree Removal
	Area B	Aldea Screen Planting
	Area C	Summit Blackberry Removal &
	Area D	Demonstration Planting Summit Coastal Scrub Demonstration
		Planting
	Area E	Summit Needle Grass Enhancement
	Area F	Buckeye, Toyone, Madrone Demonstration Planting
	Area G	Lower Medical Center Way Hazardous Tree Removal
	Area H	Coastal Terrace Native Plant Enhancement
	Trails	New Trail Connections
PR	RIORITY 2	
	Area I	Edgewood, Surge Hazardous Tree Removal
	Area J	Cypress Windbreak Demonstration Planting
	Area K	Oak Woodland Demonstration Planting
	Area L	Eucalyptus Thinning Demonstration
PR	RIORITY 3	
	Area M	Upper Medical Center Way Hazardous Tree Removal
	Area N	Redwood Bowl Demonstration Planting
	Area O	Willow Bay Demonstration Planting
	Area P	Eucalyptus Thinning for Willow/Bay Corridor
	Area Q	Chancellor's Residence Hazardous Tree Removal
	Area R	Coastal Terrace Native Plant Enhancement
	Area S	East Aldea Hazardous Tree Removal

MANAGEMENT ACTIONS

The four types of vegetation management actions are proposed for the Reserve and represented in *Figure 8: Ten Year Management Actions*. As discussed above, they will be implemented sequentially. They are:

- 1) Hazardous Tree Removal (HTR);
- 2) Eucalyptus Thinning;
- 3) Conversion Planting; and
- 4) Native Plant Enhancement.

Ten-year trail management actions are described later.

The following sections define and clarify the approach to each management action presented on

Figure 8. The map and the description should be read together to fully understand the intent. Threedimensional modeling of certain management actions illustrates the visibility of the actions as viewed from the southeast (*Figures 9-12*). Each type of action is proposed to achieve one or more of the PCAT planning principles.

Hazardous Tree Removal

This action responds to the two following PCAT planning principles:

#1 – Ensure public safety and property protection.#2 – Improve the health of the forest.

There are six hazardous tree removal areas covering approximately 18 acres: Areas A, G, I, M, Q, and S (see *Figure 9: Hazardous Tree Removal Areas*). In these areas, individual trees and limbs will be evaluated to determine if any are hazardous or potentially hazardous, and should be removed. Hazardous trees are defined below. They will be identified by a Registerd Professional Forester and removed to reduce windfall and fire hazards. Removal of these trees is a high priority in order to minimize the chance of damage to property or loss of life.

Definition of Hazardous Trees

- Within falling distance of pavement and buildings (generally around 75 feet, depending on the height of the tree).
- Severely leaning, damaged, rotting, or dead.
- Have multiple trunks, poor branching structure, or heavy limbs.

For planning and cost estimating purposes, it has been estimated that a maximum of approximately 15 trees per acre are potentially hazardous, and may have to be removed. This figure is based on the number of trees per acre that have already been determined by HortScience as hazardous along Medical Center Way. In some areas, fewer trees may need to be removed, and vice versa.



Considering that there are an estimated 740 trees per acre (including very small trees) and approximately 280 trees per acre are over 12 inches in diameter, the removal of 15 trees per acre is relatively insignificant and will be unnoticeable to the public. Within the 18 acres in the Reserve in which hazardous trees will be removed, it is estimated that only about 270 trees will be lost. Trees that are planned for removal will be tagged 30 days in advance of the work and interested community members will be notified of the tags. Hazardous trees near the remnant native plant communities will be removed after the late spring-early summer timeframe to the extent possible in order to minimize damage to the native plants.

Hazardous trees will be cut at or near ground level. No stumps will be more than six inches from the ground. In general, small trees and branches will be chipped and placed in the area of removal. When possible, chips will not be spread around the identified native plant areas and other groupings of native plants. Some larger logs may be removed from the site. Where stumps can be reached with stump grinding equipment, they will be ground to prevent sprouting. Stump grinding will be used as the preferred option to eliminate eucalyptus sprouts.



Hazardous leaning and dying tree.



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In addition, exotic vines, such as ivy growing up tree trunks, will be cut, and invasive understory plants, such as French broom and Himalayan blackberry, will be removed within the immediate vicinity of the trees being cleared of vines. Vines accelerate tree mortality and act as fire ladders, which contribute to the rapid spread of wildfires from the ground into the tree canopy. Vines will be cut at the base of trees on which they are climbing and allowed to die in place. It is recommended that this work be done in the late autumn so that the dead leaves fall off during winter and do not create an additional fire hazard. If the cuts are made in the autumn, the stems will be removed during the following spring to the extent practicable. Phased removal of these exotic species will begin when hazardous tree removal occurs in these areas. In subsequent years, vines and invasive shrubs will continue to be systematically removed, depending on funding availability.

Stumps that are not accessible to stump grinding equipment will be painted with a non-spreading herbicide to ensure that sprouting will not occur. Spot use of herbicides will also be applied, if necessary, to vines cut at the base of trees. The herbicide will be repeatedly applied if vegetation re-growth is persistent. Roundup and Garlon 4 are the most recommended herbicides because of their short residual period and strength, and because they are inactivated immediately in the soil, which prevents them from moving through the soil to other plants. Herbicides will be applied only by licensed applicators according to State and County safety standards. A monitor from UCSF will be present to ensure that all safety precautions are followed. The public will be notified at least one week in advance of the work via posted flyers in the area where the work will be performed.

Eucalyptus Thinning

This action responds to the following PCAT planning principles:

- #1 Ensure public safety and property protection.
- #2 Improve the health of the forest.
- #3 Protect and expand native plants.
- #4 Enhance wildlife habitat values.
- #5 Maintain scenic quality.

The eucalyptus forest will be thinned to reduce tree density in two demonstration areas (Areas L and P in *Figure 10: Eucalyptus Thinning Demonstration Areas*), totaling 2.5 acres. Forest thinning in the approximately two-acre Area L in the South Ridge area of the Reserve will serve as the primary





Eucalyptus stand before thinning (example site on Mount Sutro).

demonstration area for this particular type of management action. Thinning will allow remaining trees to thrive, since there will be less competition for soil nutrients, moisture, and sunlight. This management action will support the creation of glades where sunlight will be able to penetrate the forest floor and nurture herbaceous plants and grasses that look attractive and provide habitat for butterflies, birds, and other wildlife, including insects upon which these animals feed.

Thinning to a more natural density will help avert the invasion of pests (the long-horned borer, snout beatles, and red gum lerp psyllids), which are beginning to kill eucalyptus in the Bay Area and leave them more susceptible to fire. Thinning will also lower the overall wildfire fuel load in the forest, and will slow the spread of a wildfire because the tree canopy will be less dense.



Eucalyptus stand after thinning (example site in San Rafael).

For all of these reasons, eucalyptus thinning is the most important management action that can be taken. It is hoped that the community will come to appreciate the benefits of this type of management action so it can be applied to the rest of the Reserve in the long term.

Area L is not as steep as most other areas of the Reserve and, therefore, is more accessible to mechanical equipment. Also, the tree density may actually be slightly less than in other areas. Currently, there is considerable variation in tree density and size throughout the forest but all of the forest is dense. Access is difficult, but not impossible, in most of the Reserve. Therefore, a variety of techniques will be used in Area L, since different techniques will be applicable to different areas of the forest. Interested members of the community will be informed of the work before it is done, should they want to observe the work in progress from a safe distance. Thinning in the approximately half-acre Area P along the south side of Area O where new trees will be planted is intended to: 1) reduce the shade that would otherwise be cast on Area O so the new trees will have a greater rate of survival; and 2) provide a feathered (or uneven) edge to Area O so it appears more natural when the eucalyptus are replaced with the new plantings in Area O.

Large trees will be retained to maintain a sparse forest canopy, along with other trees of varying sizes to optimize age diversity. The spacing for large, healthy eucalyptus is targeted to be approximately 25 to 35 feet apart. Closer spacing for smaller trees will be acceptable in some areas, while other areas may have small clearings. Native trees and understory shrubs, such as elderberry, will be protected. Eucalyptus trees and non-native brush, vines, and debris will be removed mechanically, chipped in place, and spread throughout the site.

Not many eucalyptus trees over ten inches in diameter are likely to be removed as part of the thinning management action. Because the stumps of trees larger than this cannot be ground with equipment, herbicides will be painted on the stumps of any large trees that are cut, as described above for hazardous tree areas.

Conversion Planting

This action responds to the following PCAT planning principles:

- #1 Ensure public safety and property protection.
- #2 Improve the health of the forest.
- #3 Protect and expand native plants.
- # 4 Enhance wildlife habitat values.

Management Area	Plant Community	Suitable Conditions	Location	Benefits	Risks/Impacts			
Throughout	Blue gum eucalyptus	Coastal climate, variable soils	Throughout the Reserve	Already exists, aesthetically appealing	Suppresses other vegetation; can be a fire hazard			
C, D	Coastal scrub/ grasslands mix	Sunny spots, dry soils, wind-tolerant	South and some east slopes, summit	Diverse, good wildlife habitat	Susceptible to eucalyptus toxicity; greater visual change			
F	California buckeye/ Madrone/ Toyon mix	Full sun, well-drained soils	Dry, sunny slopes	Good wildlife habitat if healthy	May not be suitable due to fog; potential lack of availability of madrone for planting; dependent on native fungi			
B, J	Monterey cypress	Wind- tolerant	North and west slopes	Windbreak; adds diversity	Dense shade limits understory growth; subject to heart-rot			
К	Coast live oak mix	Full sun, moist soil	South and east slopes	Aesthetically pleasing; allows understory; wildlife habitat	Site may be too cool and foggy; potential disease problem (sudden oak death)			
N	Coast redwood	High moisture, shelter from wind, shade tolerant	Primarily on north and east slopes	Fast-growing, aesthetic, fire resistant	Dense shade limits understory growth; not wind resistant			
0	California bay/willow mix	High moisture, shelter from wind	Drainage bottoms on east and north sides	Bird habitat and connections to coastal scrub	Limited suitable conditions			

Table 7: Proposed Plant Communities

Eight demonstration areas totaling 7.6 acres will be converted from eucalyptus to other appropriate tree and shrub species, as listed in *Table 7: Proposed Plant Communities*. The existing resource conditions and community input were used to identify the desirable plant communities and their locations. The areas were chosen for their suitability in terms of microclimates and soil depth. All the plants selected are native to the San Francisco peninsula with the exception of Monterey cypress, which will occupy 1.3 acres as a windbreak to protect other native plantings. Plant species were also chosen to enhance wildlife habitat and visual experiences for hikers. Interested community members will be consulted to help develop detailed planting plans.

The eight conversion planting sites (Areas B, C, D, F, J, K, N, and O in *Figure 11: Conversion Planting Demonstration Areas)* occur in three general areas:

 Summit – Coastal scrub and grasses in the clearing and California buckeye, madrone, and toyon around the southern perimeter (Areas C, D, and F).

- South Ridge Monterey cypress and mixed coast live oak woodland (Areas B, J, and K).
- East Bowl/Corridor Coast redwood and willow/California bay (Areas N and O).

With the exception of the coastal scrub areas that will be planted only with shrubs, forbs, grasses, and a few trees, each conversion planting area will be dominated by the tree species specified. In addition, all conversion planting areas will be planted with a variety of native shrubs, some of which are listed in *Table 8: Recommendations for Wildlife Habitat,* along with recommendations for improving wildlife habitat. *Table 8* lists the dominant trees and the understory shrubs that are most appropriate for the conditions of the recommended conversion planting areas. It also lists some of the potential wildlife species that could be attracted to the specific vegetation of each of the recommended plant communities.

The mixed oak woodland demonstration area (Area K) will be planted with coast live oak and a mix of buckeye, toyon, madrone, and bay. One of the risks of coast live oak woodlands is the recent spread of sudden oak death (SOD) syndrome. The spacing



Table 8: Recommendations for Wildlife Habitat

- Birds are more likely to benefit from wildlife habitat improvements than mammals, reptiles, or amphibians because of their increased mobility and ability to use a greater area as habitat.
- Redwood forest typically has low wildlife diversity, while the other habitat types are more "valuable" and expected to be relatively similar in the diversity of their associated wildlife species. Diversity in redwoods can be increased by leaving openings in the forest, which are large enough to allow sunlight to penetrate to the forest floor. Understory vegetation diversity can be encouraged in these areas.
- Create openings in redwood and eucalyptus forested areas to enhance understory vegetation and increase wildlife value.
- Leave snags and logs to enhance wildlife value since snags provide nest sites for cavity nesting birds, such as woodpeckers and chickadees, while insects associated with decomposing logs can be an important food source for birds and other wildlife.
- Develop a program to monitor populations of nuisance wildlife species (e.g., skunks, raccoons, feral cats), since habitat enhancement may also increase these populations. If substantial increases are noted, develop and implement appropriate management guidelines before the populations get out of hand.
- Many of the birds that will benefit are relatively urban species (e.g. American robin, western scrub jay, European starling, Brewer's blackbird, and house finch) but understory vegetation enhancement is intended to attract the following species:

Coastal Scrub Coyote brush California sagebrush Salal Monkeyflower California blackberry Black Huckleberry Wood rose

Potential Wildlife Allen's hummingbird Bushtit Bewick's wren Orange-crowned warbler Spotted towhee

California towhee White-crowned sparrow Buckeye/ Bay/Madrone/ Toyon Hollyleaf cherry Red elderberry Coast silktassel Tanoak (full sun)

Potential Wildlife

Anna's hummingbird Downy woodpecker Hairy woodpecker Chestnut-backed chickadee Bushtit Hutton's vireo Warbling Vireo Orange-crowned warbler Dark-eyed junco **Oak Woodland** California blackberry California coffeeberry Common snowberry Hairyleaf ceanothus

Potential Wildlife

Bushtit Hutton's vireo Bewick's wren Orange-crowned warbler Spotted towhee California towhee Redwood Forest Black huckleberry Little Oregon-grape Salal Tanoak (near openings)

Potential Wildlife

Pacific-slope flycatcher Chestnut-backed chickadee Golden-crowned kinglet Dark-eyed junco

of the oaks will need to be sufficiently wide to allow for good air circulation since dead air pockets appear to be a factor in SOD, although the disease is not well understood and is currently being researched. Other oak species would not be appropriate for the particular conditions on Mount Sutro.

Conversion of the willow/bay area (Area O) will need to be sensitive to the co-existence of different species of native vegetation such as elderberry, ferns, and other shrubs and herbaceous plants.

The summit, which was cleared of much of its topsoil by the Department of Defense in the mid-1960s and was recently covered with approximately six inches of eucalyptus chips, may not be able to support coastal scrub vegetation without the addition of more topsoil. This condition will have to be more carefully evaluated before planting.

Area B is not technically a conversion planting area because the vegetation will not be cleared and replanted with nursery stock. However, Area B will be planted and eucalyptus trees eventually will be removed when the new trees have become large enough to partially screen the Aldea parking lot and apartment buildings from Clarendon Avenue. Large Monterey cypress and native shrubs will be planted along this strip. As part of the Aldea landscaping project, irrigation will be installed and maintained in support of this vegetative screen.



Scalloped edged eucalyptus thinning and conversion planting.

Native trees, shrubs, and herbaceous plants within conversion planting areas will be identified with brightly colored flags, so they can be easily seen prior to any eucalyptus removal. The scattered large eucalyptus trees to be saved will also be flagged for protection. The edges of the remaining eucalyptus forest will be scalloped to give a natural appearance. A Registered Professional Forester, UCSF staff, and community volunteers will help lay out areas for conversion and select native understory plants.

All non-native understory vegetation and smaller eucalyptus trees will be ground mechanically. For larger trees, stumps will be cut to within six inches of the ground surface and herbicide applied. Vegetation will be chipped on site and spread evenly over the entire area to minimize soil erosion and understory re-growth. Some larger logs will be hauled off the site.

The contractor, UCSF staff, and community volunteers will stake flags to identify the locations for new plants. No shrubs will be planted under existing tree driplines. Revegetation-sized nursery stock will be planted (ten-inch tubes when available; otherwise one-gallon) using planting augers or other similar equipment. Nursery stock grown from native seeds and cuttings will be used if there are volunteers who are able and willing to collect the seeds and cuttings, and grow/propagate them at an established nursery, such as the one at Golden Gate Park or San Francisco City College. Under these circumstances, the nursery would be compensated for direct costs. Otherwise, stock will be obtained from the nurseries listed on this page.



Potential conversion planting area (after clearing before planting).

Eucalyptus chips will be withdrawn from around the new plants to avoid toxicity from oils until they are fully leached (less than one year). When feasible, trees and shrubs will be planted in the fall or winter. All plantings will be irrigated with low flow drip systems. The source of irrigation water will be nearby city lines or water brought in tanks.

Sources of Native Plants

Native plants can be grown by contract or purchased directly from:

- Yerba Buena San Mateo
- Mostly Natives Tomales Bay
- Circuit Rider Sonoma County
- Presidio Nursery San Francisco
- Native Revival Nursery Aptos
- Native Here Nursery Berkeley

Planting a variety of native plant communities that are well adapted to site conditions will increase biodiversity, the ecological health of the forest as a whole, and habitat value throughout the Reserve. The fundamental goal is to create a self-sustaining forest that enhances the native vegetation of Mount Sutro The planning team is currently preparing planting palettes and templates for conversion areas.

Native Plant Enhancement

This action responds to the following PCAT planning principles:

- #2 Improve the health of the forest.
- # 3 Protect and expand native plants.
- #4 Enhance wildlife habitat values.

This management action will support and enlarge existing remnant native plant communities in three different locations (Areas E, H, and R in *Figure 12: Native Plant Enhancement Areas*). These areas include a California reed grass stand near the summit, a coastal terrace plant community below the Chancellor's residence, and another coastal terrace community just above the hairpin curve of lower Medical Center Way. These pockets of remnant native plant communities will be enhanced by removing invasive non-native shrubs, vines, and



California reed grass.

groundcovers that compete with the native species, and by selectively removing existing eucalyptus. Native plant populations can be expanded via a stewardship program implemented and managed by community volunteers.

Neighbors will be educated about the issues of planting non-natives such as ivy and broom that can invade the Reserve and encouraged to plant natives within their residential gardens. Gardeners who want more information on growing native plants can obtain a plant list and planting guide from the San Francisco



Natural Areas Program (415/753-7267). In addition, native plants are available from the nurseries previously identified.

Trails

This action responds to PCAT planning principle #6 to improve public access.

Only minor improvements are proposed for the existing trail system (see *Figure 13: Existing and Proposed Trails*) because residents of the surrounding neighborhoods are concerned that obvious improvements would attract too many visitors to the area. Improvements will be internal to the Reserve, with minimal visible appearance of change at access points. No trailheads are proposed. Several new trail segments are planned to improve access and views, and some existing trail sections on steep slopes will be abandoned.

The following discusses enhancements to the existing trail system, realignment of steep trail sections, development of new trail sections, and techniques used to accomplish trail work. There are two trail sections proposed for abandonment and six new segments proposed (*Figure 13*).

Improvements to Existing Trails

Enhancements to the existing trail system will include:

- An improved trail surface, such as decomposed granite, from the end of the pavement on Nike Road to the summit to provide a meaningful destination for people with disabilities. An alignment will be selected that does not exceed the grades encountered on the paved section.
- The surfaces of trails may be improved where there is heavy traffic, or in sections that are poorly drained, slippery, or highly erodible. Sawdust, wood chips, and gravel are suitable materials. In no case will the width of the trail itself be increased.

Realignment of Existing Trails

Some trail segments are recommended for removal and realignment. When this occurs, the abandoned trail segment will be regraded to match the surrounding contours and revegetated, if necessary and appropriate, with native species. Temporary erosion control measures, such as erosion control fabric, grass seed, and fertilizer, will be installed if needed. Follow-up monitoring will include maintaining new soil, control fabric, and vegetation as required until established.

- A. The existing Aldea-Belgrave Trail to the southeast of the Chancellor's residence is very steep, highly eroded, and dangerous. This trail will be realigned with switchbacks in an area that better avoids the Chancellor's residence.
- B. The West Ridge Trail currently goes straight up the west ridge. It is recommended that this trail be realigned with a more gentle trail with switchbacks to either side of the ridge. Avoidance of steep side slopes and erosive soils will be critical in siting this trail. A few trees may be removed to create views of the Golden Gate Bridge.

Development of New Trail Sections

The locations of new trails are based on recommendations of the PCAT. Some of the trails existed in the 1970s but have become overgrown. These trails will offer additional walking, hiking, and jogging opportunities, especially in the upper trail system. More direct access will be provided between the summit and the Parnassus campus, and between the summit and neighborhoods to the south and west.

New trail segments include:

- 1. The North Ridge-Campus Connectors will provide more direct, attractive, and complete connection between the summit and the Parnassus campus to the north and between the summit and Medical Center Way to the east, to the top of the Woodland Canyon Trail. Pedestrians will be able to avoid having to walk along Medical Center Way.
- 2. The Aldea-Belgrave Connector will connect the realigned Aldea-Belgrave Trail to near Clarendon Avenue. This will provide a shortcut between Belgrave and Clarendon Avenues.
- 3. The South Ridge Trail will connect Christopher Drive to the end of the existing South Ridge Trail.
- 4. The Aldea-Christopher Connector will provide



a more direct link between Christopher and Johnstone Drives west of the Aldea housing complex.

- 5. The East Ridge-Water Tank Connector will complete the loop of trails circling below the summit.
- 6. The decomposed granite upper Medical Center Way Walk will be extended north toward the campus and will cross the road, approximately 250 feet east of the hairpin curve, to the top of the stairs that lead down to Saunders Court.

Trail Construction Techniques

Trail development will involve establishing the desired alignment in the field, clearing vegetation, and grading the ground with a slight cross slope for good drainage. Trails will be approximately two feet wide.

Axes, brush hooks, and machetes can be used for removing small stems and branches. They are quick and efficient. Pruning and bow saws are the best option for small to medium diameter stems and branches, permitting pruning flush with stems so as not to leave any stubs. Lopping shears and handheld pruning shears provide clean, flush cuts and are good for stems with diameters less than one inch. Chainsaws provide smoother cuts and are generally more efficient than axes or machetes for large diameter stems and logs.

Another set of tools is required for removing roots and stems from treadways, excavating sloped trails, creating water bars, and other digging tasks. Shovels may be used for moving soil or surface materials and for removing rocks. Various grub hoes are useful for removing roots and stones and shaping drainages. Rakes may be used for leveling tread surfaces, and large crowbars for moving heavy objects (and avoiding shovel handle breaks).

Adaptive Management Approach

Each of the management actions will be introduced to the Reserve incrementally and methodically, primarily through the creation of demonstration areas, as discussed in the previous sections. Each demonstration area will be small compared to the overall size of the Reserve, but large enough to be meaningful in terms of evaluating the potential success of applying that management action to other areas of the Reserve in later phases of the management program.

Five years after an action has been implemented, the demonstration area will be evaluated according to specific criteria by Registered Professional Foresters, UCSF staff, and the public. Among other goals, the technical evaluation will:

- Measure new plant survival rates. Success is indicated at 90% or greater. Survival after five years typically is 100%.
- Measure new plant growth rates. Success is indicated by a tree tip growth rate of six inches or more and a shrub tip growth rate of two inches or more. If lower, determine the cause and correct, if possible.
- Evaluate eucalyptus health and public safety in thinned forests by visually assessing hazardous limbs and trunk rot.
- Determine effectiveness of mulching to minimize re-growth of invasive non-native species and confirm that weedy growth is not competing with desired species.
- Determine effectiveness of chipping, grinding, and applying herbicides on eucalyptus stumps by visually assessing the rate of re-sprouting.
- Evaluate need for continued irrigation.

Adaptive Management

Adaptive management is a flexible, learning-based management approach, which allows for uncertainty about the ecosystem being managed. It can be a valuable approach for managing open space natural areas, such as Mount Sutro, because it is not always possible to accurately predict the way modified and natural systems will behave. The management actions are designed to provide and respond to new information. Because of its flexibility, adaptive management is especially suited to integrating and addressing competing management goals.

- Determine positive habitat enhancement for bird and butterfly species by confirming growth of desired plant species.
- Determine viability of planting forbs and other plants by seed.

Necessary adjustments to the phased actions will be made based on an evaluation of the successes and shortcomings of the initial management actions as measured within each demonstration area by scientific evidence and in response to public perception. This adaptive management approach will allow UCSF to respond to opportunities and problems as they arise, and to incorporate feedback from the community into the future management of the Reserve.

Community input is a valuable component of the management evaluation. Different approaches may be considered in collecting and organizing the community's interests and desire to participate in the management of the Reserve. First, and most important, the management actions need to be explained, along with the rationale for each selected approach. This could be accomplished by erecting interpretive signage at the areas of intervention where work is performed. However, active community members would be consulted prior to erecting any signs.

The PCAT and other core groups of volunteers could be organized to help evaluate the management actions. They would be knowledgeable because of their hands-on experience and would be familiar with the perceptions of the community. Their feedback in the evaluation process would be valuable in determining the success of the management actions and their applicability to the long-term management strategy.

Noise from Management Actions

Public comments noted that noise is a potential impact of the management program and a concern. Noise will be generated by the use of chainsaws to fell and cut hazardous trees and limbs. Such noise currently occurs when chainsaws are used in the Reserve. Falling trees also are a source of noise. Because of the limited number of hazardous trees that are anticipated to be removed, the widespread locations of such trees, and spread out timing of their removal over ten years, chainsaw and falling tree noise will be temporary and should not be a problem for Reserve neighbors.

Noise will also be generated in areas designated for eucalyptus thinning and conversion planting when vegetation is removed using mechanical equipment. In each area, the work will be completed within a period of only a few days, and these periods will occur in different years. Furthermore, none of these areas are adjacent to residential neighborhoods, but rather, are internal to the Reserve. Therefore, while some amount of noise may be heard from off-site, the noise will be muffled by forest vegetation and will last for short periods of time.

VISUAL EFFECTS OF MANAGEMENT Actions

For a simulation of how the Reserve may look over time, see *Figure 14: View From 17th and Clayton Looking West.* This graphic was generated using the process represented in *Figure 15: Visual Simulation Process.* First, USGS maps and site data were used to identify the location of the key view in the photograph of the Reserve taken from 17th and Clayton looking west. Second, contour data was used to produce a three-dimensional terrain surface. Proposed trees were then draped over the terrain surface. Vegetation boundaries of the proposed management actions were overlaid on the terrain surface. Last, the terrain surface was matched to the perspective of the photograph.

The location represented in *Figure 14* was selected because it provides the most visible view of the management action areas. Other areas will be less noticeable or completely unseen from off-site. Demonstration areas in which forest thinning is planned will retain an overall forested appearance, but the retained trees will have more space to grow large. Visual simulations were not prepared for other locations because the management actions are not visible from any other direction.

Hazardous tree removal may have limited visual effects for the casual and far-off observer, as

MOUNT SUTRO OPEN SPACE RESERVE



1. Existing Condition - Photo location was selected for MAXIMUM visibility of management actions. ALL other areas of management on Mount Sutro are LESS visible



2. 2005 – Enlargement showing eucalyptus-clearing area, scalloped edge, retention of some existing eucalyptus, and retained redwood. Enlargement is more detailed than seen by the unaided eye.



3. 2010 - Enlargement showing planted redwoods becoming evident. This diagrammatic portrayal is more detailed than what will be visible from the unaided eye.



 2030 – Enlargement showing maturing redwoods filling cleared area. Notice areas of retained eucalyptus become openings in the redwood forest. View is equivalent to a 200-mm zoom lens.

VIEW FROM 17TH AND CLAYTON LOOKING WEST



MOUNT SUTRO OPEN SPACE RESERVE





The computer uses a camera to view the digital site topography in three-dimensions from a selected viewpoint. In this case an aerial view looking Northwest was chosen to show the entire site.



4. Trees are simulated to determine accurate heights of proposed plantings. In this case Redwoods are shown to the left of the road, Medical Center Way and Bay trees to the right. VISUAL SIMULATION PROCESS

 Photo Points are selected for MAXIMUM VISIBILITY of the proposed actions. Proposed actions will be less visible from all other points because of surrounding topography, buildings and trees. Digital site topography and a topographic image are used to locate selected photo points at the same relative proximity to each other as on the ground.



3. Areas of proposed management actions and existing roads are then draped over a three-dimensional terrain surface. The ten-year management areas are in yellow and possible long-term management areas are in green. The light green areas show potential thinning after the year 2010. The buildings of the UCSF Parnassus Campus are also shown for orientaion purposes.



The same computer model can be viewed from any location, to match existing photographs. Any camera variation and lens length can be accommodated.



6.In this case the model view matches the perspective of the photograph taken from 17th and Clayton looking west, the model provides the framework for photo rendering of the simulation below. Vertical tree heights are shown in red.



7. The simulation from 17th and Clayton looking west shows the MAXIMUM POINT OF VISIBILITY of the ten-year management plan. Management actions will be less visible from ALL other off site locations. Visible here are Redwoods above Medical Center Way and below is the proposed Willow/Bay corridor in the year 2030.

Figure 15



hazardous trees are few compared to the numbers of trees that will remain. Individual hazardous trees that are large or prominently located near streets may be more noticeable.

Conversion planting of some demonstration areas includes the removal of eucalyptus from areas approximately two acres in size (an area approximately 200 by 400 feet). To minimize the visual impacts from a distance, a sparse tree canopy will be retained by keeping healthy trees in place. Also, the cut areas will be irregular polygons with scalloped edges so that they will look like natural openings. Initially, cleared areas will be covered with wood chips and spotted with young plants, and will contrast in color with the surrounding forest. As the new plants grow, the forest openings will be filled with larger vegetation and groundcover giving it a green appearance. Within ten years of planting, trees may be 15 feet tall. Over time, a new tree canopy will grow, filling in the cleared area.

In the three native plant enhancement areas, the most visible management action will be the removal of invasive species. Where the removed plants are low to the ground, soil will be temporarily exposed. Where eucalyptus trees are removed, the area will be more open and sunlit.

Generally trail system improvements will have little visible effect, although some switchbacks may be noticeable until revegetation is complete.

LONG-TERM MANAGEMENT VISION

The word "vision" is meant to describe a conceptual view of the future and not a fixed plan. The vision, shown in *Figure 16: Three-Dimensional View of Long-Term Vision* and *Figure 17: Long-Term Vision*, foresees expansion of the management actions proposed in this Plan, with previous actions shown in orange, and the long-term management shown in green. The overall vision for the Reserve is a vegetation mosaic of uneven aged trees of mixed species with small openings of native shrubs. The vision focuses on a healthier, safer forest with enhanced wildlife habitat, views, and trail use.

The management actions represented on *Figures 16-17* include:

 Incremental eucalyptus thinning in the center, south, and east areas of the Reserve where trees are particularly dense.



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- Buckeye, toyon, and madrone expansion south of the summit.
- Oak woodland mix expansion in the south bowl.
- Redwood planting on the north-facing slope behind the Parnassus campus.
- Oak woodland mix planting on the eastern boundary near Edgewood Avenue.
- Willow/bay planting in the draw west of the Chancellor's residence.
- Removal of additional potentially hazardous trees along Medical Center Way to help serve as a fire break.

In addition, in some areas of the Reserve, dense stands of eucalyptus trees occur on shallow topsoil where a profusion of smaller trees (less than two inches to eight to ten-inch trunk diameter) compete for moisture and sunlight. These areas will be prioritized for thinning by degree of density.

The steep western slopes are not considered for management at this time because of their shallow soils, limited accessibility, and the public's desire to leave some of the Reserve "wild" and unmanaged. Thinning, however, may ultimately be considered for this area.

The long-term management vision is also represented three dimensionally in *Figure 16: Three-Dimensional View of Long-Term Vision.*



IMPLEMENTATION AND MAINTENANCE

MANAGEMENT ACTION IMPLEMENTATION AND MAINTENANCE

The four management actions and the development of new trail segments described in the previous chapter will be implemented in accordance with the ten-year schedule shown in *Table 9*: *Implementation and Maintenance Schedule.* The schedule also depicts when maintenance is planned. It is important to realize that this is an ideal schedule, not a fixed one, because the quantity and timing of funding availability is uncertain. If funding is delayed or insufficient, it may take longer than ten years to achieve the first phase of the management program.

Management	Areas	Year	1	2	3	4	5	6	7	8	9	10
PRIORITY 1												
Area A	Crestmont-Christopher HTR Area		*									
Area B	Aldea Screen		*									
Area C	Blackberry Removal-Planting		*									
Area D	Summit Coastal Scrub Planting		*									
Area E	Summit Needle Grass Enhancement		*		[
Area F	Buckeye, Toyone, Madrone Demonstrati	on		*				[
Area G	Lower Medical Center Way HTR Area			*				[
Area H	Coastal Terrace Native Plant Enhancem	ent		*				[
Trails	South Ridge, West Ridge, Campus Acce	ss		*	*			[[[]	
All	Evaluation of Management Actions							•				
PRIORITY 2												
Area I	Edgewood, Surge HTR					*				[
Area J	Cypress Windbreak on South Ridge				*			[
Area K	Oak Woodland on South Ridge				*							
Area L	Forest Thinning on South Ridge				*			[
All	Evaluation of Management Actions									•		
PRIORITY 3												
Area M	Upper Medical Center Way HTR							*				
Area N	Redwood Bowl Demonstration Area						*					
Area O	Willow Bay Demonstration Corridor						*					
Area P	Forest Thinning for Willow Bay Corridor	r					*				[]	
Area Q	Chancellor's Residence HTR								*			
Area R	Coastal Terrace Native Plant Enhancem	ent			l				*		[]	
Area S	East Aldea HTR									*	*	
All	Evaluation of Management Actions											•
Prepare Long-Term Management Plan												*
General and De	eferred Reserve Maintenance											
			* I	mplem	nentati	on 🛛		Mainte	nance	•	Evalu	ation

Table 9: Implementation and Maintenance Schedule

Mt. Sutro Open Space Reserve Management Plan

Conversely, actions may occur sooner than planned if grants and donations make it possible. However, once work in a management area has begun, UCSF will be committed to the completion of that work on a timely basis. For example, any area cleared will be replanted within that same year. With sufficient funding, more or all of the management actions may be achieved in a shorter period of time. It is also uncertain if Year 1 will be this next fiscal year, which begins in June 2001, because it will take time to incorporate the costs of the Plan into already planned Facilities Management budgets and to obtain financial assistance from sources outside of UCSF.

As can be seen in Table 9, Priority 1 vegetation management actions are scheduled to occur within the first two years; Priority 2 actions in Years 3 and 4; and Priority 3 actions in Years 5 through 9. Each area of the Reserve will be maintained for five years after implementing the management action, after which the action will be evaluated for broader application in the future. New trails will be developed in Years 2 and 3 and maintenance of existing (and later, new) trails will begin the first year. General maintenance of the Reserve will be continuous throughout the ten-year period, assuming funding is available on an annual basis. General maintenance is applicable to the entire Reserve, and includes ongoing maintenance activities, response to unforeseen conditions such as fallen trees, and some deferred maintenance items, like removing broom, that are directly related to the Plan. At the end of this phase of the management program, the longterm vision will be reassessed and further developed for the next ten to 20-year period.

The phased implementation schedule was developed primarily in response to community members who requested that UCSF approach the management program slowly and incrementally to provide ample time for public feedback and evaluation. Implementation phasing beginning early in the tenyear period will allow for management adaptation based on the successes and failures of the actions taken. UCSF welcomed this approach because it allows the costs of implementation (and maintenance) to be spread out over time and the Facilities Maintenance department to develop rational annual budgeting. In addition, phased planting of new species will be beneficial in diversifying the age of the forest, and incremental scheduling will provide sufficient time to prepare the different types of contracts that will be needed to get the work done, to train volunteers, and to collect seeds, grow nursery stock or otherwise secure the desired plants.

Detailed activities that are planned as part of the management implementation and maintenance programs are listed in Tables 10 and 11. *Table 10: Cost Assumptions for Implementation of Management Actions and Maintenance* specifically describes the activities associated with each type of management action including trail development. These are also discussed in detail in the previous chapter. *Table 11: Maintenance Schedule by Area* specifically describes the maintenance activities planned for each area of the Reserve, as well as for trails and general maintenance. These two tables were developed to help determine costs and to clarify required activities.

The focus of maintenance in hazardous tree removal areas will be proactive management of the ivy, especially on large tree trunks, and the control of eucalyptus sprouts on previously cut trees and ivy re-growth. Maintenance in the eucalyptus thinning demonstration areas will be limited to the removal of sprouts on cut trees, ivy and blackberry in areas previously chipped and mulched. Similarly, the maintenance of native plant enhancement areas will emphasize the removal of invasive low-growing nonnative plants. In Area R, some native plant enhancement has already occurred, so maintenance should continue. In conversion planting areas, new plants will be irrigated and monitored bi-weekly for the first growing season and less frequently during subsequent growing seasons. Temporary automatic drip irrigation will used for approximately six months each year for up to five years or until plants are fully established. The contractor will be required to guarantee one-year survival and replace with new plants, if needed. Invasive non-native plants around new plants will be removed twice a year from managed areas.

Trails will be maintained regularly to better allow their use and ensure continued accessibility. The
Table 10: Cost Assumptions for Implementation of Management Actions and Maintenance

- 1. Hazardous Tree Removal (Contract Labor)
- Calculated with acres by 15 trees/acre = number of trees, times \$3,000 each. Budget includes:
- Cutting trees by chainsaw to within 6" of ground.
- Chipping trees in place or placing on site for habitat improvement.
- Removing stumps where access with grinder is feasible.
- Periodic application of herbicides where stump grinding is not feasible.
- Killing and subsequently removing vines on large trees within the HTR area.
- ✤ \$600 additional/tree for maintenance of the HTR areas over 5 years (\$120 /yr/tree).

2. Eucalyptus Thinning (Contract Labor)

- Acres to be thinned times cost of \$25,000/acre. Budget includes:
- Retaining healthy eucalyptus of various ages at optimal spacing of 25'-35' apart.
- Mechanically removing and chipping small trees, invasive brush, vines and debris.
- Stump grinding where feasible (most areas).
- Applying herbicides to prevent sprouting of eucalyptus where necessary.
- Protecting native trees and understory during construction.
- Maintaining thinned eucalyptus areas at \$2,500/year/acre for 5 years.
- Removing invasive species including eucalyptus, blackberry, broom, and ivy.
- Budget for sign explaining action to public.

3. Conversion Planting and Irrigation (Contract Labor)

Acres to be planted by cost. Budget of \$30,000 per acre includes:

- Identifying and protecting native tree and shrub species.
- Mechanically clearing most existing vegetation.
- Onsite debris mulching in areas to be planted.
- Planting 1-gallon trees 20 feet on center (110 plants/acre).
- Planting 1-gallon shrubs 10 feet on center (435 plants/acre).
- Drip irrigating every plant.
- Budget for signs explaining actions to public.
- Maintenance for the first year is included as part of the construction contract.
- Maintenance for a period of five years is budgeted at \$2,500 per year per acre.

4. Native Plant Enhancement (Contract Labor)

- Area of three existing native plant communities times \$30,000/acre. Budget includes:
- Removing invasive plants including trees, vines, and woody plants.
- Restoring optimal growing conditions for the native plant community.
- Planting additional natives around perimeter of existing community, as available and appropriate.
- Maintaining native plant communities at \$2,500/year/acre for 5 years.
- Removing invasive species including eucalyptus, blackberry, broom, and ivy.

5. Trail Construction (Contract Labor)

- 8,000 linear feet of new trails times \$12 / foot. Budget includes:
- Constructing two newly aligned existing trails: Aldea-Belgrave and West Ridge Trails.
- Constructing six new trails: South Ridge, North Ridge-Campus Connectors, Aldea-Belgrave Connector, Aldea-Christopher Connector, East Ridge-Water Tank Connector, and Medical Center Way Walk Extension.
- Maintaining vegetation on all trails (5 feet on either side) for entire ten-year period.
- 6. Long-term Management Plan Preparation and Incorporation of Phase I Successes.
- 7. Contractor Overhead and Profit on Implementation of Management Actions (25%).
- 8. Oversight of Contracts, Volunteers and Staff by UCSF Facilities Management, Campus Planning, and Community and Government Relations Departments (30%).
- 9. Contingency (15%).
- 10. Implementation of Management Actions and Maintenance Compounded Annually by 5%.

Table 11: Maintenance Schedule by Area

Area A: Crestmont-Christopher Hazardous Tree Removal

- Annual maintenance (Years 2-6).
- $\dot{\cdot}$ Killing vines on large tree trunks, perhaps 50 trees per year (roughly 35% of 140 trees/half acre/year-500 trees on 5 acres over 10 years-approximately 20 minutes per tree).
- Selective thinning of very small eucalyptus trees in conjunction with ivy removal. •••
- . Spot herbicide application if ivy and eucalyptus re-growth is persistent over time.
- ••• Removal of sprouts on stumps not ground and where herbicide application has not been effective, and/or reapplication of herbicide.

Area B: Aldea Tree Screen

To be covered by UCSF Housing Office budget. ٠

Area C: North Summit Blackberry Removal and Coastal Scrub Demonstration Planting

- Maintenance for 5 years (Years 2-6).
- * Biannual removal of invasive non-native sprouts in mulched area.
- * Biweekly visual inspection of plants and irrigation and periodic repair of drip irrigation systems.

Area D: Summit Coastal Scrub Demonstration Planting

- Maintenance for 5 years (Years 2-6).
- Biannual removal of invasive non-native sprouts in mulched area. •••
- * Biweekly visual inspection of plants and irrigation and periodic repair of drip irrigation systems.

Area E: Summit Needle Grass Enhancement

- Maintenance for 5 years (Years 2-6).
- ••• Biannual removal of all non-native sprouts in native plant area.

Area F: South Summit Buckeye, Toyon, Madrone Demonstration Planting

- ** Maintenance for 5 years (Years 3-7).
- \div Biannual removal of invasive non-native sprouts in mulched area.
- * Biweekly visual inspection of plants and irrigation and periodic repair of drip irrigation systems.

Area G: Lower Medical Center Way Hazardous Tree Removal

- Annual maintenance (Years 3-7).
- Killing of vines on large tree trunks, perhaps 50 trees each year (roughly 35% of 140 trees/half acre/year-400 trees on 4 acres over 8 years-approximately 20 minutes per tree). $\dot{\cdot}$
- $\dot{\cdot}$ Selective thinning of very small eucalyptus trees in conjunction with ivy removal.
- ٠ Spot herbicide application if ivy and eucalyptus re-growth is persistent over time.
- * Removal of sprouts on stumps not ground and where herbicide application has not been effective, and/or reapplication of herbicide.

Area H: Lower Medical Center Way Coastal Terrace Native Plant Enhancement

- Maintenance for 5 years (Years 3-7).
- ••• Biannual removal of all non-native sprouts in native plant area.

Area I: Edgewood and Surge Hazardous Tree Removal

- Annual maintenance (Years 5-9).
- Killing of vines on large tree trunks, perhaps 80 trees each year (roughly 35% of 140 trees/half acre/year-400 trees on * 4 acres total over 5 years-approximately 20 minutes per tree).
- $\dot{\cdot}$ Selective thinning of very small eucalyptus trees in conjunction with ivy removal.
- * Spot herbicide application if ivy and eucalyptus re-growth is persistent over time.
- $\dot{\cdot}$ Removal of sprouts on stumps not ground and where herbicide application has not been effective, and/or reapplication of herbicide.

Area J: South Ridge Cypress Demonstration Planting

- Maintenance for 5 years (Years 4-8). **
- \div Biannual removal of invasive non-native sprouts in mulched area.
- * Biweekly visual inspection of plants and irrigation and periodic repair of drip irrigation systems.

Area K: South Ridge Oak Woodland Demonstration Planting

- Maintenance for 5 years (Years 4-8). Biannual removal of invasive non-native sprouts in mulched area. $\dot{\cdot}$
- * Biweekly visual inspection of plants and irrigation and periodic repair of drip irrigation systems.

Area L: South Ridge Forest Thinning

- Maintenance for 5 years (Years 4-8). *
- ••• Biannual removal of eucalyptus sprouts, ivy, and blackberries in mulched area.

Table 11: Maintenance Schedule by Area (Continued)

- Area M: Upper Medical Center Way Hazardous Tree Removal
 Maintenance for 4 years (Years 7-10).
 Killing of vines on large tree trunks, perhaps 75 trees each year (roughly 35% of 140 trees/half acre/year-300 trees on 3 acres over 4 years-approximately 20 minutes per tree).
- * Selective thinning of very small eucalyptus trees in conjunction with ivy removal.
- ÷ Spot herbicide application if ivy and eucalyptus re-growth is persistent over time.
- * Removal of sprouts on stumps not ground and where herbicide application has not been effective, and/or reapplication of herbicide.

Area N: Central Redwood Bowl Demonstration Planting

- ٠ Maintenance for 5 years (Years 6-10).
- * Biannual removal of invasive non-native sprouts in mulched area.
- $\dot{\cdot}$ Biweekly visual inspection of plants and irrigation and periodic repair of drip irrigation systems.

Area O: Central Willow-Bay Corridor Demonstration Planting

- Maintenance for 5 years (Years 6-10) *
- * Biannual removal of invasive non-native sprouts in mulched area.
- \Leftrightarrow Biweekly visual inspection of plants and irrigation and periodic repair of drip irrigation systems.

Area P: Central Willow-Bay Corridor Forest Thinning

- $\dot{\cdot}$ Maintenance for 5 years (Years 6-10).
- $\dot{\cdot}$ Biannual removal of eucalyptus sprouts in mulched area.

Area Q: Chancellor's Residence Hazardous Tree Removal

- Maintenance for 3 years (Years 8-10). Killing of vines on large tree trunks, perhaps 15 trees each year (roughly 35% of 140 trees/half acre/year-45 trees on * 0.5 acres over 3 years).
- $\dot{\cdot}$ Selective thinning of very small eucalyptus trees in conjunction with ivy removal.
- ٠ Spot herbicide application if ivy and eucalyptus re-growth is persistent over time.
- ÷ Removal of sprouts on stumps not ground and where herbicide application has not been effective, and/or reapplication of herbicide.

Area R: Chancellor's Residence Coastal Terrace Native Plant Enhancement

- ٠ Ongoing maintenance.
- \Leftrightarrow Biannual removal of all non-native sprouts in native plant area.

Area S: East Aldea Hazardous Tree Removal

- \Leftrightarrow Maintenance for 2 years (Years 9-10).
- \$ Killing of vines on large tree trunks, perhaps 100 trees each year (roughly 35% of 140 trees/half acre/year-200 trees on 2 acres over 2 years).
- $\dot{\cdot}$ Selective thinning of very small eucalyptus trees in conjunction with ivy removal.
- ÷ Spot herbicide application if ivy and eucalyptus re-growth is persistent over time.
- ÷ Removal of sprouts on stumps not ground and where herbicide application has not been effective, and/or reapplication of herbicide.

Trails

- ÷ Annual maintenance (Years 1-10).
- * Biannual maintenance of vegetation along all trails.
- * Periodic trash removal
- $\dot{\cdot}$ Annual trail bed regarding where eroded by water or foot traffic.

General Maintenance

- As needed and where needed (Years 1-10). *
- ÷ Removal of storm debris, downed trees and branches, and hazardous trees.
- $\dot{\cdot}$ Broom removal (water tanks, along Medical Center Way, stairs by Edgewood Avenue, above Kirkham Avenue, elsewhere).

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- ÷ Trash removal and removal of campsite materials.
- Vegetation cutback along Medical Center Way and parking lots. Security patrol on trails (FM or UCPD). Drainage repairs. *
- *
- * *
- Retaining wall/slide maintenance.
- * Maintenance equipment purchase.
- * Other as required.

trail system will be cleared of debris, overgrowing vegetation, and downed trees and limbs. Vegetation up to five feet on both sides of the trails will be cut back twice a year. Hazardous trees and tree limbs within falling distance of trails will be removed as needed to ensure user safety. The existing trails that need the most work include the summit and the North, East, and South Ridge trails. Trails to the west of the Reserve on private property and across City-owned property on the east side of the Reserve may not be improved or maintained by UCSF unless the respective property owners agree to these actions and agreements can be reached to compensate UCSF accordingly.

Cost Estimates

The costs for the Phase I Management Plan have been estimated and spread over a ten-year period, in accordance with the phased management actions and maintenance (see *Tables 10 and 11*). In the cost estimate (see *Table 12: Total Management and MaintenanceCosts*), the management action column includes the inital cost of implementing the management actions (e.g., eucalyptus tree removal and planting new trees), and the maintenance column includes all of the costs in the following years (e.g., controlling the re-growth of eucalyptus sprouts), as well as general maintenance in the Reserve.

Table 12: Total Management and Maintenance
Costs*

	Management		
Year	Action	Maintenance	TOTAL
1	594,000	192,000	786,000
2	491,000	223,000	714,000
3	469,000	247,000	716,000
4	376,000	278,000	654,000
5	171,000	295,000	466,000
6	291,000	336,000	627,000
7	114,000	310,000	424,000
8	96,000	331,000	427,000
9	99,000	298,000	397,000
10	150,000	297,000	447,000
TOTAL	2,851,000	2,807,000	5,658,000

*Includes 3% inflation compounded annually.

As can be seen in Table 12, the total cost for the ten-year program is approximately \$5.7 million with costs roughly divided between implementing management actions and performing Reserve maintenance.

FUNDING AND PARTNERSHIPS

UCSF funding for the initial management actions for the Reserve will demonstrate a commitment to the goals of the Plan, both to the public and potentially interested third parties. This commitment, in the form of dedicated matching funds, will be one of the defining criteria for resource management agencies, non-profit organizations, and foundations, such as the California Coastal Conservancy, the Trust for Public Land, or the Packard Foundation that may be in a position to provide funding.

One approach would be to fully fund the first year's management actions, followed by funding the subsequent two years at 50%. While the first year's actions are being implemented, grant funding could be researched and applied for, showing dedicated funding for the following years. A few examples of potential funding organizations are:

1) U.S. Department of Agriculture Natural Resource Conservation Service's Wildlife Habitat Incentives Program, a voluntary program for people who want to develop and improve wildlife habitat (primarily on private land), which provides both technical assistance and up to 75% cost-share assistance to establish and improve wildlife habitat.

2) U.S. Department of Transportation Federal Highway Administration's Recreational Trails Program, which provides funds to states to develop and maintain recreational trails and trail-related facilities.

3) California Department of Parks and Recreation's Trails and Habitat Improvement Programs.

4) California Department of Forestry's Urban and Community Forestry Program, which provides funds to create sustainable urban forests to help improve the quality of urban environments and the quality of life. 5) Private foundations and charitable trusts.

Part of the implementation program will be to pursue funding opportunities. If the grants do not materialize, then the funding could be combined to fund the second year's management. The third and fourth years would then be funded at 50% to again position the program for matching funds.

Matching funds typically are provided for either property acquisition or development (plan implementation), but generally not maintenance. For the Reserve, funding support for implementation is clearly the objective, whereas maintenance funding may have to be the responsibility of UCSF. It may be possible to fund maintenance through donations or special state monies.

Fostering partnerships with the City and County of San Francisco, potentially in conjunction with the Natural Areas Program may qualify UCSF for matching funds. Funding agencies are often interested in projects which involve interagency cooperation.

For this approach, the City and UCSF would jointly apply for resource management funds. The scope of the project would be larger, as likely would be the intended benefits. Also, both the City and UCSF could provide matching funds, further leveraging the funding agency's dollars.

Other benefits to be explored include coordinating with the City's Natural Areas Program to manage the City's adjacent forest. The two proposed willow/ bay corridors (Areas N and O on *Figure 8) could* be extended eastward through the City-owned property. This action would provide an elongated wildlife habitat corridor. UCSF will encourage the City to thin eucalyptus on City property.

Another potential partnership could be developed with local colleges whereby students participating in planting projects can earn credits in horticultural programs such as the Nursery Practices class and other horticultural classes at San Francisco City College. High school and middle school students may be able to meet curriculum or Service Learning Day requirements by participating in Reserve management activities.

Community Involvement

Integrating the interests and potential resources of community organizations and individuals that want to participate in the long-term stewardship of the Reserve will be an ongoing management activity for UCSF. Community involvement programs initially need to communicate the real opportunities for improving the Reserve, the true benefits to the community, and the opportunities for agency, corporate, non-profit, and individual involvement. An entity could be established to promote the ongoing management of the reserve and to administer financial donations.

Coordination with the City of San Francisco is another area for coordination of community involvement. The City's Natural Areas Program administers the adjacent parcel with many of the same conditions and opportunities encountered in the Reserve. Managing the parcels together will enlarge the potential benefit areas and further reduce hazards. The City fire department may also be interested in the approach to long term management of both parcels in order to reduce the risk of fire. Volunteer efforts incorporating fire department personnel could be focused on fire hazard reduction.

Volunteer Stewardship Program

Continued involvement by community members will ensure the success of resource management decisions. Because the Reserve is located in the middle of San Francisco, a great opportunity exists for attracting community members. A volunteer program can have enormous potential benefits if the program is well managed. A volunteer program could serve as the backbone of a community involvement campaign to distribute information about Reserve management activities and to channel the energies of the most motivated individuals into active management participation. Those individuals who choose to participate as volunteers would become the core knowledge base about Reserve management activities and would in turn be able participate in decisions to clearly communicate with the broader local community.

Various environmental organizations, many of which are represented by individuals who have been involved in the Reserve's planning process, may also wish to participate in work sessions and the Mount Sutro Reserve Stewardship Program.

With UCSF oversight, volunteers could participate in the following activities, among others:

- New tree and shrub planting
- Native plant propagation and planting
- Trail development
- ✤ Trail management
- ✤ Ivy removal from trees
- Invasive non-native understory removal
- Weed control in mulched areas
- Eucalyptus sprout and sapling removal
- Native seed collection
- New plant and irrigation inspection
- Demonstration area evaluations.

Volunteer efforts could be compared to the cost of doing the same activities by contract, and if real savings can be demonstrated, funding agencies could be swayed to support the project. For safety reasons, volunteers cannot run heavy equipment or chainsaws, apply herbicides, or remove poison oak. However, organizations such as the California Conservation Corps can do some of this work and at lower cost than private companies because they are partially subsidized by the state. The California Coastal Conservancy and other organizations are more likely to reward funds to projects that utilize the Corps.

NEXT STEPS

Once the Plan is approved by the UCSF Chancellor, and potentially the Regents, then implementation activities can begin.

Initial efforts include:

 Establishing UCSF management responsibilities;
 Setting up community involvement programs and communicating the goals and benefits of Reserve management to community organizations;

3) Pursuing internal funding and matching grants from agencies, non-profit organizations, and corporate sponsors; and 4) Implementing the first five management priorities in the Reserve, as listed below:

Area A - Removing hazardous trees along Crestmont and Christopher Avenues;

Area B - Planting a visual screen along Clarendon Avenue in front of Aldea;

Area C - Removing a patch of blackberry shrubs at the summit;

Area D - Planting the summit with coastal scrub; and

Area E - Enhancing the Pacific reed grass community at the summit.

An excellent resource for additional information about non-profit entities established to support open space and environmental improvement can be researched at The Foundation Center at 312 Sutter Street, San Francisco, CA (see http:// fdncenter.org/sanfrancisco).

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Parnassus CAG Action Team (PCAT)

Dennis Antenore, Parnassus neighbor; former member, City Planning Commission Sue Bierman, Parnassus neighbor; former member, Board of Supervisors Craig Dawson, Parnassus native; Inner Sunset Merchants Association representative Agar Jaicks, Parnassus neighbor Beatrice Laws, Parnassus neighbor Carolyn Blair, member, San Francisco Tree Council. Greg Gaar, Parnassus neighbor; San Francisco historian Ruth Gravanis, member, Sierra Club Pinky Kushner, Parnassus neighbor; member, Inner Sunset Park Neighbors Ben Pease, member, Bay Area Ridge Trail Council John Rizzo, member, Sierra Club Jake Sigg, member, California Native Plant Society