UPPER STEVENS CREEK PARK RESOURCE MANAGEMENT PLAN

Prepared for
Santa Clara County
Parks and Recreation Department

April 1993

BRADY AND ASSOCIATES, INC., PLANNERS AND LANDSCAPE ARCHITECTS

UPPER STEVENS CREEK PARK RESOURCE MANAGEMENT PLAN

■ ■ ■

Prepared for
Santa Clara County
Parks and Recreation Department

April 1993

BRADY AND ASSOCIATES, INC. PLANNERS AND LANDSCAPE ARCHITECTS

UPPER STEVENS CREEK PARK RESOURCE MANAGEMENT PLAN

■ ■ ■

Prepared for
Santa Clara County
Parks and Recreation Department

April 1993

PREPARED BY
BRADY AND ASSOCIATES, INC.
PLANNERS AND LANDSCAPE ARCHITECTS

IN ASSOCIATION WITH
WILDLAND RESOURCE MANAGEMENT
THE HABITAT RESTORATION GROUP
JOHN NICOLES, LICENSED FORESTER

This document is printed on recycled paper.

Upper Stevens Creek Park
RESOURCE MANAGEMENT PLAN

TABLE OF CONTENTS

■ ■ ■

I.	INTRODUCTION		1
	A.	Purpose of the Project	1
	B.	Process	1
	C.	Methodology	2
	D.	Intent of the Resource Management Plan	2
	E.	Report Format	2
II.	MANAGEMENT GOALS AND OBJECTIVES		5
	A.	Intent	5
	B.	Organization	5
	C.	Objectives Achieving Multiple Goals	5
	D.	Coordination of Objectives	6
	E.	Goals and Objectives	6
III.	EXISTING CONDITIONS		19
	A.	Project Location	19
	B.	Climate	23
	C.	Park Characteristics	23
	D.	Accessibility	24
	E.	Land Use and Recreational Features	24
	F.	Park History and Archaeology	31
	G.	Geology, Soils and Hydrology	32
	H.	Vegetation and Wildlife	38
	I.	Fire Hazards	60
	J.	Staff Resources	78
IV.	MANAGEMENT PROJECTS		81
	A.	Organization	81
	B.	Priorities	81
	C.	Required Oversight	82
	D.	Prescribed Burn Projects	85

E. Pre-Project Surveys 86
F. Short-Term Projects 86
G. Ongoing Long-Term Projects 89

V. PROJECT SCHEDULING AND STAFFING REQUIREMENTS 107
A. Criteria for Setting Priorities for Project Implementation 107
B. Available Staffing and Requirements for Projects 108
C. Recommended Priorities for Project Scheduling 109

VI. LIST OF PREPARERS 113

VII. BIBLIOGRAPHY 115

VIII. LIST OF PERSONS CONTACTED 127

List of Tables

1. Bryam's Fireline Intensity 69
2. Rate of Spread Values and Interpretations 69
3. Fire Hazard By Plant Community 71
4. Estimated Staffing Requirements and Priorities 110
5. First Phase Priority Projects 112

List of Figures

1. Regional Location Map 20
2. Adjacent Land and Linkages 21
3. Park Trails and Roads 22
4. Structures in the Park and Vicinity 26
5. Slope Analysis 33
6. Aspect Map 34
7. Geologic and Hydrologic Features 36
8. Plant Communities 39
9. Sensitive Habitat Map 53
10. Fire Hazards Related to Fuel Loads 65
11. Fuel Loadings of Fuel Plots 66
12. Predicted Rates of Spread for Fuel Plots 67
13. Predicted Flame Lengths for Fuel Plots 68
14. Short-Term Projects 82
15. Ongoing Long-Term Projects 83
16. Grizzly Flat and Charcoal Road Understory Removal Projects 84

APPENDICES

A. Wildlife Species of Special Status
B. Wildlife Species Known or Predicted to Occur in the Park
C. List of Vascular Plant Species Observed at the Park
D. Potential Plant Species of Concern in the Park
E. Fuel Model Methodology and Results
F. Fire Ecology and Age Structure of Vegetation
G. Sample California Native Species Field Survey Form
H. Pre-Project Survey Descriptions
I. Other Projects to Consider

Chapter I
INTRODUCTION

■ ■ ■

A. Purpose of the Project

Upper Stevens Creek Park is a rugged remote Park located in California's Coast Range. The 1,095 acre Park is heavily forested and surrounded by public open space lands and some residential properties.

The Park was acquired between 1966 and 1968 by Santa Clara County. Because of the Park's dense vegetation, steep terrain, diseased trees (on Table Mountain) and existing drought conditions, fire hazards in the Park are a critical concern. Protecting and enhancing the Park's biodiversity and protecting existing habitat is also of particular concern because of the existing bark beetle infestation, fungus and invasion of exotic plant species in some areas of the Park. The County Parks and Recreation Department has management responsibility for the Park, but never developed a formal management plan. Thus, the County decided to prepare the Upper Stevens Creek Park Resource Management Plan to provide a technical framework for management of the Park's resources. The intent of the Plan is to provide overall policy direction as well as identify specific management projects for the Park staff to undertake both on a short- and long-term basis.

B. Process

Plan preparation was undertaken as a two-step process. A Baseline Analysis Report, prepared in November 1992, identifies preliminary goals and objectives, documents existing conditions, and presents resource management findings. The Report was reviewed by the Park staff and a licensed forester. Information was refined and suggestions were incorporated into this Resource Management Plan.

C. Methodology

The baseline conditions inventory contained in the Resource Management Plan was based on a number of field visits by Brady and Associates and its subconsultants, analysis of existing published information, such as the Table Mountain Resource Management Plan; existing soils surveys, and conversations with the County Parks and Recreation Department Project Team, and other interested or affected agencies and individuals. New resource data was collected for the fire hazards and biotic resources. In addition, an archaeological literature search was conducted for the project.

The consultant team analyzed the resource information, degree of threat to biologic and human resources from fire, insects and exotic species. In conjunction with Park staff, a set of resource management goals were selected.

Based on the goals, the consultant team identified several policy areas which the plan needed to address. These include Vegetation and Biodiversity Management, Fire Hazard Management, Land Use Practices, Viewshed Enhancement and Implementation. Objectives to meet the goals were selected for each. In addition, within each management area, specific projects were identified which could be undertaken immediately. Priorities for immediate projects were based on the threat to Park resources and available man power.

D. Intent of the Resource Management Plan

It is the intent of this Plan to serve as a long-term policy document which the Park can use to guide its management of the Park. It is also intended to be used to select projects for a capital improvement program and to set priorities for selection of future projects.

E. Report Format

This report consists of six chapters, which together, comprise the Resource Management Plan. These chapters include the following:

Chapter I. Introduction discusses the purpose, use and organization of the report.

Chapter II. Management Goals and Objectives provides a list of resource management goals and objectives for the Park.

Chapter III. Existing Conditions describes the existing conditions in the Park and its vicinity including project locations, climate, Park characteristics, accessibility, land use and recreational features, Park history and archaeology, geology, soils and hydrology, wildlife and vegetation, fire management factors and staff resources.

Chapter IV. Management Projects provides detailed discussion of recommended management projects organized into four categories including Vegetation and Biodiversity Management, Fire Hazard Management, Land Use Practices and Viewshed Enhancement. Each managment project describes the relevant issue, tasks to be implemented and any necessary precautions that should be taken.

Chapter V. Project Scheduling and Staffing Requirements describes criteria for prioritizing projects, staffing requirements for projects, recommended project scheduling.

Chapter VI. List of Preparers provides a list of the document's preparers.

Chapter II
MANAGEMENT GOALS AND OBJECTIVES

■ ■ ■

A. Intent

The goals of the Plan are based on goals identified by the Santa Clara County Parks and Recreation Department and observations resulting from field studies conducted during preparation of this Plan. The goals provide the policy framework for the Resource Management Plan. The objectives describe the ways in which a particular goal can be achieved. The specific projects recommended in Chapter IV implement these objectives. The goals, objectives and projects will restore a natural ecosystem, reduce fire hazards, encourage land use practices which maintain and enhance Park resources and enhance views.

B. Organization

The Management Plan sets five overall goals: improve overall biodiversity in the Park, reduce fire hazard as feasible, encourage land use practices to reduce damage to natural resources, improve views and implement projects as feasible within staffing limitations. Objectives are organized into two categories for Goals A and B. These categories include: (1) "Parkwide" objectives contain more general objectives that apply to the whole Park. (2) "Vegetation-specific" objectives address the particular concerns of that vegetation type within the Park. The vegetation-specific objectives are organized according to the Park's dominant plant communities. These plant communities include Oak forest, Douglas fir forest, grassland, chaparral, riparian forest and the abandoned Christmas Tree Farm on Table Mountain. Objectives for Goals C, D and E fall into one category, "Parkwide" Objectives.

C. Objectives Achieving Multiple Goals

Some of the objectives identified under Goal A, which encourages biodiversity, also achieve the objectives of Goal B, which seeks to reduce fire hazards. By

encouraging a mix of vegetation types and age structures, high fuel loads can be reduced because a variety of vegetation eliminates existing dominant species which have high fuel loads. Objectives addressing vegetation management for biodiversity that subsequently reduce fire hazards are denoted with a "*". These are not repeated under Goal B to avoid duplication.

D. Coordination of Objectives

The goals and objectives for resource management are designed to be compatible with one another. The Plan's biological and fire management consultants coordinated the development of objectives, as well as development of management projects, to avoid any conflicts. Several objectives, however, may appear to present the potential for conflicts. Specifically, fire management objectives recommending removal of dead wood (downed wood and snags) may conflict with biotic resource objectives recommending preservation of wildlife habitat resources (also snags and downed wood). These potential conflicts have been resolved in both the language of the fire management objectives, and in Chapter VI. Management Projects.[1]

E. Goals and Objectives

Goal A. Improve Biodiversity: Manage Ecosystems to Promote the Widest Variety of Native Plant and Animal Species

Goal A reflects the Parks and Recreation Department's desire to manage the Park's resources to improve biodiversity of native and sensitive species and their habitat.

The canopy and understory of the Park used to be much more open. Lower stand densities were common. All tree species that are present today occurred in the past, however the prevalence of the species is shifting. It is likely the Park was covered by more oak savanna, with grass understory. This vegetation type and stand structure was probably created and maintained by frequent fires. This coincides with clear evidence of residence of native Americans who were likely to tend the land with fire to foster acorn, and grass seed as food crops,

[1] Chapter VI recommends that biologists identify significant habitat and plant species before certain fire management projects are implemented to insure that significant impacts to biotic resources do not occur.

and to encourage deer habitat (which is open chaparral, mixed with open oak savannah). Without fires, the grasslands tend to decrease in size. Review of aerial photos, dated 1986, confirms that the grassland has been diminishing in size.

In general, with no action, the Park will succeed to a more uniform vegetation. Grassland, chaparral, and oak/madrone woodlands will decline in areal extent; however, species will remain as minor component. Douglas fir (and riparian vegetation, to a limited extent) will increase in area and attain dominance in the majority of the Park.

Diversity will be reduced with the more uniform vegetation, and ultimately, there will be a more uniform age distribution (no young stands). In some places, (such as where grasslands have been invaded) the changes have already happened. Douglas fir could succeed oaks in 20-30 years, while other changes, such as invasion of the chaparral, will take longer.

The plant community stages that are missing or not well represented are young oak woodlands, young chaparral, and expanses of grass. While grassland habitat is diminishing in size due to encroachment of coyote brush, north coastal scrub, and to a lesser degree, by Douglas fir, overall, most of the chaparral in the Park can be characterized as mature.

Upper Stevens Creek County Park provides habitat for a variety of wildlife species. However, as the Park continues to evolve to a more uniform vegetation type, the diversity of wildlife habitat will decrease and the variety of wildlife the Park presently enjoys will diminish. Several specific observations indicate the Park is evolving to a more uniform age and dominant vegetation type. There are few early successional stages of vegetation in the Park (i.e., the chaparral is uniformly old). Variability in Park vegetation is decreasing. Douglas fir is invading the oak/madrone woodlands. The oaks, particularly black oaks, are declining because of a lack of light. Madrone and madrone trees are declining in health. The decline may be due to lack of light. Succession is not only a key to the variety of vegetation but of wildlife in the Park. Biodiversity refers to a state in the natural environment where there is a variety of ecosystems (i.e. coniferous forests and riparian forests) and a maximum variety of plant and animal species, as well as species age structures within a given ecosystem.

Diversity can be encouraged Parkwide by maintaining and restoring a variety of plant communities with varying successional stages, protecting sensitive plant and wildlife habitat, and protecting significant wildlife resources, such as snags

and downed wood. Within specific-vegetation types, biotic resources can be enhanced by protecting the Park's forests in the event of wildfire, enhancing existing grassland, maintaining and encouraging young growth in the chaparral community, protecting and enhancing riparian vegetation, which is in and of itself a diverse plant community and by eliminating some non-native invasive and diseased insect-harboring vegetation on Table Mountain.

The Park staff has indicated its desire to increase variety of plant communities within the Park itself. While the Upper Stevens Creek Park is a part of a much larger ecosystem, which has a great degree of variety, the Park staff wishes to modify and maintain to a limited degree an ecosystem which includes more grassland, younger stands of chaparral, and fewer non-native species. In addition, the staff wants to reduce fire hazards to some specific residences near the park boundary. The variety and type of vegetation which results from the fire management program will result in more fire resistent old age Douglas fir. However, the fire management program will also result in converting "old" plant communities to "young" ones.

The Park's resources are limited; both in terms of funds and in terms of manpower. Thus, most of the Park will not be managed and will continue to develop and succeed to an even-aged ecosystem. A few areas have been selected to be managed in order to create small pockets or patches of younger or more open habitat, thus creating a degree of variety.

Parkwide Objectives:

The broad objectives in this section were developed to establish a policy basis for pursuing some specific projects, but also to allow the Park to have guidance regarding future management of the Park.

Objective A1.* **Enhance native vegetation and restore a variety of plant communities and vegetation type and vegetation age with an even distribution of early successional stages to late climax vegetation types, located in large patches.**

(A variety of plan communities can reduce fire hazards that occur when a highly flammable plant community dominates; therefore, this objective also meets fire hazard reduction goals.)

Objective A2. **Control non-native vegetation such as french broom and common thistle, which are located along roads such as Skyline Boulevard, and species at Table Mountain such as**

Monterey Pine, Scotch Pine and White fir (see objectives A14 and A15).

The presence of conifers on Table Mountain which are not native to the Stevens Creek Park compete with and displace native trees. Furthermore, Monterey Pine trees on Table Mountain are susceptible to insect and disease problems. Bark beetles, are infesting trees in the Table Mountain area. Common thistle and French Broom, an invasive non-native species located along road cuts can interfere with the establishment of desired native species.

There are two major ways the vegetation in the Park can be managed to increase the variety of types and age. First, some existing vegetation can be cut and removed. Secondly, specific areas in the Park can be proscribe burned.

Objective A3. **Regenerate the species that require fire to trigger germination (e.g., chaparral and herbaceous), thereby replenishing seed reservoirs in the soil.**

Sensitive species, such as rare serpentine endemics, may occur in the Park. They are not currently threatened by Park activity, but could be in the future if new trails are constructed or management programs fail to consider their potential presence.

Objective A4. **Protect and enhance habitat for sensitive plant species.**

Wildlife species diversity and abundance on the project site varies seasonally, and annually depending upon the quantity and quality of resources present and successional stage of habitat development. While some wildlife species may be restricted to certain plant communities due to specific habitat requirements, many of them utilize several of the habitats present in the Park, as well as the habitat in the surrounding areas.

Wildlife corridors provide connections between habitat areas, enhancing species richness and diversity in the local area (Harris 1984, Adams and Dove 1989), and helping to maintain regional biodiversity. Movement corridors are especially important to wide-ranging mammals, such as the mountain lion, bobcat, and gray fox.

Upper Stevens Creek County Park is contiguous with other open space preserves and Parks along the crest of the Santa Cruz Mountains, providing opportunities for wildlife movement within and across the project site. The

primary patterns of wildlife movement within, to and from the Park typically would occur along Stevens Creek and its major tributaries, and along ridgetops. Smaller ephemeral drainages, as well as established trails and roads, also provide wildlife movement corridors through the project site. Movement to and from the Park, across the crest of the Santa Cruz Mountain is another pattern of wildlife movement.

Objective A5. **Maintain optimal wildlife populations, including habitat for sensitive species and wildlife corridors within the Park and those that link with adjacent parklands. Sensitive habitats include, but are not limited, to the ladybug wintering site, the riparian corridor, snags and downed wood. These habitats are important to maintaining biodiversity in the Park.**

Maintain existing wildlife habitat, such as the ladybug wintering site, and other habitat such as the riparian corridors and downed wood. The major ridgetop wildlife corridor running along Charcoal Road from Highway 4 to Table Mountain should also be protected. This corridor likely links with adjacent parks and habitat. These habitats are important to maintaining diversity.

There is the potential for presence of rare and endangered species in the Park based on field observations of habitat types.

Objective A6. **Protect rare and endangered species found in the Park.**

Objectives by Vegetation Type:

Oak Forest

Objective A7.* **Maintain existing acreage of oak forest by encouraging regeneration in openings and maintaining enough light and water.**

Objective A8.* **Increase wildflower/bulb cover and species in understory.**

Grassland

Patches of grassland habitat among more heavily vegetated areas form ecotones or edges between habitat types. These edges support a great variety of wildlife.

Objective A9.* **Increase grassland habitat, including grassland in the Table Mountain area and along Charcoal Road.**

Chaparral

Objective A10.* **Maintain and encourage young growth in the chaparral community. (By encouraging a mix of ages in Chaparral, the mature, highly flammable chaparral would not dominate the plant community; therefore, this objective also meets fire hazard reduction objectives.)**

Riparian

Wetland vegetation supports a rich variety of plants and animals that adds to biodiversity. Equestrians, bicycles and pedestrians can adversely affect wetland vegetation up and downstream from creek crossings. Measures to control human use can eliminate impacts to wetland vegetation.

Objective A11. **Protect riparian corridors and wetland vegetation.**

Abandoned Christmas Tree Farm (Table Mountain)

Objective A12. **Allow for retention of some non-native specimens (not native to project vicinity) that do not threaten endemic vegetation, such as Sequoiadendron giganteum.**

Objective A13. **Enhance existing vegetation with native plant species.**

Goal B. Reduce Fire Hazard

Goal B addresses fire hazards in the Park. This goal is intended to minimize, as much as feasible, threats to public safety and vegetation through resource management programs and other improvements.

Objectives have been identified that attempt to reduce risk of loss by minimizing potential for fire escaping Park boundaries, minimizing spontaneous ignitions, enhancing fire protection through fuel management and access improvements, clearing understory vegetation that forms ladders to treetops, removing dead wood where it does not conflict with habitat conservation goals, increasing fire predictability and minimizing damage to improvements within and adjacent to the Park as much as possible.

There are areas of the Park, such as Table Mountain and areas containing chaparral, that pose a high fire hazard, primarily because of vegetative fuel load, compounded with other factors including, local weather, topography, accessibility and water supply. Access and water supply are poor. Topography is steep, which makes access to fire locations difficult. Also, fires spread faster on steep slopes. Local weather (especially wind and temperature) is ideal for very hot fires. Fuels exist (such as chaparral and the dead and diseased trees on Table Mountain) that would burn with vigor. The number of fires is likely to be low, but the stage is set for an uncontrollable fire if one is started.

The Park does not have a fire management plan. However, fire suppression practices used by Park management stress protection of life, property, and natural resources, in that order.

Overall, road conditions in the Park are adequate, with the exception of poor turn-arounds and no loop road. Although a loop road would be desirable, turn-around sites can be added and fire hazard reduction through fuel load management may mitigate the hazards related to limited access. Water supply is practically non-existent with the exception of the 15,000 square foot reservoir at Table Mountain. Water from Stevens Creek can be drafted, but would have to be pumped into a tanker then carried via the truck to the fire. If the fire is anywhere other than on Grizzly Flat Trail, this process could take over an hour per trip. Water is likely to be hauled from outside the Park (probably from the fire station) in a pumper to the fire, and hoses strung from that. If the fire is not located near a road (and it is likely a great portion of a large fire would not be near a road), hand lines would be dug to "contain" the fire and the fire would be extinguished with a lot of hand work. Water would augment this manual labor. The majority of water would probably be delivered by air, via helicopter and with air tankers. Firefighting foam and fire retardants may also to be used. There are adequate water supplies for helicopters within a one and one-half mile radius of the Park, including Horseshoe and Jukoji lakes.

Some general rules of fire are that 1) Ignitions related to occupancy are highly probable along established (public) roads. Thus, ignitions would more likely occur along Skyline Boulevard. They are less probable along established trails and along Stevens Creek; 2) Fires tend to run uphill. A fire ignited at Skyline would not be expected to move into the Park, except under a strong west wind; 3) In the event of an ignition during hazardous weather at the foot of the slope, suppression would take place along the ridge. Taking these rules into consideration the risk to the Park is from fire running up slope behind houses on the ridge, where suppression forces have limited access.

Of the fuel types in Upper Stevens Creek, the most moderate hazards exist in the oak/madrone hardwoods, and the most extreme in the chaparral. Grasslands burn quite quickly but they do not have high fuel loads, therefore, they do not present high risks. The chaparral in the Park is old, fuel-laden, and would pose extreme difficulty in suppression; however, this fuel type is not particularly easy to ignite. Three areas present special challenges to fire management in Upper Stevens Creek Park: 1) Table Mountain, because of its concentration of dead trees and its position in the local topography; 2) the vegetation below and surrounding adjacent residences, both at the western and southern borders; and 3) the three residences on adjacent MROSD land.

The residences adjacent to Upper Stevens Creek Park at its western boundary are generally located above an oak/madrone hardwood fuel type. Douglas fir (and more heavy fuels) are currently concentrated on the lower slopes. Most of the lots are east-facing; although, some face the west and are protected by the uppermost ridge. Ignitions in this area are less likely because of a lack of access and a lack of grass (and the hardwoods are relatively difficult to ignite). Because of the aspect of the slope, a fire is not likely to be wind-driven, but would probably travel against the prevailing wind up slope.

In summary, there is a fire risk to the 19 homes at the Park's western boundary, the three MROSD residences at the Park's southern boundary, and the several homes at the Park's eastern boundary in Stevens Canyon; however, fires started at residences could also spread into the Park. Poor access and water supply in the Park exacerbate the Park's high fire hazard which is based primarily on the existing fuel load. Fire presents a risk not only to humans, but to Park resources. For example, fire damages vegetation, particularly native oaks. However, fire is also essential to restoration and maintenance of all vegetation types. Some risk to wildlife in the riparian corridor would occur from fire damage.

The highest fire hazard in the Park is associated with the Park's chaparral plant community. High fire hazard on Table Mountain is associated with its position in the local topography and the vegetation type (the relationship of grassland and dead pine trees) in the area. The Park's oak-madrone vegetation presents a moderate fire hazard.

Parkwide Objectives:

Objective B1: **Control wildfire throughout the Park where feasible through fuel management, including prescribed burns and clearing understory ladder fuel.**

Objective B2. **Minimize potential for damage to improvements (roads, structures, springs) where feasible.**

Objective B3: **Minimize potential for a fire escaping Park boundaries where feasible.**

Objective B4: **Minimize unplanned ignitions in the Park as feasible.**

Objective B5: **Enhance firefighting and fire response capability, as feasible, by insuring passable access during a wildfire by reducing fuel loads adjacent to roads and structures, and maintaining safe road gradients.**

Objective B6. **Balance wildlife habitat protection with fuel reduction by removing some dead wood to reduce the fuel load.**

Objective B7. **Increase predictability of fires and high risk fire periods, as feasible, which will aid rangers in deciding when to close the Park to protect public safety.**

Objectives by Vegetation Type:

Douglas fir forest

Objective B8. **Maintain Douglas fir survivability in the event of a wildfire.**

Chaparral

Objective B9. **Decrease proportion of dead wood in chaparral.**

Objective B10. **Create patches of the chaparral of different ages to reduce flammability and increase control potential.**

Grassland

Objective B11. **Encourage grassland along roads, rather than highly flammable plants such as chaparral. Grass is considered one of the easiest fuel types in which to suppress a fire.**

Patches of grassland habitat among more heavily vegetated areas form ecotones or edges between habitat types. These edges support a great variety of wildlife.

Abandoned Christmas Tree Farm (Table Mountain)

The grass on Table Mountain has high potential for ignition during the summer months. If ignited, the grass will serve as a wick to the declining conifers which are moderately flammable. The dead pine trees that are vertically continuous are likely to produce a shower of embers which would then rain down on vegetation on all sides of the topographic peninsula, igniting spot fires. These are likely to burn rapidly uphill and produce fire behavior that would challenge the best fire suppression efforts. Additionally, embers produced with a westerly wind would likely travel across Park boundaries and fall into the adjacent MROSD lands to the east and across Stevens Creek. Grass fires are most easily controlled. As a result, they are a desirable species to encourage on Table Mountain. The dead pine trees pose the greatest threat because they can spread fire quickly from their crowns.

Objective B12.* **Eliminate dying insect-harboring trees located in the abandoned Christmas Tree Farm on Table Mountain. By controlling the amount of dying trees due to insects, fire hazards related to dead plant material can be reduced.**

Objective B13. **Restore the abandoned Christmas Tree Farm area on Table Mountain to patches of oak/madrone woodland and encourage grass to reduce flammability, spotting potential, rates of spread and to improve potential for control. (This configuration of patches controls spread rate. Grassland, in particular, is one of the easiest fuel types in which to suppress fire.)**

Goal C. Encourage Land Use Practices Which Maintain and Enhance Park Resources

Goal C is intended to address existing and future problems that may be associated with trail uses, vehicular use, vegetation and fuel management projects. Erosion can adversely affect plant communities and wildlife habitat, and create unsafe access routes. In some cases, land use and construction activity can adversely affect Park resources.

Trail erosion exists on the multi-use trails related to bicycle, equestrian and vehicular use, primarily higher speed downhill travel, as well as on roads with steep gradients. Trail erosion at stream crossings related to bicycle and equestrian use, as observed on the Canyon Trail and Alternate Trail (currently being repaired) can adversely affect aquatic habitats for fish and wildlife. Trail erosion is particularly serious during wet weather. The installation of step-over logs to slow bicyclists and the rerouting of trails can mitigate this problem. The future trail/road, which is currently under construction near the Grizzly Flat Trail, contains gradients of 20 percent, posing an emergency access hazard.

The new trail/road, which will be constructed off of Grizzly Flat Road, is intended to be wide enough to provide vehicular access. The alignment of this new road follows an old ranch road which is overgrown with vegetation, except where it has been cleared in preparation of the new road's construction. Based on this alignment, the road will approach 20 percent at its steepest point according to Park staff;[2] although it may be steeper in places. The steepest point occurs in the area shown on Figure 3 (Chapter III) near the 2,000-foot elevation. This gradient poses safety hazards for emergency vehicles (in addition to erosion impacts).

The California Department of Forestry and Fire Protection Public Resources Code 4290 states ". . . road, streets, private lanes and driveways shall not exceed 15 percent, except up to 16 percent grades may be allowed by the local fire district for distances of not more than 400 feet."

Steep slopes on roads limit the types of equipment that can be used to suppress a fire. Even if the road travels downhill, the steepness of the grade may deter fire fighters from committing resources and personnel because in an

[2] Allan Wiegman, Park Ranger, Santa Clara County Parks and Recreation Department, personal communication, December 1992.

emergency, they need a safe escape route. Switchbacks can be installed to ameliorate long stretches of steep grade.

Parkwide Objectives:

Objective C1. **Control use on trails where slip-out or erosion is a problem.**

Objective C2. **Incorporate erosion control into ecosystem biodiversity and fire hazard reduction projects.**

Objective C3. **Install erosion control on existing trails and roads.**

Objective C4. **Construct trails and roads with gradients of less than 15 percent to the maximum extent feasible to improve emergency access. Where possible, 10 percent or less will dramatically reduce erosion problems.**

Goal D. Enhance Views

Goal D is intended to enhance a few select views within the Park that have been obscured by vegetation.

Scenic views to the north, west and south from Table Mountain are obscured by maturing non-native and some native vegetation. Table Mountain provides one of the few panoramic views in the Park. Views are much more limited than when the park was purchased.

The Parks and Recreation Department originally acquired the Table Mountain property, in part, because of the scenic views available from it, as well as its recreational and open space linkage values. These views have since diminished, primarily due to the growth of non-native trees associated with the abandoned Christmas Tree Farm. There is an additional view enhancement opportunity near the intersection of the Skyline Trail, Alternate Trail and Charcoal Road. These two view enhancement locations contain the only real long-range views in the Park. Other are obscured by topography or dense vegetation.

Parkwide Objectives:

Objective D1. **Enhance views from Table Mountain through vegetation management, such as restoring grasslands and removing non-native, insect-harboring diseased trees (as recommended objectives in Goals A and B).**

Goal E. Carry out Implementation Project Commensurate with Park Staffing Limitations

Upper Stevens Creek Park is operated out of the Sanborn/Skyline Park Ranger unit which is operated out of the Northwest Unit. The Northwest Unit includes nine of the County's Parks. The Sanborn/Skyline Park Unit provides ranger patrol and maintenance for Sanborn, Skyline and Upper Stevens Creek Parks. This unit has one senior ranger, two permanent rangers, two full time maintenance staff, three seasonal rangers, one seasonal maintenance staff and two seasonal student professionals (who primarily take fees at the entrance to Sanborn Park).

Currently, rangers patrol the Park an average of 12 hours per week. Maintenance staff spends roughly six hours per week in the Park. Overall, staff spends more time in the Park in the summer than in the winter, because of high use patterns in the summer and because staff avoids driving in the Park when roads are wet in order to minimize erosion.

Staff resources available to the Park are limited. Supplemental resources could be utilized to implement management programs; however, this labor is available primarily in the summer, and in some cases, requires Park staff supervision.

Parkwide Objective:

Objective E1. **Prioritize projects according to most needed and most effective.**

Chapter III
EXISTING CONDITIONS

▪ ▪ ▪

This chapter contains documentation and analysis of existing conditions within Upper Stevens Creek Park and in its immediate vicinity. This chapter lays the foundation for the goals and objectives and management projects recommended in following chapters.

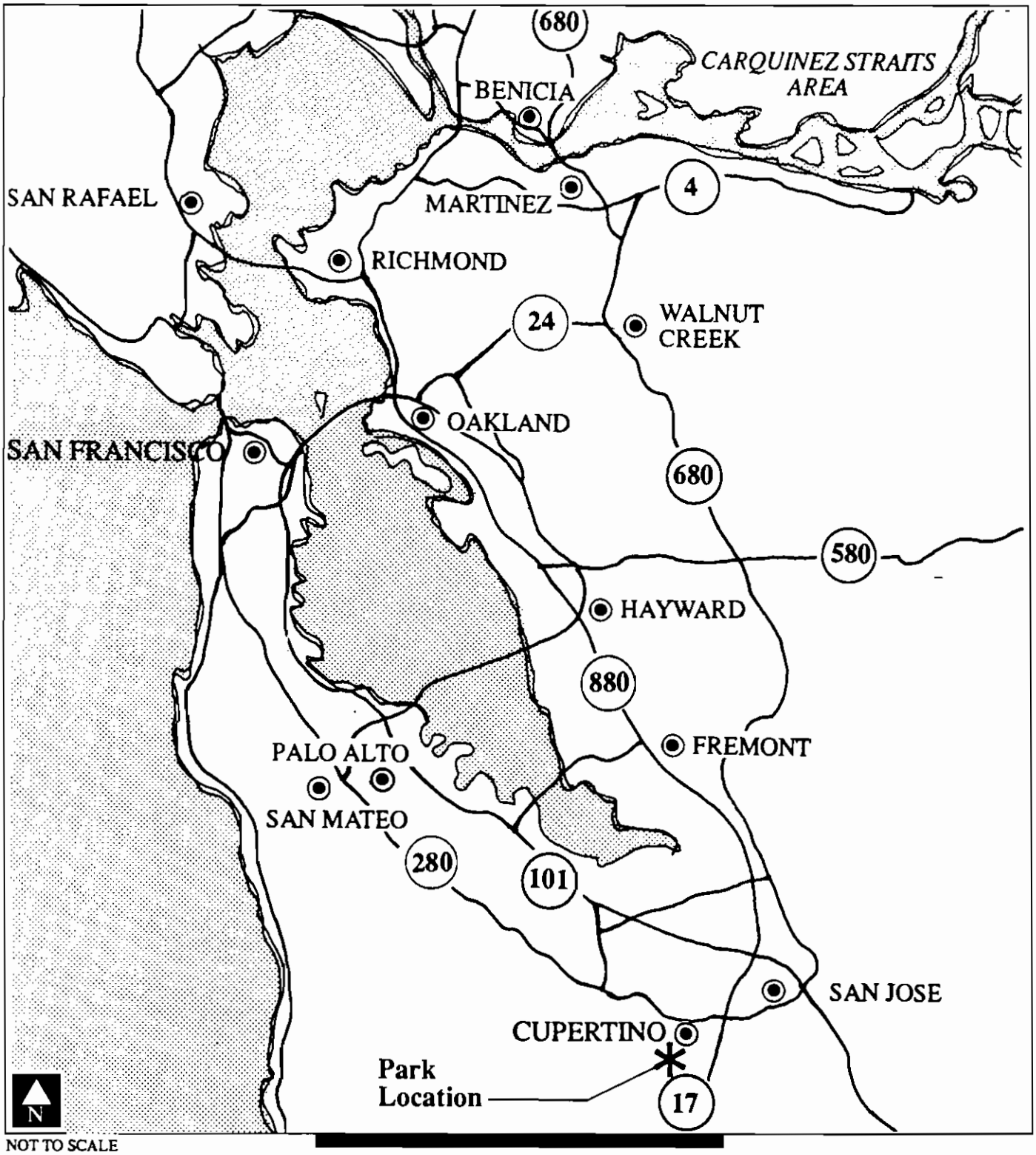
The following factors are described in this chapter:

A. Park Location
B. Climate
C. Park Characteristics
D. Accessibility
E. Land Use and Recreational Features
F. Park History and Archaeology
G. Geology, Soils and Hydrology
H. Vegetation and Wildlife
I. Fire Management Factors

A. Park Location

Upper Stevens Creek County Park is located on the western boundary of Santa Clara County, west of Cupertino and Saratoga, as shown in Figure 1. Upper Stevens Creek County Park, which is owned by Santa Clara County, covers 1,095 acres of land. Figure 2 shows the Park's location in the context of surrounding land, roads and trails. Figure 3 provides a larger-scale picture of the Park's boundaries and internal trails.

The Park is bordered on the southwest by Skyline Boulevard (Highway 35), except for two areas where private lots are located between the highway and the Park. Most of the northern and eastern perimeters of the Park border Midpeninsula Regional Open Space District (MROSD) land: to the north is MROSD's Monte Bello Open Space Preserve, to the southeast is Saratoga Gap Open Space Preserve, and to the west is Long Ridge Open Space



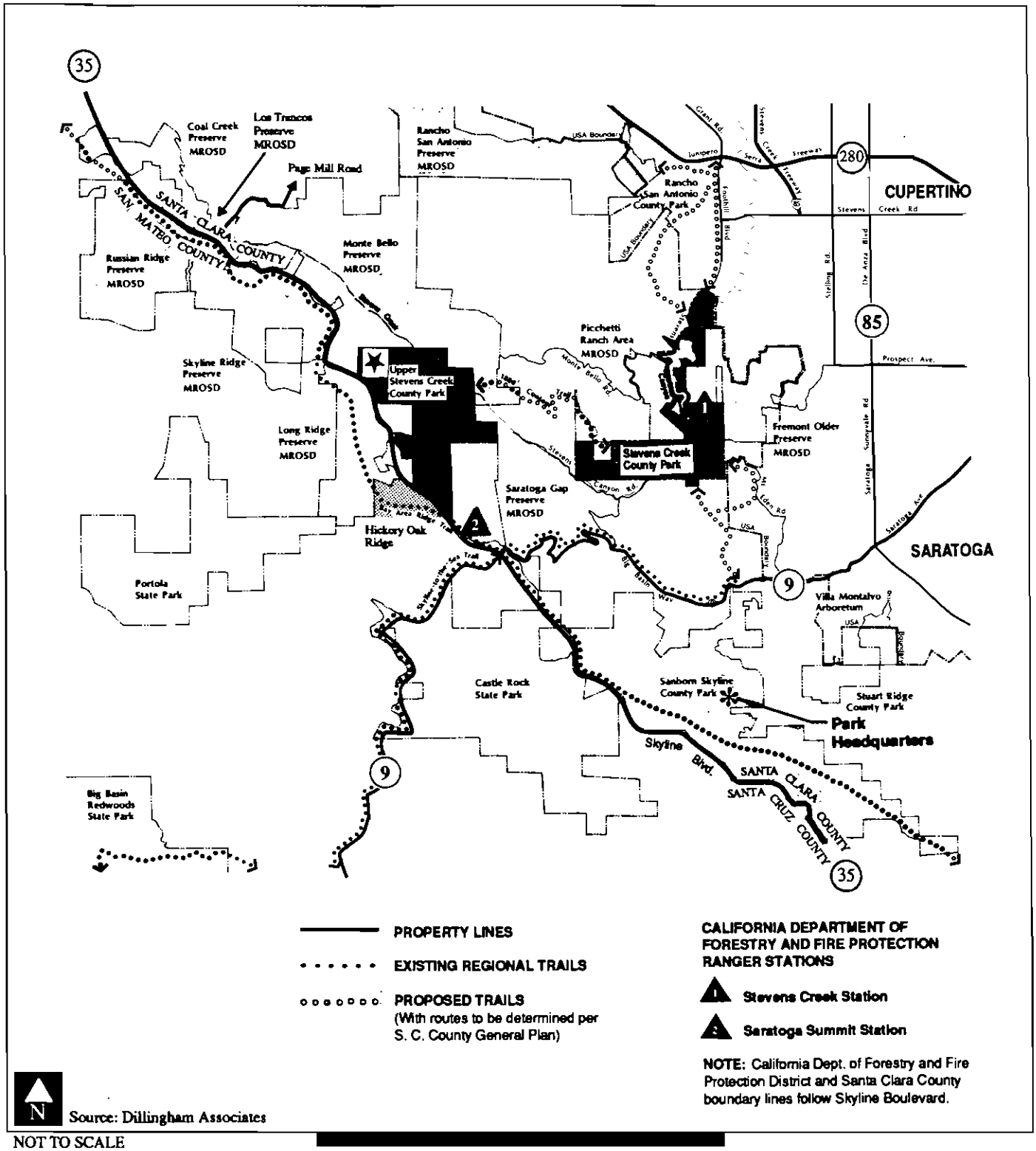
NOT TO SCALE

UPPER STEVENS CREEK
RESOURCE MANAGEMENT PLAN
Santa Clara County

FIGURE 1

Regional Location

BRADY AND ASSOCIATES
PLANNERS AND LANDSCAPE ARCHITECTS

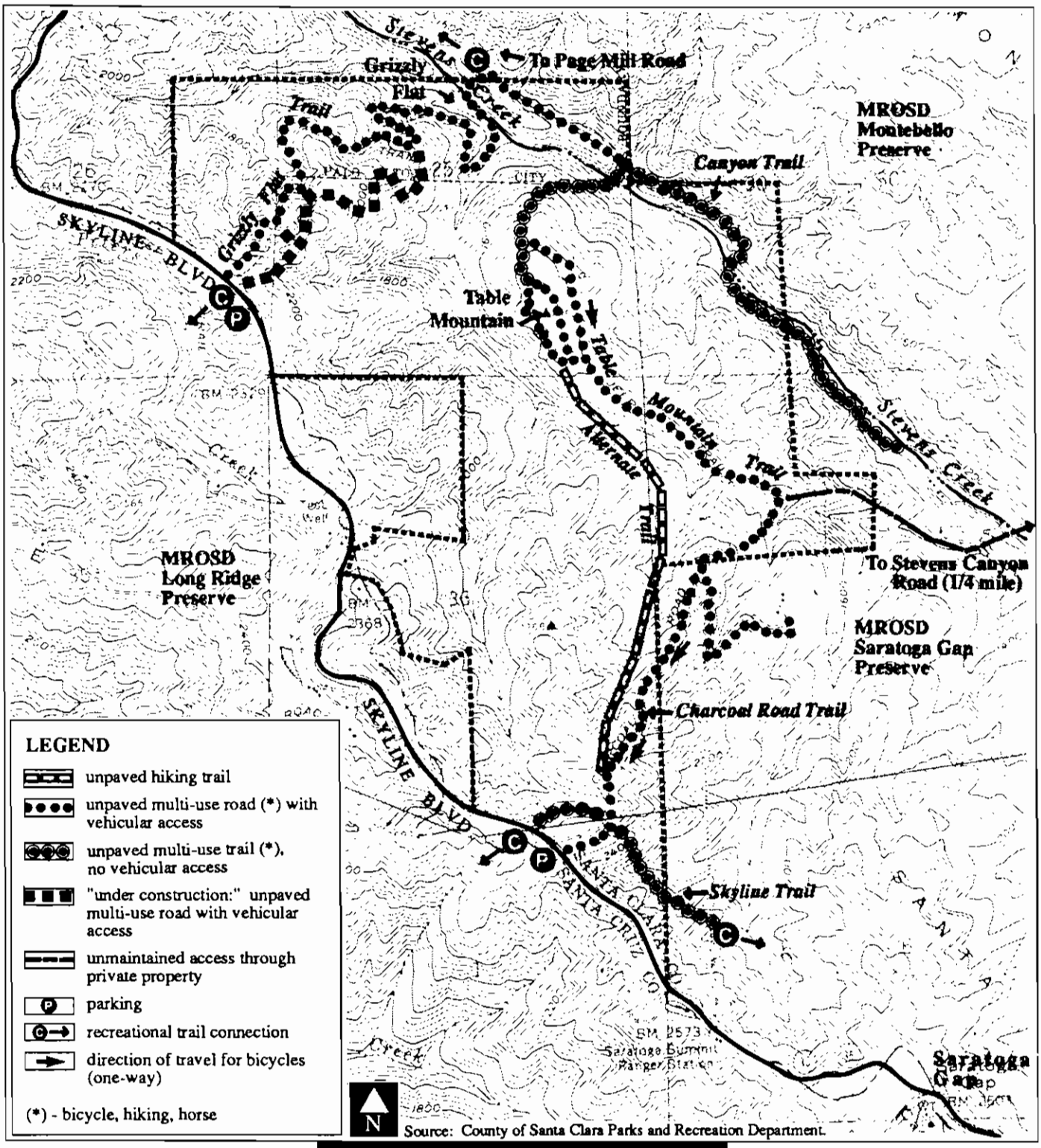


NOT TO SCALE

UPPER STEVENS CREEK
RESOURCE MANAGEMENT PLAN
Santa Clara County

FIGURE 2

Adjacent Lands and Linkages



UPPER STEVENS CREEK
RESOURCE MANAGEMENT PLAN
Santa Clara County

FIGURE 3

Parks Trails and Roads
(conceptually drawn)

BRADY AND ASSOCIATES
PLANNERS AND LANDSCAPE ARCHITECTS

Preserve. Undeveloped private land borders part of the eastern portion of the Park.

B. Climate

Located in the coastal fog belt, the Park has cool, damp winters and dry, warm summers. It receives about 45 inches of rain yearly, and seldom sees snow. The dry season extends from June into September, and summer temperatures range from the high 70's to the low 90's. Winds often blow up Stevens Creek Canyon from below Montebello Ridge to the northwest.[1] Climate is discussed in greater detail in Chapter III, Fire Management Factors.

C. Park Characteristics

Upper Stevens Creek Park is a densely vegetated, steep, remote Park. Oak-Madrone Mixed Hardwood Forest, the Douglas Fir Forest and Northern Mixed Chaparral are the most prevalent plant communities in the Park. Some slopes are covered with large ferns and appear moist and lush, while others are dry and grassy supporting oak grasslands. In addition to native plant communities, the Park contains the 38-acre Table Mountain area, a flat mountain top which contains a remnant Christmas tree farm. The Park is characterized by extreme variations in elevation and very steep slopes. Table Mountain which is located in the north central part of the Park, has an elevation of 1,852 feet. The highest elevation in the Park is 2,480 feet at Skyline Boulevard. Stevens Creek, at elevation 1,200, cuts across the Park's northern boundary, and another unnamed perennial creek runs north-south through the Park. The Park's deeply incised ridges contain slopes as great as 70 percent in places, and the majority of the Park contains slopes between 30 and 50 percent.

As shown in Figure 3, the Park has roughly five miles of internal trails that also link to adjacent public open space areas. The multi-use trails accommodate hikers, bicyclists, equestrians, and ranger and emergency vehicles. The Park also includes hiking-only trails.

[1] Michael Young, Table Mountain Resource Management Plan, Santa Clara County, 1984.

D. Accessibility

Upper Stevens Creek Park borders Skyline Boulevard (Highway 35), northwest of the intersection of Skyline Boulevard with Big Basin Way (Highway 9). The Park can be accessed from Stevens Creek Park (also known as Lower Stevens Creek Park), to the east, via Stevens Canyon Road to Big Basin Way.

Access to Upper Stevens Creek Park from Park headquarters in Sanborn/ Skyline Park is somewhat difficult because the Park's access points on Skyline Boulevard are accessible only by winding roads. In case of an emergency, if ranger patrol units are not already in the Park, it takes them at least 20 minutes to get from Park headquarters (in Sanborn Skyline Park) to Charcoal Road gate. The closest California Department of Forestry ranger station, Saratoga Summit Station, has good access, as it is located on Skyline Boulevard and only 3,000 feet from the Charcoal Road Trail access gate. The Park Ranger Station is located three miles from the gate.

Within the Park, vehicular access is limited to two primary 12-foot wide dirt roads, the Grizzly Flat Trail and the Charcoal Road Trail, both of which are very steep and windy in places. Many areas of the Park are not visited by rangers because access is limited by terrain, vegetation, and lack of roads. Park roads and trails are depicted in Figure 3. Access and road conditions as they relate to fire safety issues are discussed in greater detail in Chapter III.F. At the Park's southern boundary is an unmaintained access through private property to Stevens Canyon Road, which is 1/4 mile away. This road would need to be improved to accommodate Park, MROSD and Central Fire District 4-wheel drive vehicles.

E. Land Use and Recreational Factors

1. Surrounding Uses

Upper Stevens Creek County Park is surrounded by public land with the exception of some private land that borders part of the western portion of the Park and the eastern portion of the Park at the private road connection to Stevens Canyon Road. The Park is bordered on the west by Skyline Boulevard (Highway 35), except for two areas where private lots are located between the highway and the Park. Figure 2 shows the Park's location in the context of surrounding land, roads and trails. Figure 3 provides a larger-scale picture of the Park's boundaries, internal trails and location of residential development.

a. Surrounding Open Space Uses. Upper Stevens Creek Park is located in an area that is largely open space with a few scattered residential clusters. The MROSD Open Space Preserves border the Park and link to other preserves in the area, as shown in Figure 3. Monte Bello Preserve, to the north of the Park, connects to Rancho San Antonio Preserve. Skyline Ridge Preserve, located to the northwest, connects to Russian Ridge Preserve. Long Ridge Preserve, located to the west, connects to Portola State Park to the southwest. To the southeast, Saratoga Gap Preserve extends to the junction of Skyline Boulevard and Big Basin Way (Highway 9). Across this junction are Castle Rock State Park and Sanborn Skyline County Park. These lands are linked by connecting trails. The proposed Bay Area Ridge Trail will further link all the open space preserves and Parks together that are located along Skyline Boulevard, including Upper Stevens Creek Park.

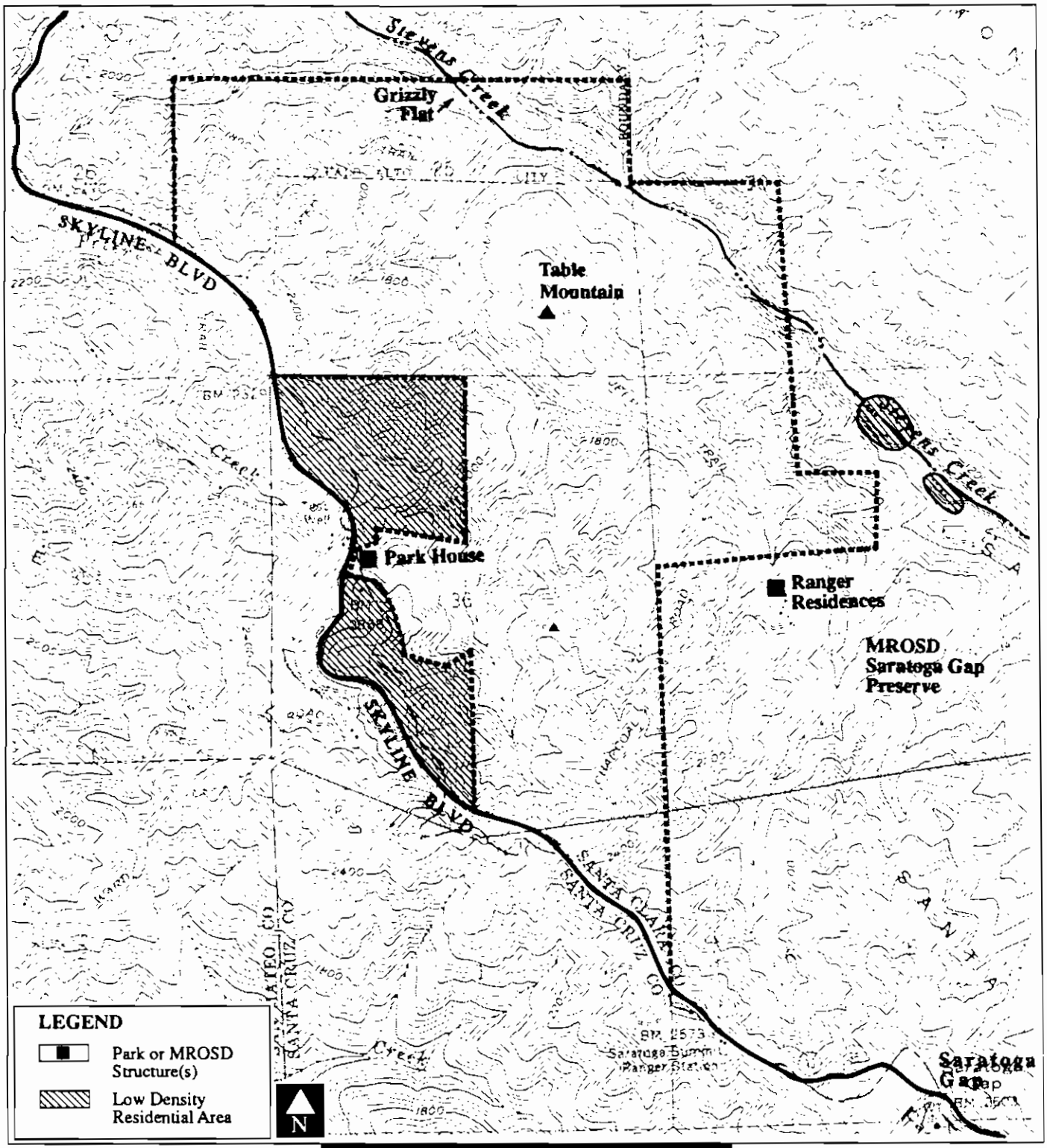
b. Surrounding Residential Development. There are 19 residential units adjacent to the Park with access off of Skyline Boulevard. In addition, there is one unoccupied County Park ranger unit in the vicinity of these homes. There are several residences located at the Park's eastern boundary in Stevens Creek Canyon. MROSD owns three residences which are located roughly 1,500 feet south of the Park in the Saratoga Gap Preserve. One of these is occupied by a ranger and the other two are rental units. Figure 4 shows the general location of these residential units. These units take access off of the Park's Charcoal Road Trail. MROSD maintains about one-half mile of the upper section of this road since it relies on the road for access to its residences.[2] The location of this residential area is shown in Figure 4.

2. Recreational Trails

a. Internal Park Trails.

(1) Trail Access and Linkages. The Park has two primary entrances which can be used by recreational users, both accessed from Skyline Boulevard. These two access points are at the Charcoal Road and the Grizzly Flat trailheads. There is a small Parking lot at the Grizzly Flat trailhead and limited Parking is available on the shoulder of Skyline Boulevard near the Charcoal Road gate. Another trailhead is located at the end of Stevens Canyon just outside the Park's eastern boundary.

[2] John Escobar, Operations Manager, Midpeninsula Regional Open Space District, personal communication, October 8, 1992.



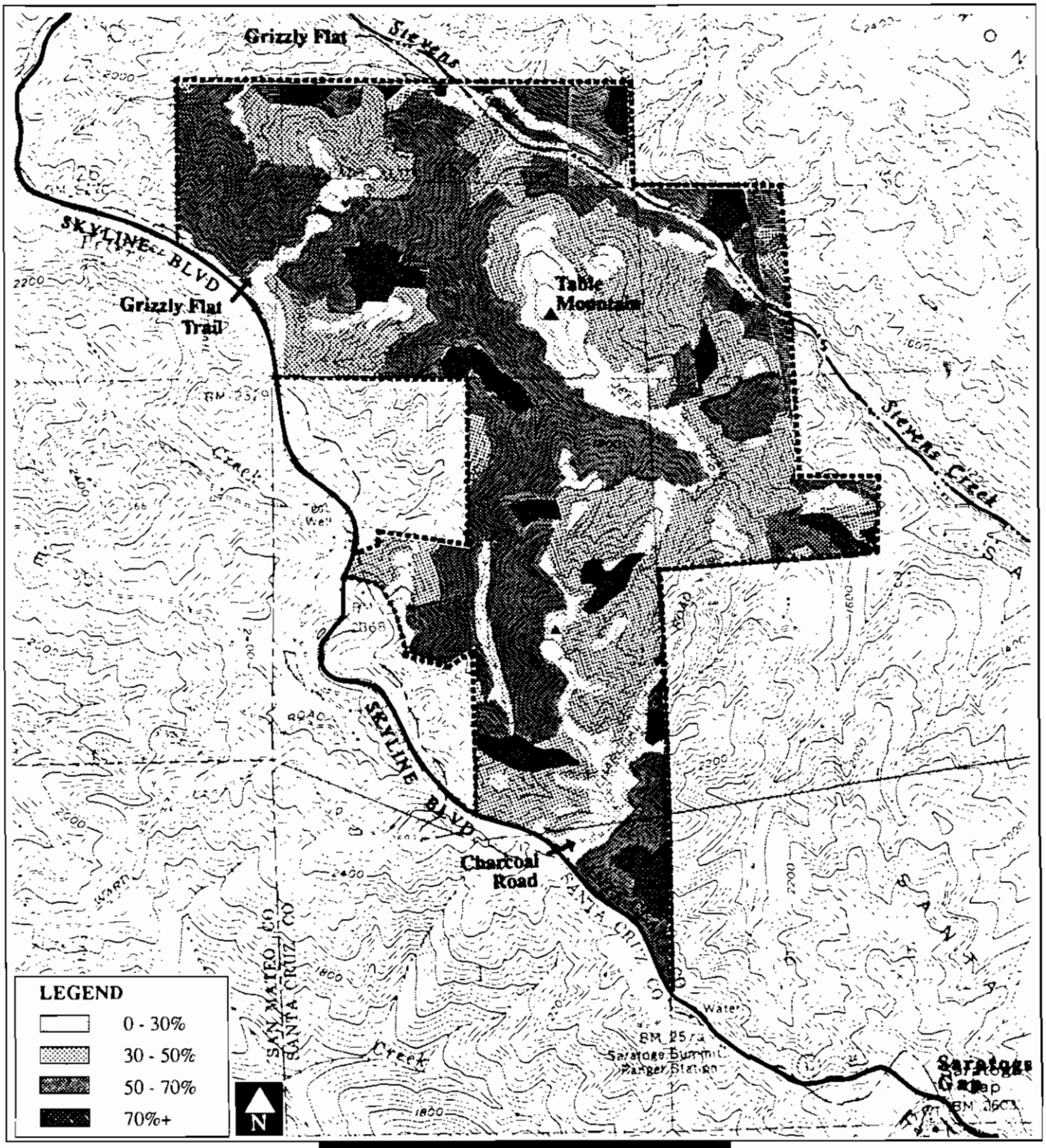
Scale in feet:
0 500 1000 2000 3000

UPPER STEVENS CREEK
RESOURCE MANAGEMENT PLAN
Santa Clara County

FIGURE 4

Structures in the Park and Vicinity

BRADY AND ASSOCIATES
PLANNERS AND LANDSCAPE ARCHITECTS



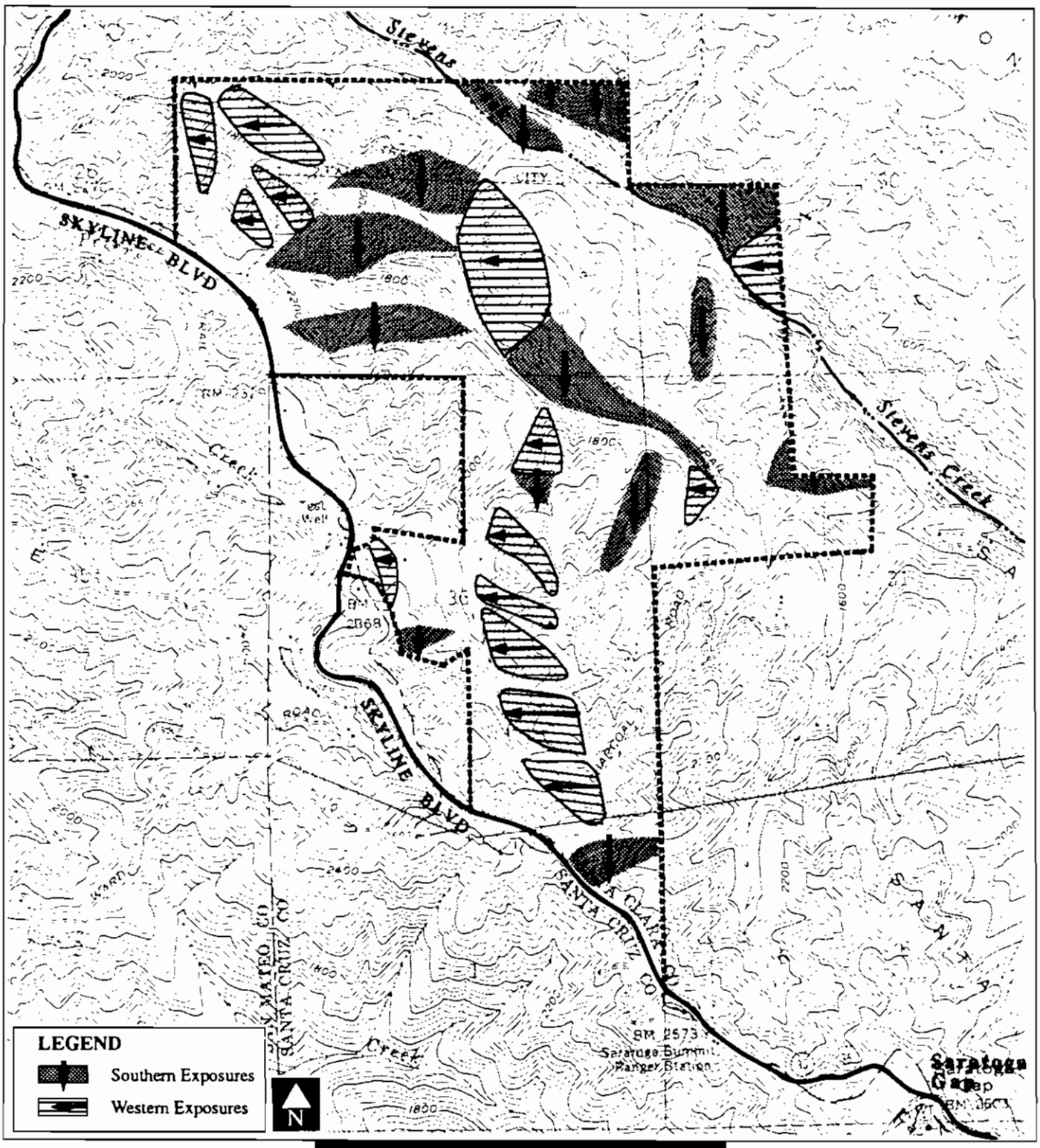
Scale in feet:
0 500 1000 2000 3000

UPPER STEVENS CREEK
RESOURCE MANAGEMENT PLAN
Santa Clara County

FIGURE 5

Slope Analysis

BRADY AND ASSOCIATES
PLANNERS AND LANDSCAPE ARCHITECTS



Scale in feet:
0 500 1000 2000 3000

UPPER STEVENS CREEK
RESOURCE MANAGEMENT PLAN
Santa Clara County

FIGURE 6

Aspect Map

BRADY AND ASSOCIATES
PLANNERS AND LANDSCAPE ARCHITECTS

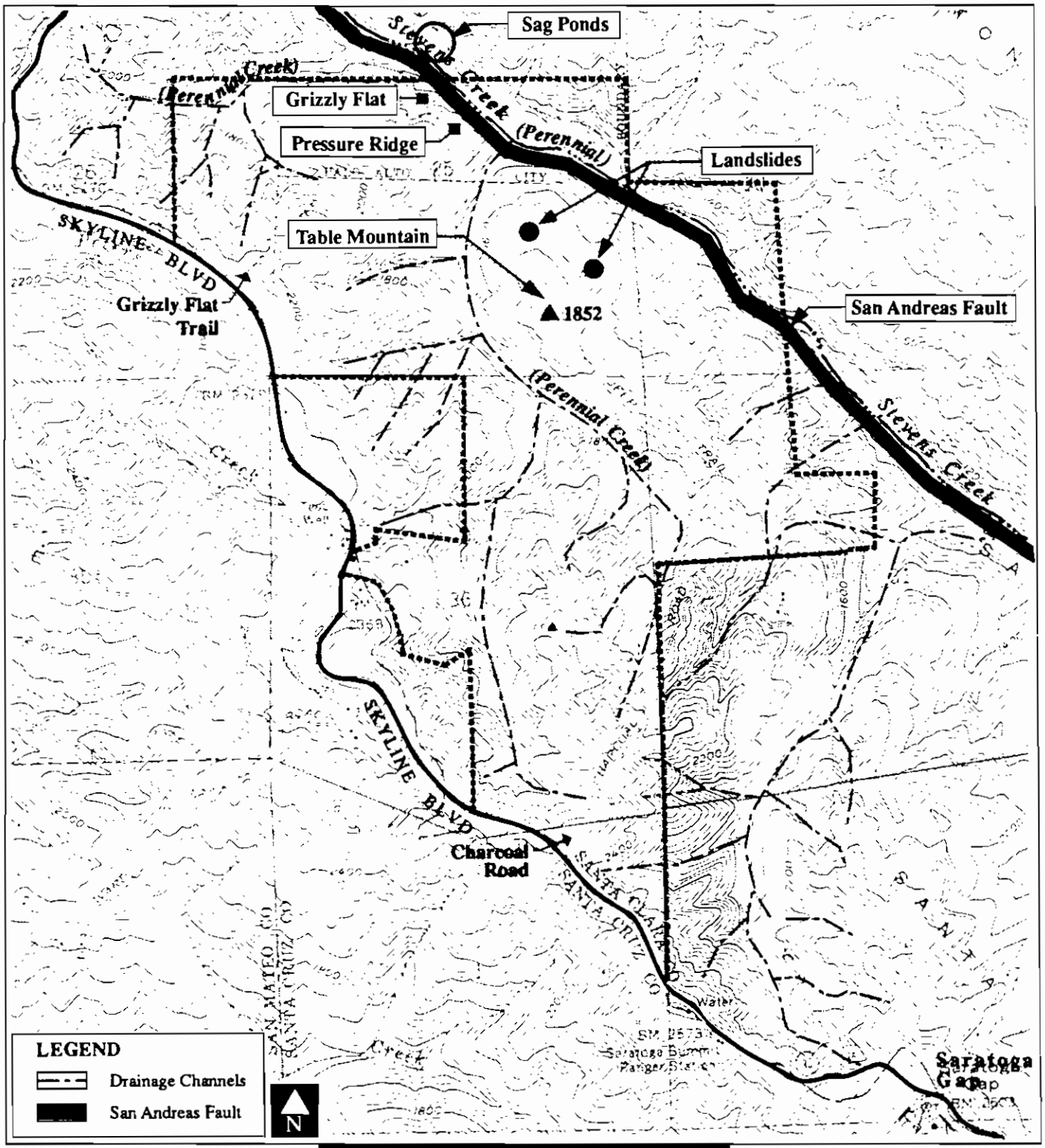
northwest into Steven's Creek, and have carved valleys with primarily east and west facing slopes. These valleys and canyons have very steep sides, slopes averaging 40 to 75 percent. The development along Skyline Boulevard, southwest of Table Mountain, rests on a ridge which falls off precipitously to the north and east.

There are three notable peaks in the Park. The highest of the three peaks is near the junction of Charcoal Road with Skyline Boulevard. A second peak is near the center of the site and the northern residential area. The third peak is on Grizzly Flat Trail near Skyline Boulevard.

2. Hydrology

Upper Stevens Creek Park is located on the steep hillside between Stevens Creek to the northeast and the ridge forming the Santa Clara County line to the southwest. As shown in Figure 7, this hillside is incised by an unnamed perennial (year-round) stream and several other perennial and seasonal drainages, which flow northeast into Stevens Creek. The perennial stream that transects the center of the Park runs roughly north-south within the Park, draining most of the Park. The watershed for this stream is entirely contained within the Park and the private lots located between the Park and Skyline Boulevard. The northwestern corner of the Park is drained by a seasonal drainage. The eastern portions of the Park drain also directly or indirectly into Stevens Creek.

Stevens Creek experiences flooding along its entire length during big rains. Flooding has been limited in recent years due to the six year drought. When flooding does occur, waters topping the stream's bank can cause safety problems for recreational users trying to cross the creek, as well as causing erosion. There are two crossings on Stevens Creek within the Park. One at Grizzly Flat and one where the Canyon Trail crosses the creek. These are "bottom crossings", which means there are no bridges, rather Park users must cross the creek using the logs or rocks within the creek bed. Erosion from flooding is a natural occurrence and does not appear to be caused by any activity in the Park.



UPPER STEVENS CREEK
RESOURCE MANAGEMENT PLAN

Santa Clara County

FIGURE 7

Geologic and Hydrologic Features

3. Geology and Soils

a. Geology. As shown in Figure 7, the San Andreas Fault traverses the northeastern portion of the Park, roughly along the course of Stevens Creek. Past earthquakes have left sag ponds alongside the creek a quarter-mile to a half-mile upstream from Grizzly Flat, near the western boundary with the Monte Bello Preserve. Sag ponds are areas of depression which periodically pond when it rains and the water table rises. The San Andreas fault is a strike-slip fault, with right lateral displacements; eastern blocks tend to move south. The underlying rock is in the Franciscan-Knoxville group of Jurassic age. Miocene beds border the fault.[12] A pressure ridge, which is formed by activity associated with the fault, is located below Grizzly Flat, and broken rock can be found at the base of this ridge.[13]

b. Soils. Most of the Park, southwest of Stevens Creek and the San Andreas Fault, has Felton-Maymen Association soils. Northeast of the fault are soils of the Maymen-Los Gatos Gaviota Association. Both soil associations are well to excessively well drained, forming a shallow to moderate layer of soils on sandstones and shales.[14]

The Felton-Maymen Association consists of eroded soils on strongly acid rock. Felton soils have brown silt loam surface soils and light brown clay loam subsoils. Maymen soils have fine sandy loam surface soils and light brown fine sandy loam subsoils, usually rocky. Felton and Maymen soils are suitable for pasture and woodland use with major limitations, but are used primarily for wildlife, recreation and watershed. Some Felton soils have been used for timber production. Logged areas show sheet, gully and rill erosion. Because of the bedrock substrate damage from severe erosion is hard to rebuild. Infiltration is slow.

Soils in the Maymen-Los Gatos-Gaviota Association are highly erodible and are suitable only or wildlife, watershed and recreation uses. Infiltration is very slow.

[12] U.S. Soil Conservation Service, *Soils of Santa Clara County*, 1968.

[13] Raleigh Young, Santa Clara County Parks, personal communication, October 2, 1992.

[14] U.S. Soil Conservation Service, *Soils of Santa Clara County*, 1968.

Landslides have occurred on Table Mountain. One is on the mountaintop, toward the eastern end of the tree farm. The other is on the hillside where the trail descends; the trail has slid out twice and had to be repaired.[15]

H. Vegetation and Wildlife

1. Methods

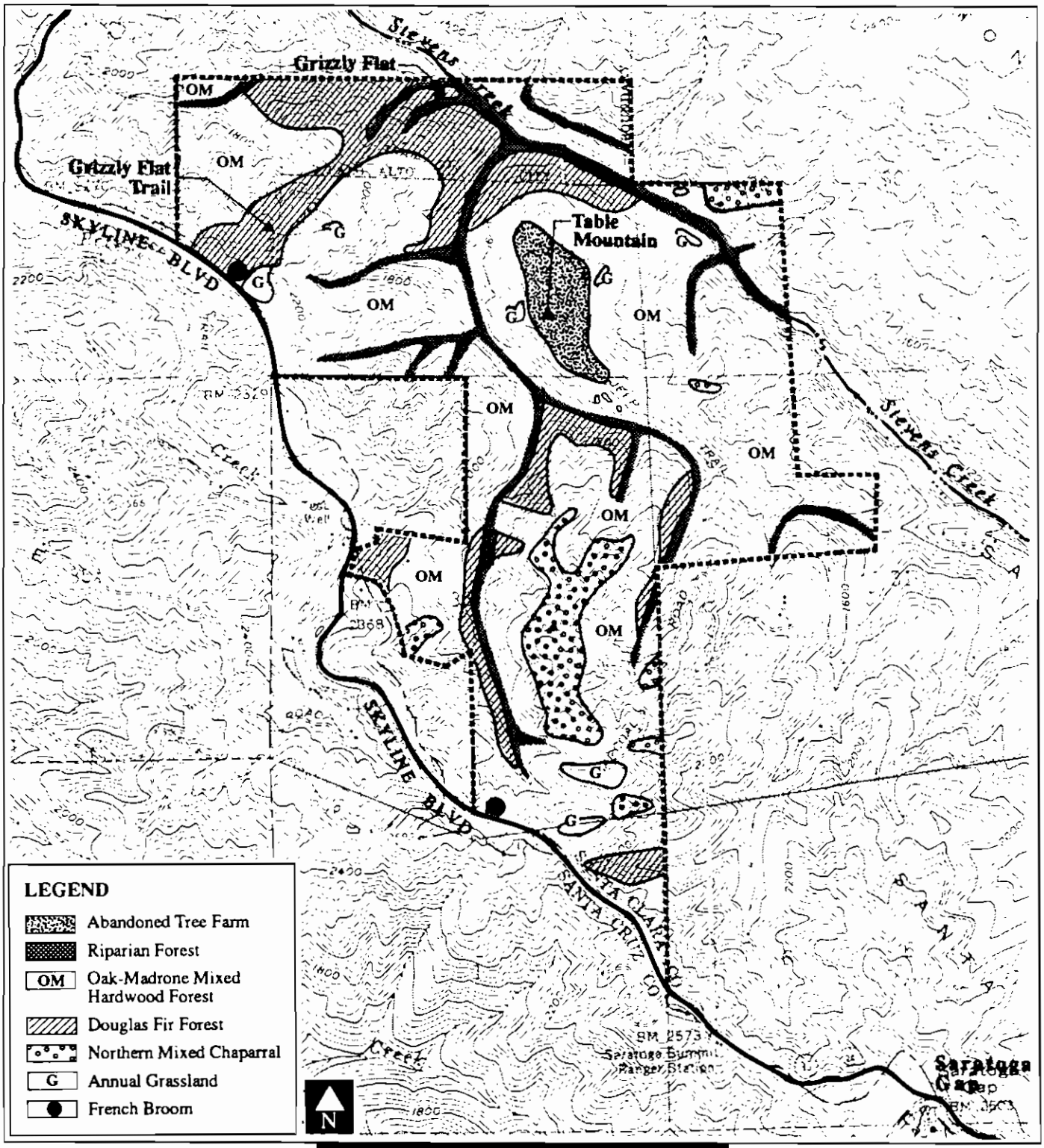
The vegetation resources of Upper Stevens Creek County Park were investigated in September and October 1992. In collaboration with Carol Rice, Wildland Resource Management, the Park's biotic resources were evaluated to determine successional trends, sensitive resources and other issues related to biotic resource management. Appendix B contains information on the wildlife survey methodology, and Appendix C contains information on the plant survey methodology.

2. Vegetation

The Park includes a variety of plant communities, which reflect the differences in topography, moisture availability and aspect. The majority of the wooded slopes have east-facing or north-facing exposures, whereas areas supporting grassland and chaparral have southern exposures or are associated with ridgetops. The plant communities include: oak-madrone mixed hardwood forest, Douglas fir forest, annual grassland, northern mixed chaparral, and riparian forest. Of these communities, northern mixed chaparral, annual grassland, and Douglas fir forest are recognized by Terrestrial Natural Communities of California (Holland, 1986). The plant communities that occur in Upper Stevens Creek County Park are depicted in Figure 8 and are described below. (See Appendix C for a list of Species in the Park.)

a. Oak-Madrone Mixed Hardwood Forest. Oak-madrone mixed hardwood forest is the dominant plant community found at Upper Stevens Creek Park and occupies approximately 680.4 acres. The overstory tree canopy is not distinctly layered and the dominant tree species are black oak (*Quercus kelloggii*) and madrone. The following overstory species also occur: California bay (*Umbellularia californica*), coast live oak (*Quercus agrifolia*), tan bark oak (*Lithocarpus densiflorus*), big leaf maple (*Acer macrophyllum*) and Douglas fir (*Pseudotsuga menziesii*). Coast redwood (*Sequoia sempervirens*), which is

[15] Raleigh Young, Santa Clara County Parks, personal communication, October 2, 1992.



UPPER STEVENS CREEK
RESOURCE MANAGEMENT PLAN
Santa Clara County

FIGURE 8

Plant Communities

typical of a mixed evergreen forest was not observed, except for some roadside plantings.

Some of the madrone trees appeared to be declining in health and vigor. Upper foliar dieback (assumed to be due to fungal pathogens) was observed in many of the madrone trees. Madrones are also susceptible to decreased vigor resulting from drought; therefore the foliar dieback may be caused by California's sixth year of drought.

The density of the understory varies; overall, the understory is open to moderately dense. The dominant woody shrubs are California hazel (*Corylus californica*) and poison oak (*Toxicodendron diversilobum*). Common herbaceous species include California blackberry (*Rubus ursinus*), western sword fern (*Polystichum munitum*), and western chain fern (*Woodwardia fimbriata*).

b. Douglas Fir Forest. Douglas fir forest occupies approximately 194.6 acres in Upper Stevens Creek Park. This type of forest is more prevalent on north-facing exposures and protected drainages compared to the oak-madrone mixed hardwood forest. The tree overstory has a dense two-layered canopy with Douglas fir being the dominant species in the upper layer. The lower canopy layer is dominated by California bay and tan bark oak. Other tree species observed include madrone, interior live oak (*Quercus wislizenii*), and big leaf maple.

The moderately dense shrub layer is dominated by California hazel, wild rose (*Rosa californica*) and poison oak. Other shrubs observed include blue blossom ceanothus (*Ceanothus thrysiflorus*), common snowberry (*Symphoricarpos albus* var. *laevigatus*), and ocean spray (*Holodiscus discolor*). The dominant herbaceous species are California blackberry, western sword fern, and hairy honeysuckle (*Lonicera hispidula*). The following herbaceous species also occur: wild cucumber (*Marah fabaceus*), brook foam (*Boykinia elata*), California brome (*Bromus carinatus*), bur chervil (*Anthriscus scandicina*), and rayless arnica (*Arnica discoidea*).

Lower limb dieback was observed in some of the Douglas fir trees. This may indicate old age and declining health or the dying lower limbs may reflect a natural thinning process due to competition for light, especially for trees on north-facing slopes.

c. Annual Grassland. Annual grassland occupies approximately 15.8 acres. Patches of grassland occur within the oak-madrone mixed hardwood forest and in open areas within the abandoned Table Mountain Tree Farm. The grasses tend to occur in areas having sunny exposures such as south-facing slopes or ridgetops. The largest area of grassland was observed along Skyline Boulevard in the vicinity of the entrance to Grizzly Flat. This area was noted to have had a recent fire. According to the California Department of Forestry, the burn was accidental and originated from human activity on Skyline Boulevard.[16]

The majority of the species in the annual grassland are non-native; however, the native grass species alkali rye grass (*Elymus triticoides*) is common. The following non-native grasses were observed: soft chess (*Bromus mollis*), wild oat (*Avena* sp.), ripgut brome (*Bromus diandrus*), and fescue grass (*Festuca* sp.). The annual grassland also supports flowering native species such as blue-eyed grass (*Sisyrinchium bellum*), iris (*Iris* sp.), California poppy (*Eschscholzia californica*), fireweed (*Epilobium* sp.), lupine (*Lupinus* sp,), and turpentine weed (*Trichostema lanceolatum*). In some of the grassland areas, there are scattered occurrences of coyote brush (*Baccharis pilularis* var. *consanguinea*). It appears that in some areas the grassland is undergoing succession into scrub or wooded habitats.

d. Northern Mixed Chaparral. Northern mixed chaparral occupies approximately 65.3 acres of the Park. Along the Charcoal Road Trail and the Alternate Trail, the oak-madrone mixed hardwood forest intergrades into northern mixed chaparral. The chaparral habitat appears to be associated with sandy soil along ridgetops. The shrub layer provides the dominant cover in this community type and is usually dense, 80-100 percent cover. The dominant woody shrub is usually hoary manzanita (*Arctostaphylos canescens*), although in some areas to the north of Stevens Creek, chamise (*Adenostoma fasciculatum*) is the dominant species. Other shrubs include sticky monkey flower (*Diplacus aurantiacus*), chaparral pea (*Pickeringia montana*), and toyon (*Heteromeles arbutifolia*). Yerba santa (*Eriodictyon californicum*) is also common. Stunted interior live oak, scrub oak (*Quercus dumosa*), coast live oak, and madrone trees are the dominant tree species.

Due to the dense shrub cover, the herbaceous layer is minimal. Most herbaceous species were noted immediately adjacent to trails where there is

[16] Allan Wiegman, Park Ranger, Santa Clara County Parks and Recreation Department, personal communication, October 1992.

less competition for light. Herbaceous species include pearly everlasting (*Anaphalis margaritacea*) and common wooly sunflower (*Eriophyllum lanatum*).

e. Riparian Forest. Riparian forest is very valuable because it supports a high density of wildlife species. Because riparian habitat is diminishing in California, it is given particular attention by Fish and Wildlife agencies.

Riparian forest is found along Steven's Creek and its major tributaries and is associated with perennial or intermittent water flow, respectively. Approximately 102.2 acres of riparian forest is found within the Park's boundaries. The species composition and the structure of the tree overstory varies throughout the Park. For example, the riparian forest located where the Canyon Trail crosses Steven's Creek has a two-layered tree canopy. The upper layer is dominated by white alder (*Alnus rhombifolia*), whereas the lower layer is dominated by California bay and big leaf maple. Where the Grizzly Flat Trail crosses Steven's Creek, there are no white alders and more tan bark oak and Douglas fir occur in the channel. In the riparian forest located at the lowest reach of Stevens Creek within the Park, western sycamore (*Platanus racemosa*) and willow (*Salix* sp.) are common. In some of the smaller tributaries, the dominant overstory species is California bay.

The species composition of the understory is not as variable. The understory is moderately dense, except where California bay trees are prevalent and the understory is open. The dominant woody shrubs are common snowberry (*Symphoricarpos albus* var. *laevigatus*), thimbleberry (*Rubus parviflorus* var. *velutinus)* and poison oak. Common herbaceous species include western coltsfoot (*Petasites frigidus* var. *palmatus*), stinging nettle (*Urtica dioica* ssp. *holosericea*), western sword fern, and California mugwort (*Artemisia douglasiana*).

f. Abandoned Tree Farm (Table Mountain). The vegetation found at Table Mountain consists mainly of non-native species planted to create a tree farm in about 1940. Prior to planting, the area was probably a grassland. The tree farm occupies approximately 36.7 acres and supports a mosaic of community types with annual grassland and scrub elements forming patches between scattered non-native conifer species. Many young madrone trees and coyote brush are colonizing the area.

The dominant tree species are non-native Monterey pine (*Pinus radiata*) and Coulter pine (*Pinus coulteri*). White fir (*Abies concolor*), Sequoia big tree (*Sequoiadendron giganteum*), Douglas fir, noble fir (*Abies procera*) and Scotch

pine (*Pinus sylvestris*) were also observed. Of these tree species, only Douglas fir is native to this region.

Overall, the shrub layer is open and is dominated by scattered coyote brush and poison oak. Coffeeberry (*Rhamnus californica*), toyon, and manzanita also occur.

The herbaceous layer consists of patches of bracken fern, California blackberry, and grasses. The dominant grasses are alkali rye grass, soft chess, and wild oat. Additional flowering species include iris, pearly everlasting, common thistle (*Cirsium vulgare*), terpentine weed, English plantain (*Plantago lanceolata*), and tarweed (*Madia* sp.).

Common thistle is an invasive non-native species that appears along the road cuts in this area. This species can interfere with establishment of desired native species.

Some of the grassy areas within Table Mountain support hydrophytic species that are characteristic of wet meadows. These species include English plantain, common rush (*Juncus patens*), and sedge (*Carex* sp.).

Hydrophytic plant species were also observed in a small (1,500 square-foot) man-made, earthen reservoir located on a portion of the east-facing slope of Table Mountain (Figure 8). According to Park Ranger Allan Wiegman, the reservoir was originally built for holding irrigation water for the tree farm. During the October 1992 field survey, water was present in the reservoir. The reservoir appears to be spring fed.

The common plant species at the reservoir include: cat-tail *(Typha sp.)*, common rush, arroyo willow *(Salix lasiolepis)*, and water smartweed *(Polygonum punctatum)*.

Many of the pine species, especially Monterey pine, are either dead or declining in health/vigor. The poor health of the pines may be attributed to bark beetles and fungal pathogens. Inspection of the bark showed insect galleries and fungal fruiting bodies such as brackets on the outer bark. The bark-boring beetles can eventually kill the infested trees and spread to adjacent healthy trees. The beetles feed and breed beneath the bark, destroying a portion of the cambium. Each pair of beetles kill a limited amount of living tissue, but if enough pairs attack a tree so that their feeding areas overlap, a tree will become girdled and die. (Cooper, 1992.)

g. Plant Species of Concern. Riparian plant communities are the most sensitive. This community is considered sensitive habitat and have been identified by the California Department of Fish and Game as habitat of special concern (Wetlands Resource Policy, California Department of Fish and Game Commission, 1987). Riparian habitat is valuable because it supports a high density and diversity of wildlife species and because it is a diminishing resource. In the State of California, at least 89.0 percent of riparian areas existing 130 years ago have been lost.

Plant species which are legally protected by federal or State law or which are being considered for protection, may occur in the Park. The records of the California Natural Diversity Data Base (WDDB, 1990) and the California Native Plant Society (Smith and Berg, 1988) indicate that 42 plant species of concern have the potential to occur in Santa Clara County. These species were screened by assessing habitat and substrate requirements to determine which ones have the potential to occur in the vicinity of Upper Stevens Creek County Park. A rock outcrop of serpentine soil was identified just east of the Park adjacent to Steven's Creek in oak-madrone mixed hardwood forest, roughly 3,000 feet north of the MROSD residence. Because the rock outcropping could extend into the Park, rare serpentine endemics that occur in Santa Clara County have been included in the list of potential species of concern.

The screening resulted in the following 17 species: arcuate bush mallow (*Malacothamnus arcuatus*), balsamroot (*Balsamorhiza macrolepis* var. *macrolepis*), California bottlebrush grass (*Elymus californicus*), caper-fruited tropidocarpum (*Tropidocarpum capparideum*), clustered lady's slipper (*Cypripedium fasciculatum*), Contra Costa goldfields (*Lasthenia conjugens*), fragrant fritillary (*Frillaria liliacea*), Hoover's button celery (*Eryngium aristulatum* var. *hooveri*), hospital canyon larkspur (*Delphinium californicum* ssp. *interius*), Marin dwarf flax, (*Hesperolinon congestum*), Oakland star tulip (*Calochortus umbellatus*), Santa Clara thorn mint (*Acanthomintha lanceolata*), Santa Cruz Mountains beardtongue (*Penstemon ratanii* var. *kleei*), Santa Cruz Mountains pussypaws (*Calyptridium parryi* var. *hesseae*), straggly gooseberry (*Ribes divaricatum* var. *publiflorum*), valley oak (*Quercus lobata*), and western leatherwood (*Dirca occidentalis*). The status codes, potential habitat, and blooming periods for these potential species of concern are listed in Appendix D.

None of these potential species of concern were observed during the fall 1992 field survey. However, it should be noted that the species listed in

Appendix D have bloom periods before the present field survey. Past observations by forester, John Nicoles, document the presence of valley oak at the Park. Occasional grassy openings in the forest habitat are likely to support rich displays of spring wildflowers. In particular, a grassy knoll to the northwest of Table Mountain along the Table Mountain Trail appears likely to provide habitat for species of concern. Flowering species at this particular knoll include hirsute gum plant (*Grindelia hirsutula*) and stiff bird's beak (*Cordylanthus rigidus*).

California's endangered plants are protected under the California Endangered Species Act (CESA) and the California Native Plant Protection Act (NPPA).

Of the 17 plant species of concern shown in the table contained in Appendix D, five species are considered rare, threatened, or endangered and merit protection. These species are: fragrant fritillary (in the coastal scrub and grassland habitats), Marin dwarf flax (in the grassland and on dry slopes on serpentine), Contra Costa goldfields (in moist areas and grassland habitat), carper-fruited tropidocarpum (in the grassland habitat), and Santa Cruz mountains pussypaws (in the chaparral habitat). Whereas, the other 12 species of concern need more data to support protection or are the watch list of species with limited distribution. For information on the legal status of each species of concern, see the codes presented in the footnotes in Appendix D.

h. Exotics. Two populations of the invasive, non-native French broom (*Cytisus monspessulanus*) were observed along Skyline Boulevard and are depicted in Figure 8.

3. Vegetation Dynamics — Succession

In order to develop a management plan for the Park it is important not only to know what resources exist, but also what natural processes are occurring. With such understanding, a strategy can be developed to encourage or discourage the natural process.

During the field reconnaissance, several observations were made which provided keys to the natural processes. Observations from Park rangers and a study of aerial photography also provided clues. Finally, a knowledge of vegetation dynamics led to conclusions and recommendations.

a. Conclusions on Successional Trends in the Park. The canopy and understory of the Park used to be much more open. Lower stand densities were common. All tree species that are present today occurred in the past,

however the prevalence of the species is shifting. It is likely the Park was covered by more oak savanna, with grass understory. This vegetation type and stand structure was probably created and maintained by frequent fires. This coincides with clear evidence of residence of native Americans who were likely to tend the land with fire to foster acorn, and grass seed as food crops, and to encourage deer habitat (which is open chaparral, mixed with open oak savannah). Without fires, the grasslands tend to decrease in size. Review of aerial photos, dated 1986, confirms that the grassland has been diminishing in size.

b. Summary of Successional Characteristics and Trends in the Park. In general, with no action, the Park will succeed to a more uniform vegetation. Grassland, chaparral, and oak/madrone woodlands will decline in areal extent; however, species will remain as minor component. Douglas fir (and riparian vegetation, to a limited extent) will increase in area and attain dominance in the majority of the Park. Wildlife species diversity will change correspondingly, with species that possess high affiliations with grassland, oak forest and chaparral becoming less numerous or absent from the Park, and conifer-associated species becoming more numerous. Overall, wildlife species richness is expected to decrease over current conditions through time.

Diversity will be reduced with the more uniform vegetation, and ultimately, there will be a more uniform age distribution (no young stands). In some places, (such as where grasslands have been invaded) the changes have already happened. Douglas fir could succeed oaks in 20-30 years, while other changes, such as invasion of the chaparral, will take longer.

The plant community stages that are missing or not well represented are young oak woodlands, young chaparral, and expanses of grass. The successional characteristics and trends for each plant community in the Park is described below:

(1) Oak/madrone woodlands.

(a) Characteristics of Succession. There are several successional pathways that have been recognized in mixed evergreen hardwoods on the coast of California. With frequent, light fires, oaks are generally maintained as open stands with a grass understory. Shrubs occur on the outside of stand and among openings of the forest. With infrequent fires, the disturbance will be more intense, and will be stand-replacing in nature. Most importantly, between infrequent fires — a period lasting as long as hundreds of years — oaks and madrones will become a minor component of Douglas fir forest.

(b) Successional Trend in the Park. Although oak regeneration was observed in openings in the canopy, the more common trend in the Park is that Douglas fir is invading the oak/madrone woodland where the stands density forms more of a closed canopy. The Douglas fir is currently a ladder fuel, occupying both the understory and the lower portion of the canopy. It is expected the Douglas fir will be taller than the oaks in 20-30 years. In places where Douglas fir has already overtopped the oaks, the hardwoods are already declining because of lack of light. This is more common in black oak stands, and was observed along the Grizzly Flat Trail near the switchbacks. The understory shrubs are declining generally throughout the Park because of the increased stand density and resulting lack of light (and possibly water due to the six year drought).

(2) Douglas fir forest.

(a) Characteristics of Succession. Where Douglas fir stands are 80 years old and have gained dominance over the oak canopy, many oak and Douglas fir logs lay on ground, indicating a site conducive to insect and fungal infestations. Oaks still standing rarely have more than two branches still alive. Here a conversion from oak/madrone woodland to Douglas fir forest is almost complete.

The pattern of succession to Douglas fir has been recently documented in several publications (Amme 1987, McBride et al. 1987, Rice 1983). Thus the successional pathways that a Douglas fir forest follows is of interest. With frequent fires, (i.e. 20 years) the understory of a closed canopy forest will be kept clear, and the stand density will be low. The patch size is small. Where Douglas fir trees are open grown, frequent fires will maintain a grassy understory. With moderately frequent fires (i.e., 40 years), an understory of oaks, hazelnuts, madrones, and tanoaks will be present between fires, however, fire will kill all but the largest trees. Infrequent fires are stand-replacing fires, where early successional vegetation results after the blaze.

(b) Successional Trend in the Park. The Douglas fir forest is increasing in area throughout the Park. Douglas fir trees have grown in almost all vegetation types, creating an understory in the oak/madrone forest of almost pure Douglas fir, and invading margins of grasslands and chaparral stands.

Within the older Douglas fir forests, stand density has almost doubled in last 60-70 years because of the growth of new Douglas fir trees. Numerous Douglas fir trees that grew in the open were observed, as indicated by the

thick and low branching habit of the trees. These same trees have "close neighbors" now and the lower branches have died because of the lack of light.

(3) Grassland.

(a) Characteristics of Succession. Because grasslands are an early vegetation stage in all but the most infertile soils, the successional pathways are more simple. With frequent fires, grasslands are maintained. With infrequent fires, grasslands are relatively quickly replaced with shrubs (such as coyote brush and other species of the north coastal scrub), chaparral, Douglas fir, and oaks.

(b) Successional Trend in the Park. Most of the small patches of grasslands in the Park have already been converted to a variety of vegetation types, leaving only remnants of larger meadows.

(4) Chaparral.

(a) Characteristics of Succession. While chaparral commonly is the last vegetation to change into the climax community of Douglas fir due to the rocky soils conditions where chaparral grows, several shifts in species composition, and stand structure, occur in the years following fire. With fires more frequent than every 20 years, sprouting species will become more dominant because the species that rely on seeds to reproduce may not have enough time to establish a bountiful seed bank. With moderately frequent fires, all species — sprouting, seeding, and fire-following herbs — are maintained. With infrequent fires, chaparral is slowly invaded by Douglas fir. Fire-following herbs may be lost from seed bank because the length of time between fires is longer than the time in which the seeds are viable.

(b) Successional Trend in the Park. The chaparral in Upper Stevens Creek Park is old, and undergoing several shifts in its composition. Within the chaparral community itself, oaks gain dominance because of higher stature (although will not assume true tree size), and short-lived species diminish in cover.

(5) Riparian. The riparian vegetation is not normally associated with fires so the successional pathways are not well documented. With frequent fires, the area of riparian vegetation would be limited because fire would top-kill the plants. And conversely, with infrequent fires, riparian corridors would be expected to expand.

(6) Abandoned Christmas Tree Farm (Table Mountain). One possible successional pathway that Table Mountain could follow without management is that fungus and disease will kill the existing pines, resulting conditions that would create a stand-replacing fire. A grassland with an occasional sprouting oak species would result in areas that are not blanketed with a new crop of pine seedlings. If no fire occurs, the pines will continue to reproduce along with the oak and madrones currently encroaching the old Christmas tree farm, and a dense hybrid forest of pines, firs, redwoods and hardwoods would result. With management, however, the historic mixture of woodland and grassland can be fostered.

4. Wildlife

Upper Stevens Creek County Park provides habitat for a variety of wildlife species. Wildlife species richness in the Park is relatively high due to its large size, the diversity of habitat types present, the occurrence of surface water, and presence of movement corridors. The undeveloped landscape of the project site contributes to biodiversity of the Stevens Creek watershed.

Wildlife species diversity and abundance on the project site varies seasonally, and annually depending on the quantity and quality of resources present and successional stage of habitat development. While some wildlife species may be restricted to certain plant communities due to specific habitat requirements, many of them utilize several of the habitats present in the Park. In general, the habitats and wildlife species of the Park are typical of the Santa Cruz Mountains. (Appendix B lists known or predicted species found in the Park.)

a. Oak-Madrone Mixed Hardwood Forest. The wildlife value of the oak-madrone mixed-hardwood forest varies with the degree of canopy cover and density and diversity of understory plant species present. Wildlife species diversity and abundance is high where the vegetation is highly-stratified, offering a greater variety of niches for wildlife species.

Oak woodlands are considered critical habitats for the conservation of many bird and mammals species (Block *et al.* 1990). Important habitat features of oak woodlands include acorns and the presence of cavity-bearing trees. As a seasonal food, acorns are important for the survival of many species of wildlife in fall and winter (Tietje 1990). Mature oak trees bear natural cavities which are important resources for cavity-nesting birds, and small mammals. Also, mature oak forests typically contain snags (standing dead trees). Snags are valuable resources for woodpeckers, which prefer dead trees and limbs for excavation of roost and nest sites (Thomas 1979). Subsequently, snags receive

high levels of use by secondary cavity-nesting birds such as chickadees and wrens. Snags also support wood-boring insects which provide food for bark-gleaning insectivorous birds.

Some of the other important food plants for wildlife that occur in this habitat include madrone, California hazelnut, coffeeberry, blackberry, and poison oak. These plants provide seasonal wildlife food such as berries and nuts which are consumed by many bird and mammal species.

Another important feature of the oak-madrone forest is the abundance of fallen woody debris (e.g., limbs and logs). Woody debris adds structural complexity to the forest habitat , and is important as cover, nesting, roosting, and foraging substrate for wildlife. Downed wood also helps moderate arid conditions, creating micro-climates suitable for amphibians and reptiles.

(1) Amphibians. The micro-climate resulting from the shade of canopy trees and the presence of downed woody debris offers suitable cover for many amphibians. The debris provides suitable breeding and cover sites for species such as arboreal salamander, Ensatina and California slender salamander. Aquatic breeding species, such as California newt, typically spend their terrestrial existence in rodent burrows or under woody debris.

(2) Reptiles. The oak-madrone forest supports a high diversity of reptiles due to the abundant prey and cover provided by understory vegetation and fallen woody material. Representative species which occur in this habitat include western fence lizard, southern alligator lizard, western skink, common kingsnake and ringneck snake.

(3) Birds. Bird species richness and abundance is high in the oak forest, especially where the understory is stratified and dense. This habitat is especially important to cavity-nesters and those species that consume acorns. As a result of many factors (migratory and local movements, reproduction, mortality, seasonally changing habitat requirements) bird populations are distinctly different from season to season.

Typical cavity-nesting birds include chestnut-backed chickadee, Bewick's wren, plain titmouse, western screech owl, hairy woodpecker, Nuttall's woodpecker and acorn woodpecker. Birds that are dependent on acorns as a seasonal food include acorn woodpecker, Steller's jay, band-tailed pigeon, California quail, mountain quail and wild turkey. Other representative bird species which occur in the hardwood forest include red-tailed hawk, Cooper's hawk, great horned

owl, dark-eyed junco, rufous-sided towhee, black-throated gray warbler, black-headed grosbeak, Hutton's vireo, solitary vireo and orange-crowned warbler.

(4) Mammals. Most of the mammals known or predicted to occur in this habitat are essentially year-round residents. The moist ground conditions created by the abundant duff layer support large invertebrate populations, providing prey for insectivores, such as shrews and moles. Acorns provide a valuable seasonal food for deer and squirrels, and offer suitable denning sites for cavity-dwelling mammals. Trees and the aerial habitat of the oak forest are used by a variety of bat species.

Representative species known or expected to occur in this habitat include broad-footed mole, dusky-footed woodrat, deer mouse, brush mouse, black-tailed deer, Merriam's chipmunk, western gray squirrel, bobcat, gray fox, striped skunk, Virginia opossum, red bat, hoary bat and California myotis.

b. Douglas Fir Forest. This habitat is of limited occurrence in Santa Clara County, occurring only near the crest of the Santa Cruz mountains. Wildlife use of this habitat is expected to be similar to that of adjacent oak-madrone forest. However, some wildlife species have a higher degree of association with the Douglas fir forest, due to the predominance of Douglas firs and the more moist nature of the understory in this forest type. Douglas firs are unique in the project area as a native cone-bearing tree. Several wildlife species of the project site are principally associated with these trees.

(1) Amphibians. Representative species in this habitat include Pacific giant salamander, California slender salamander and California newt.

(2) Reptiles. Species associated with moist environments that are expected to occur in this habitat include sharp-tailed snake, California mountain kingsnake and northern alligator lizard.

(3) Birds. The breeding avifauna of this habitat is distinct due to the predominance of Douglas firs, which support bird species commonly associated with coastal coniferous forests. These include northern saw-whet owl, sharp-shinned hawk, olive-sided flycatcher, brown creeper, pygmy nuthatch, yellow-rumped warbler, western tanager, and pine siskin. Tall Douglas fir trees could provide nest sites for golden eagles. Purple finch are probably more numerous in this habitat than in adjacent oak forests. Red crossbills are highly dependent on cones of conifers and may be numerous in the Park in some years. The dark, mesic understory is highly suitable for wintering varied thrush.

(4) Mammals. The mesic soil conditions of this habitat are suitable for insectivores such as Trowbridge's shrew and shrew-mole. Fringed bat, long-eared bat and silver-haired bat are a few of the bats expected to roost and forage in this habitat.

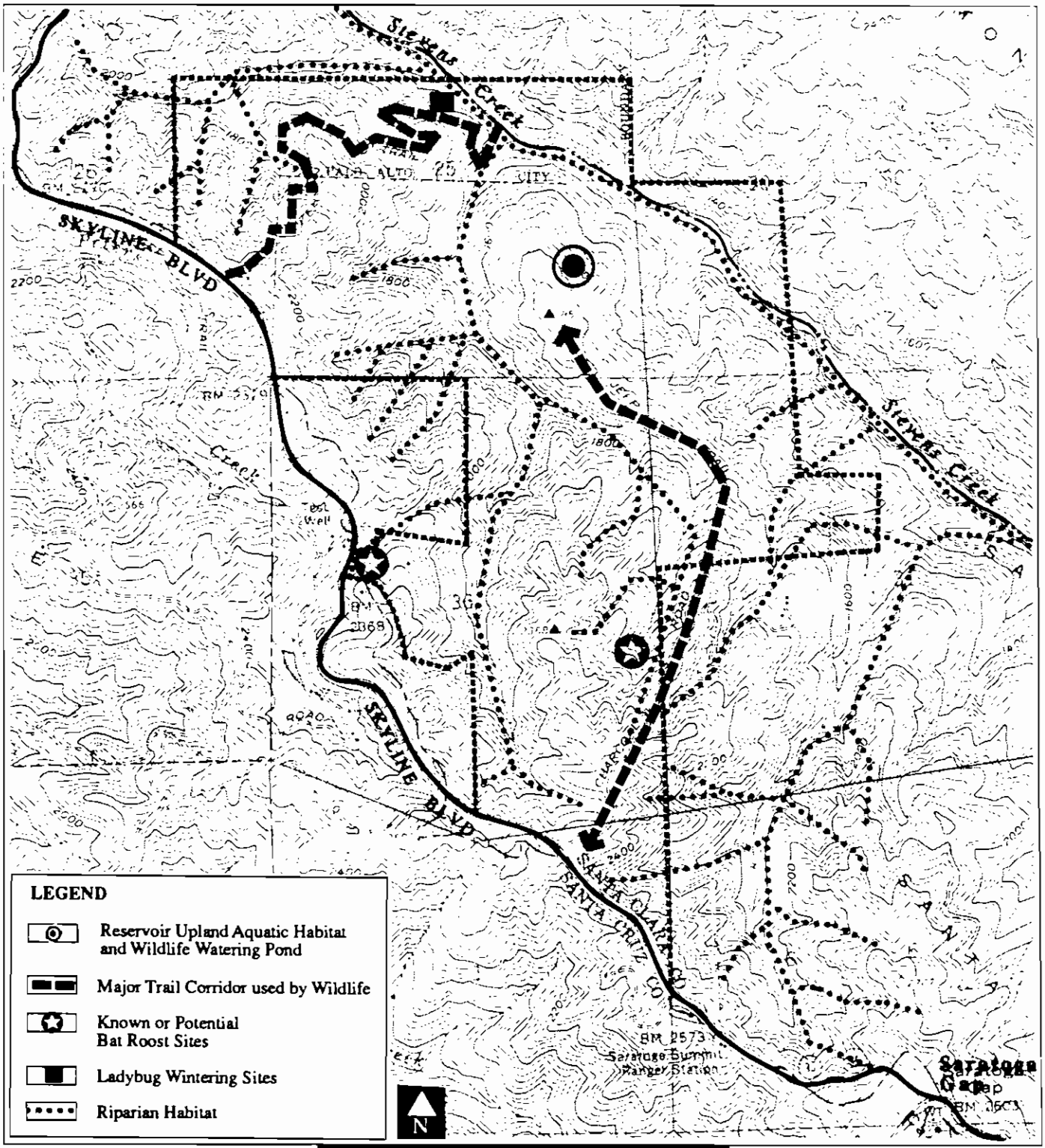
(5) Insects. The Park supports a ladybird beetle (ladybug) wintering site.[17] Adult ladybirds often hibernate during winter, frequently in large aggregations, under forest litter. The ladybird wintering site is located at the base of a large Douglas fir at Grizzly Flat. The location of this site and other sensitive habitats is found on Figure 9.

c. Riparian Forest. The wildlife values of the riparian forests within the Park are similar to the oak forest, described above, as the riparian habitat occurs within a forested setting, and many of the wildlife species using the adjacent forests also occur within the riparian forest. However, riparian forests associated with perennial and intermittent surface water probably support a higher diversity of wildlife species than the surrounding forest habitat. Wildlife use surface water for drinking, bathing, escape cover, foraging, and reproduction. Thus, Stevens Creek, with its perennial surface flow, is probably a focal point of wildlife activity in the project area. (See Figure 9.) During the survey, flowing and ponded water was observed throughout its length within the Park.

Riparian habitats in California rank among the highest in wildlife species diversity and abundance. Factors which contribute to the high wildlife value include the presence of surface water, the variety of niches provided by the high structural complexity of the habitat, the abundance of plant growth, and the importance of riparian habitat as wildlife corridors. The value of riparian habitat is underscored by its limited distribution regionally and Statewide. Riparian habitats are protected by the California Department of Fish and Game (CDFG).

(1) Amphibians. Amphibians are expected to be more numerous and diverse in this habitat than elsewhere in the study area. Most species require the aquatic environments found in riparian habitats in order to complete their life cycle, while others seek the mesic conditions underneath fallen logs and woodland debris for breeding and refuge.

[17] Allan Wiegman, personal communication; personal observation.



Scale in feet:
0 500 1000 2000 3000

UPPER STEVENS CREEK
RESOURCE MANAGEMENT PLAN
Santa Clara County

FIGURE 9

Sensitive Wildlife Habitats

The numerous pools that occur within Stevens Creek provide breeding habitat for aquatic-reproducing species such as Pacific giant salamander, California newt and Pacific treefrog. California newts were commonly observed in Stevens Creek. Black salamanders, which require moist substrates for breeding, are predicted to be common along creek margins and headwater springs.

(2) Reptiles. In addition to the reptiles described for the Douglas forest habitat, species that utilize aquatic habitat for foraging or escape cover are predicted to occur in this habitat. These include western aquatic garter snake and western terrestrial garter snake.

(3) Birds. Bird species composition in this habitat is not expected to differ significantly from adjacent forested habitats due to similarities in plant species composition and vegetative structure. However, the prevalence of deciduous trees (e.g., sycamores and willows) in the lower reach of Stevens Creek within the Park is especially suitable for neo-tropical migrants, which feed on the numerous insects supported by these plants to replenish migratory fat reserves. Neo-tropical migrants such as Wilson's warbler, warbling vireo, Pacific-slope flycatcher, as well as residents such as winter wren and song sparrow are more abundant in riparian habitats than in adjacent oak forests. American dippers are known to occur along Stevens Creek just downstream of the project site. Northern pygmy-owls are limited to streamside forests in Santa Clara County, and have been recorded nesting along Stevens Creek just upstream of the project site.

(4) Mammals. In addition to the species using adjacent oak forests, riparian-associated species that are known or predicted to occur in this habitat include raccoon and, possibly, ringtail cat. Bats associated with riparian forests include Townsend's big-eared bat, California myotis, long-eared myotis and fringed myotis. Wide-ranging species that are expected to use Stevens Creek and other drainages as movement corridors include black-tailed deer, bobcat, gray fox and coyote.

(5) Fishery Resource of Upper Stevens Creek. Based on Leidy's 1981 study of stream fishes of the San Francisco Bay drainage, the upper Reach of Stevens Creek supports only native fish species. These include steelhead, California roach, three-spine stickleback and Sacramento sucker. The fishery resource of upper Stevens Creek represents one of the few in the South Bay area that has not been significantly degraded through the introduction of non-native fish species. Leidy found that the occurrence of native fish species was strongly correlated with unaltered streams, as well as

those which experienced little human-related disturbances (i.e., vegetation removal, channelization, impoundments, etc.).

Although the fall surveys were conducted during California's sixth consecutive year of drought, streamflow persisted in upper Stevens Creek, and pools were common throughout its length in the Park. The portion of Stevens Creek within the Park could provide habitat for the above-mentioned native fish. During the field reconnaissance, unidentified fish were observed in pools at the Table Mountain Trail crossing and near Grizzly Flat.

The presence of stream flow and pool development in Stevens Creek in the Park, despite consecutive years of drought, coupled with its relatively undisturbed nature makes a significant fishery resource.

d. Northern Mixed Chaparral. Although the Park site contains a variety of chaparral plant associations, for the purposes of describing the wildlife values, these different types will be combined under the general term "chaparral", since wildlife resource use of these plant associations are similar due their comparable structural and environmental characteristics. In this context, chaparral is defined as a "community of evergreen woody shrubs" (Quinn 1990) with a characteristic arid micro-climate.

In general, wildlife species abundance and diversity in chaparral is influenced by plant community structure and the arid environmental conditions. Thus, habitat preferences of chaparral wildlife are described in relation to plant community age, density of plant cover, proximity to openings, and degree of habitat edge. These characteristics are primarily a function of habitat disturbances, the most important of which is fire.

The chaparral community on the project site is mostly dense in nature, with open or disturbed areas concentrated along trail/road cuts or near rock outcrops. The dense nature of the vegetation is especially suited to secretive wildlife species preferring such conditions for cover. Disturbed chaparral is frequented by those species that require open areas for foraging adjacent to dense cover.

Important features of chaparral habitat on the site include: (1) the presence of oaks; (2) sandy soils; and (3) areas of rock outcrops. The oaks produce acorns, which are important components in the diet of many wildlife species. The sandy substrate provides habitat for species unique to this substrate type. Rock outcrops contribute to the habitat mosaic of the chaparral community and provide supplemental denning, cover and roost sites for wildlife.

(1) Amphibians. The arid environment and lack of surface water of the chaparral are expected to limit use by amphibian species, as dry conditions are generally unsuitable for amphibians. Species such as western toad and Pacific tree frog may occur in the chaparral, as adults disperse from nearby aquatic breeding sites.

(2) Reptiles. A wide variety of reptiles make use of the chaparral. Prey populations of rodents and invertebrates provide foraging resources, while rock outcrops and the abundance of low-growing shrubs offer excellent cover, sunning and territorial display sites. Typical species include western fence lizard, western skink, California whipsnake, and western rattlesnake.

(3) Birds. The chaparral supports a limited, but distinctive avifauna. The dense vegetation offers excellent cover for secretive birds, and those requiring dense cover adjacent to open foraging sites. Representative birds of this habitat include the blue-gray gnatcatcher, wrentit, lazuli bunting, California towhee, California thrasher, scrub jay, fox sparrow, white-crowned sparrow and golden-crowned sparrow. Black-chinned sparrow and sage sparrow occur where chaparral consists of extensive areas of chamise and sage. Rufous-crowned sparrows occur in areas with rock outcrops and California sage. Manzanita and sage provide important nectar sources for Anna's hummingbird and Allen's hummingbird. Toyon produces berries which are consumed by many birds.

(4) Mammals. Eleven mammal species that prefer dense chaparral are expected to utilize this habitat in the Park. Small mammals include brush rabbit, Merriam's chipmunk, Heermann's kangaroo rat, California pocket mouse, California mouse, dusky-footed woodrat and brush mouse. Predatory species that forage in dense chaparral include mountain lion, bobcat, gray fox and spotted skunk. Coyotes forage in open, disturbed areas of chaparral.

e. Mixed Grassland. Grasslands are important wildlife resources. The grasses and forbs produce an abundance of seeds and attract numerous insects, providing food for granivorous and insectivorous wildlife. Sparrows, gophers, mice and shrews are commonly found in this habitat. Consequently, grasslands are valuable foraging sites for raptors such as hawks and owls, and other predators including coyote, fox, skunk and snakes. Aerial foraging species that occur over grasslands include bats and swallows.

The wildlife value of the grassland habitat on the site is moderated by its limited distribution. However, grasslands are still expected to support use by a variety of wildlife species. Grassland is diminishing, however, due to natural

encroachment of other successional plant communities. In general, the wildlife values of the grasslands are highest adjacent to other habitats and where shrubs are found interspersed within. The mosaic of open grassy areas surrounded by forests (as found along Highway 35 and along the ridgetop adjacent to the Charcoal Road Trail) increases wildlife species richness of the Park by producing a diversified habitat that supports wildlife species that utilize grasslands for feeding, and trees and shrubs for cover and/or nest sites.

(1) Amphibians. Amphibian species diversity and abundance is low in grassland habitats due to their arid nature. Some species such as Pacific treefrog and California slender salamander disperse into grasslands during rainy periods, and/or seek rodent burrows as refuge during the dry season.

(2) Reptiles. Grassland habitats support numerous invertebrate and rodent populations, providing a prey base for many reptile species. In addition, abandoned rodent burrows offer snakes and lizards refuge. Reptiles typical of grassland habitats include gopher snake, racer, southern alligator lizard and western fence lizard.

(3) Birds. The grasslands on the site provide foraging habitat for a variety of raptors, including golden eagle, red-tailed hawk, American kestrel, and turkey vulture. Passerine birds expected to occur in this habitat include savannah sparrow, house finch, lesser goldfinch, lark sparrow and western meadowlark. Violet-green swallows commonly forage over this habitat. Western bluebirds will use this habitat where suitable cavity-bearing trees are interspersed or nearby.

(4) Mammals. Grasslands are productive habitats for rodents, rabbits and hares, providing an abundance of food plants and cover. Representative species include Botta's pocket gopher, western harvest mouse, California meadow vole and black-tailed hare. In turn, these smaller mammals provide a prey base for bobcat, gray fox, coyote and long-tailed weasel. Black-tailed deer will frequent grasslands to browse. Pallid bat may forage in this habitat for terrestrial and aerial invertebrates.

f. Abandoned Tree Farm (Table Mountain). The habitat of the former tree farm is a mosaic of pine snags, non-native pine trees, chaparral plants, succeeding shrubs and trees of adjacent oak-madrone forest and small open grassy patches. Because of the ridgetop location of the tree farm and the lack of continuous tree canopy cover, the microclimate of this habitat is more arid in nature than the other habitats present on the site. The vegetative structure creates a habitat that supports species with preferences for edge situations

and/or the interspersion of open and dense vegetation. Wildlife use of this habitat will vary with the continued change in vegetative growth, eventually exhibiting values similar to the adjacent oak-madrone forest.

(1) Amphibians. Many of the species that were discussed above for the oak-madrone forest are also expected to occur in this habitat. The presence of downed woody material moderates arid conditions and provides cover for species such as California slender salamander, ensatina and western toad.

(2) Reptiles. The arid environment together with the abundance of cover and foraging sites create optimal conditions for western fence lizard, which was observed to be numerous in this habitat. Other species likely to occur include southern alligator lizard, western rattlesnake, California whipsnake and gopher snake.

(3) Birds. The presence of snags makes this habitat suitable for a variety of woodpeckers, including northern flicker, and hairy woodpecker. Red-breasted nuthatch are locally distributed in the Santa Cruz Mountains, and are often associated with closed-cone forests (e.g., knobcone pine and monterey pine). Dense shrub cover adjacent to open areas are favorable for white-crowned sparrow and golden-crowned sparrow. Other representative birds of this habitat include California quail, house wren, California thrasher and hermit thrush.

(4) Mammals. The mosaic of dense shrub cover and open foraging areas provides habitat for brush rabbit, Heermann's kangaroo rat, pinyon mouse, and black-tailed deer. The vegetation structure and prey populations, in turn, provide foraging habitat for predators such as mountain lion, bobcat and coyote.

g. Ponds. Surface water away from Stevens Creek is a limited resource in the Park. Hence, the reservoir at Table Mountain is a significant wildlife resource. As noted above, in the discussion of riparian forest habitat, the presence of water makes the Park suitable to a greater variety of wildlife species, as wildlife use surface water for drinking, bathing, escape cover, foraging, and reproduction. The Table Mountain reservoir is probably a focal point of wildlife activity.

At the time of the survey, the pond was approximately 30-40 feet in circumference. The water was tea-colored and slightly turbid. Wetland plants included cat-tail, polygorum and duckweed.

The presence of wetland plants such as cattails and duckweed creates increases the wildlife value of the pond by providing cover, breeding sites and a food base for a diversified aquatic invertebrate fauna, which form a link in many food chains. The pond is a critical resource for species that require surface water for reproduction, especially in arid environments such as that of Table Mountain. California newts were abundant at the Table Mountain reservoir during the reconnaissance. Other aquatic-breeding species that are expected to occur at the pond include Pacific treefrog and western toad. Mallard and great blue heron are expected to forage at the pond on occasion. Other wildlife species expected to occur at the pond include western terrestrial garter snake, raccoon, striped skunk and gray fox.

h. Structures. Abandoned structures occur on the former Rogers Property adjacent to the Park's western boundary and in the vicinity of Charcoal Road Trail on MROSD land. These structures provide roosting habitat for bats,[18] which could include pallid bat, Townsend's big-eared bat and long-eared bat. These structures also offer den sites for woodrats and a variety of other rodents.

i. Wildlife Movement. Wildlife corridors provide connections between habitat areas, enhancing species richness and diversity in the local area (Harris 1984, Adams and Dove 1989), and helping to maintain regional biodiversity. Movement corridors are especially important to wide-ranging mammals, such as the mountain lion, bobcat, and gray fox.

Upper Stevens Creek County Park is contiguous with other open space preserves and Parks along the crest of the Santa Cruz Mountains, providing opportunities for wildlife movement within and across the project site. The primary patterns of wildlife movement within, to and from the Park most likely occur along Stevens Creek and its major tributaries, and along ridgetops. Smaller ephemeral drainages, as well as established trails and roads, also provide wildlife movement corridors through the project site. Movement to and from the Park, across the crest of the Santa Cruz Mountain is another pattern of wildlife movement.

j. Wildlife Species of Special Status. Nine wildlife species of special status have been identified as known or potential significant user's of the project site and vicinity, based on literature review, the CNDDB, and field survey. Significant user's are those species which breed on the site, or occur regularly

[18] Allan Wiegman, Park Ranger, personal communication; personal observation.

during the non-breeding season. These include federal candidate species and state species of special concern. No rare or endangered species were identified as occurring or potentially occurring in the Park. Federal Candidate species or State species of special concern do not receive substantive or procedural protection pursuant to the Federal Endangered Species Act or the California Endangered Species Act. However, species under these categories could be considered "rare" or "endangered" during environmental review pursuant to Section 15380(d) of the California Environmental Quality Act (CEQA) Guidelines. The special status species are California red-legged frog, foothill yellow-legged frog, sharp-shinned hawk, Cooper's hawk, golden eagle, long-eared owl, American badger, pallid bat and Townsend's big-eared bat. Detailed descriptions of status, habitat requirements and distribution for the wildlife species of special status are included in Appendix A.

I. Fire Hazards

This section describes several factors that influence fire hazards in the Park. These include fuels in the Park, the local weather, topography, fire protection resources, water supply, and access. In addition, the fire ecology of the vegetation types present in the Park is discussed. Appendix E contains a full discussion of Fuel Model Methodology and Results for the Park and Appendix F contains an overview of the Fire Ecology and Age Structure of Vegetation.

1. Existing Fire Management

The Park does not have a fire management plan; however, fire suppression practices promulgated by Park management stress protection of life, property, and natural resources, in that order.

2. Existing Fire Protection Services

Fire protection of Upper Stevens Creek Park is provided by the California Department of Forestry and Fire Protection (CDF) with first response by the County Parks Department and MROSD. MROSD ranger response time is shorter than the Park Ranger response time due to the close proximity of the MROSD ranger station, located on Skyline Boulevard within three miles of the Park. There is a reciprocal response between the County and MROSD. The nearest station is approximately 3,000 feet south of the southern border of the Park on Skyline Boulevard, so response times from this station are immediate. The station is equipped with both wildland and structural fire protection

engines. Equipment is also available from other nearby CDF stations, such as the second closest station at the intersection of Woodside Drive and Skyline Boulevard. Fire protection is augmented by a volunteer fire protection district which also covers structural fire protection.

The Central Fire District, whose headquarters are in Los Gatos, is interested in providing service to the area including the Park by expanding their boundary to the County line at Skyline Boulevard. They are in the process of mapping the area in anticipation of annexing it. The Central Fire District would have joint coverage with the CDF. Central Fire District would provide fire protection that can be accomplished using trucks and its first priority would be structural fires and emergency medical response. CDF would cover wildland fires with aid from Central Fire District. The Central Fire District hopes to have the annexation complete within a year.[19]

3. Access

a. Existing Access. Access is an important factor in fire management. Access speeds the response time to the fire, and increases the odds it can be extinguished when it's still small. It also allows supplemental resources (engines, firefighters) to be used more quickly. Access referred to in this section is vehicular access, because the preferred mode of initial response to a wildland fire or unknown emergency is with a pickup truck.

Vehicular access to Upper Stevens Creek Park is afforded by one road: Skyline Boulevard. There are two roads that run off of Skyline Boulevard into the Park: Charcoal Road and the Grizzly Flat Trail; however, these two roads do not connect, and therefore both are "one way in and one way out" roads. These roads generally provide access to the northern and east-central area of the Park. If the unimproved access on the private road (on the Villasenor property) in Stevens Canyon were improved, this road could potentially be used for emergency access.

Both Park roads are well graded, with steepness that is suitable for emergency response. Charcoal Road is the steeper of the two roads in and is marginally passable with a passenger car. The width of both roads are ample for passage of emergency vehicles of all types, averaging 12 to 20 feet wide; however, in

[19] Mike Rock, Business Manager, Central Fire District, personal communication, December 18, 1992.

both roads, locations to turn around are scarce. Three turn-arounds exist on the Grizzly Flat Road, and four exist on the Charcoal Road Trail.

Access from the eastern boundary of the Park does not exist at this time; however an unmaintained road crosses private property (Villasenor property) to the southeast. With significant road work this road could provide safe emergency access to the Park. In order to make this access road useful for fire fighting purposes extensive grading would need to be completed, which is a major capital improvement.

Use of the Park's roads could be hampered in the time of an intense wildfire by the continuous canopy over the road, since fire could easily travel in these crowns across the road. Additionally, the radiant heat from abundant fuels on either side of the road could impair travel, and preclude access (and egress).

There are no places where helicopters could land currently in the Park, so fire suppression with a helicopter would need to take advantage of locations to refuel, board and deliver passengers, i.e. off the Park property. Helicopter access is provided within two miles at the main entry to the Skyline Ridge Reserve. This area serves as a staging area for Life Fight and CDF in emergency cases.

b. Future Access Under Construction. The new trail/road, which will be constructed off of Grizzly Flat Road, is intended to be wide enough to provide vehicular access. The alignment of this new road follows an old ranch road which is overgrown with vegetation, except where it has been cleared in preparation of the new road's construction. Based on this alignment, the road will approach 20 percent at its steepest point according to Park staff;[20] although it may be steeper in places. The steepest point occurs in the area shown on Figure 3 near the 2,000-foot elevation. This gradient poses safety hazards for emergency vehicles (in addition to erosion impacts).

The California Department of Forestry and Fire Protection Public Resources Code 4290 states "...road, streets, private lanes and driveways shall not exceed 15 percent, except up to 16 percent grades may be allowed by the local fire district for distances of not more than 400 feet."

[20] Allan Wiegman, Ranger 1, Santa Clara County Parks and Recreation Department, personal communication, December 1992.

Steep slopes on trails limit the types of equipment that can be used to suppress a fire. Even if the trail travels downhill, the steepness of the grade may deter fire fighters from committing resources and personnel because in an emergency, they need a safe escape route. Switchbacks can be installed to ameliorate long stretches of steep grade.

c. Assessment. Overall, road conditions in the Park are adequate, with the exception of poor turn-arounds and the lack of a loop road. Although a loop road would be desirable, fire hazard reduction through fuel load management can mitigate the hazards related to limited access. In addition, a fire station, the California Department of Forestry Summit Station, is only 3,000 feet from the Charcoal Road Trail entrance. As a result, emergency response time is considered acceptable.

Access from the east is inadequate, as it would take at least 30 minutes to get to the Park from the southern extension of the Canyon Trail on MROSD land. The Park is totally inaccessible from the northern portion of the Canyon Trail on MROSD land because there is no vehicular bridge crossing Stevens Creek. Construction of a vehicular access road across the creek could have erosion impacts and would be very costly. Fire hazards can be reduced through vegetation management in this eastern part of the Park instead of costly access improvements.

4. Water Supply

Water supply is an important factor in fire management. The availability of water increases the efficiency with which the fire can be extinguished, or contained.

Upper Stevens Creek Park can provide some water supply from creeks in the Park for wildfires; however, because of its remote location and meager flow during fire season, water for fire suppression is likely to be delivered from water tenders. The steep canyons and shallow depth of Upper Stevens Creek preclude its use by helicopters; nearby reservoirs and cattle ponds would likely be the nearest water source for suppression. Reservoirs are available 1/4 mile to the west at Jikoji and 1-1/2 miles to the northwest at Skyline Ridge Preserve. These water resources are valuable in providing access to CDF helicopters.

The spring from the unoccupied Park house on the western edge of the Park can be made into a water source for fire suppression. This possibility should explored as it is the nearest supply to residences on the western border. While

water is likely to be brought in from the nearby fire station, an on-site water supply may be critical in an emergency.

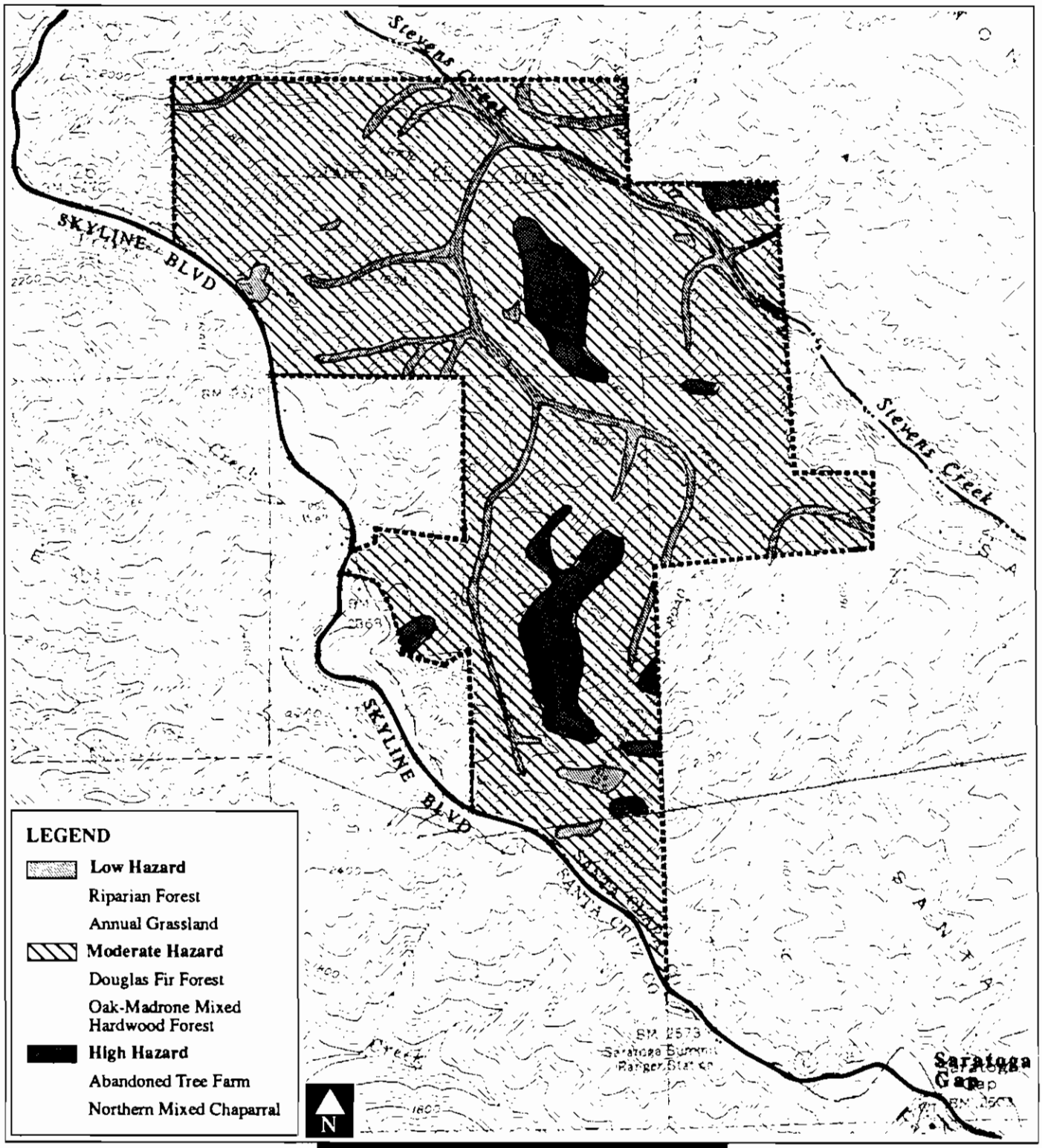
a. Assessment. Water supply is, practically speaking, non-existent. Water from Stevens Creek can be drafted, but would have to be pumped into a tanker then carried via the truck to the fire. If the fire is anywhere other than on Grizzly Flat Trail, this process could take over an hour per trip. Water is likely to be hauled from outside the Park (probably from the fire station) in a pumper to the fire, and hoses strung from that. If the fire is not located near a road (and it is likely a great portion of a large fire would not be near a road), hand lines would be dug to "contain" the fire and the fire would be extinguished with a lot of hand work. Water would augment this manual labor. The majority of water would probably be delivered by air, via helicopter and with air tankers. Firefighting foam and fire retardants are also likely to be used. Overall, the water supply in the Park is poor and must be addressed as part of the management plan.

5. Vegetation Types and Fuel Loads

The types of vegetation and the amount of fuel load is important factor in fire management. Each type of vegetation in the Park has characteristics which make it behave differently in a fire. These characteristics include fuel loading, predicted routes of spread and predicted flame lengths. Depending on these characteristics, some plant communities present higher fire hazards than others. In order to understand the characteristics of each community, fuel samples are collected and fire behavior is modeled.

The following discussion summarizes the results of the fire behavior prediction model, BEHAVE, run by Wildland Resource Management for this project. Fuel samples were collected in seven plots which represented the structure and species composition of the fuel types found in the Park. Modeling results are contained in their entirety in Appendix E, along with a description of the fuel modeling methodology.

A brief description of the fire ecology of each of the vegetation types modeled, with the exception of riparian vegetation, is discussed below. The model used does not evaluate "riparian" as a plant community; however, because of its proximity to water, it poses a very low fire hazard, as shown in Figure 10. A more complete discussion is found in Appendix F. Figures 11 through 13, and Tables 1 and 2, illustrate the fuel characteristics and predicted fire behavior of the fuel types sampled (based on the plot samples). Table 1 provides an interpretation of flame lengths. Table 2 provides an interpretation of the rates

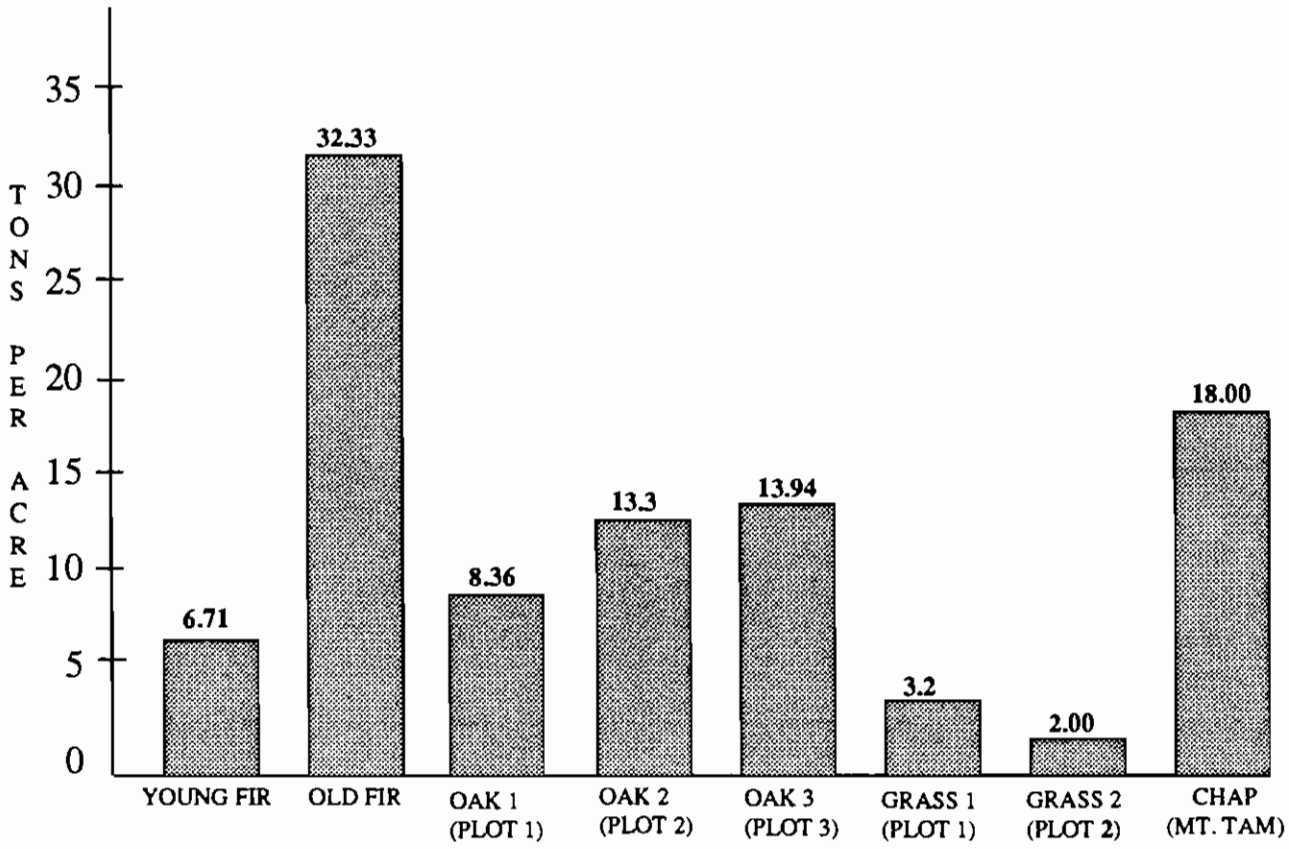


UPPER STEVENS CREEK
RESOURCE MANAGEMENT PLAN
Santa Clara County

FIGURE 10

Fire Hazards
Related to Fuel Types

BRADY AND ASSOCIATES
PLANNERS AND LANDSCAPE ARCHITECTS



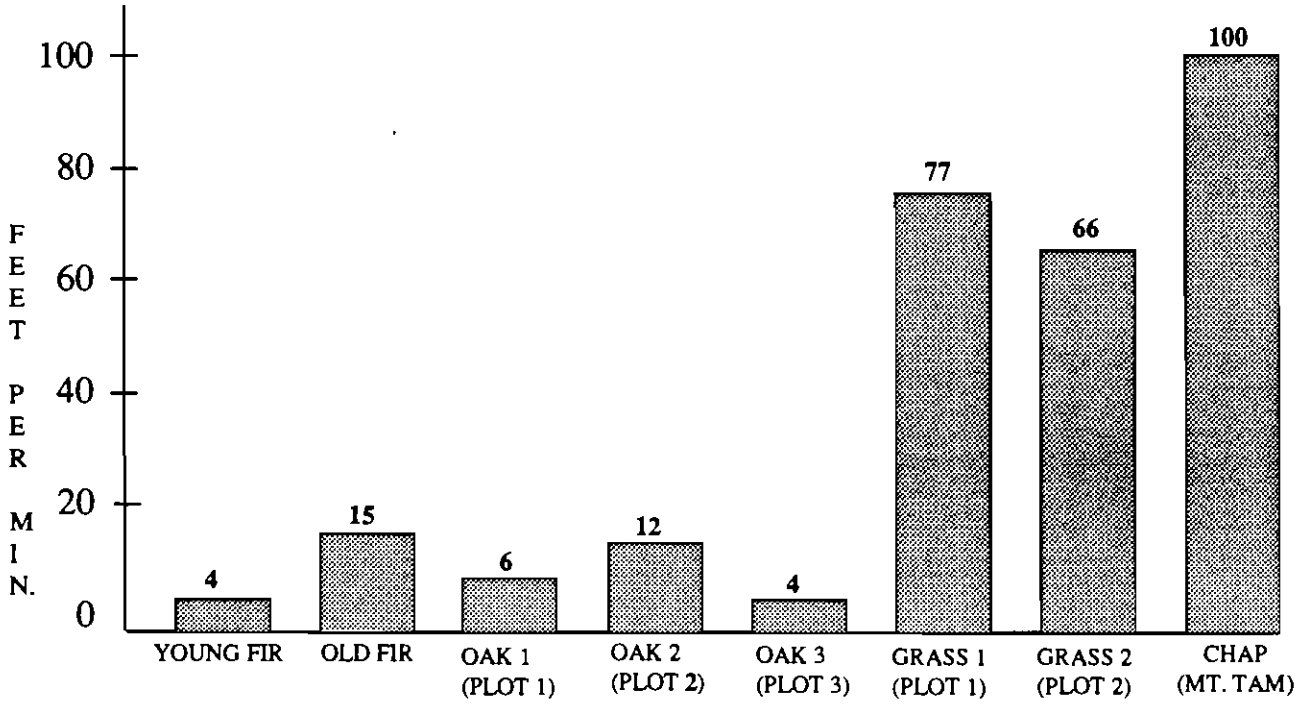
Source: Carol Rice, Wildland Resource Management.

UPPER STEVENS CREEK
RESOURCE MANAGEMENT PLAN
Santa Clara County

FIGURE 11

Fuel Loading of Fuel Plots

BRADY AND ASSOCIATES
PLANNERS AND LANDSCAPE ARCHITECTS

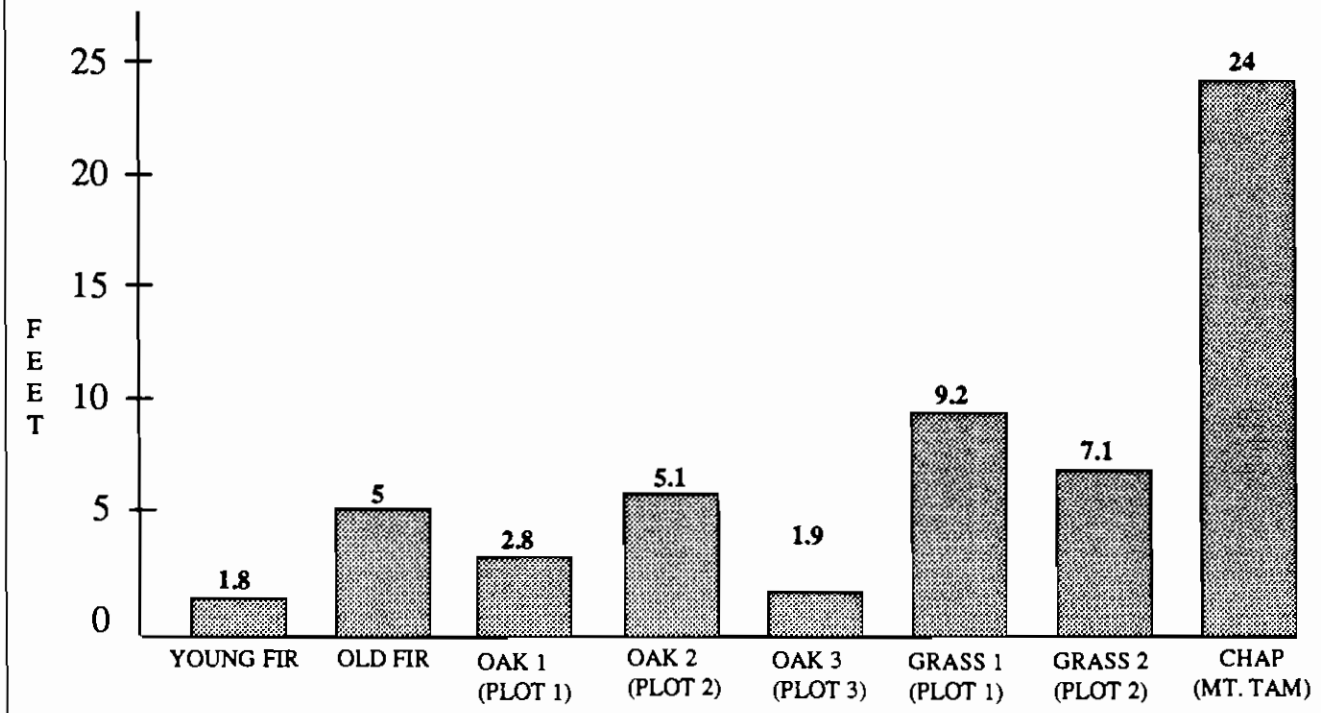


Source: Carol Rice, Wildland Resource Management.

UPPER STEVENS CREEK
RESOURCE MANAGEMENT PLAN
Santa Clara County

FIGURE 12

Predicted Rates of Spread for Fuel Plots



Source: Carol Rice, Wildland Resource Management.

UPPER STEVENS CREEK
RESOURCE MANAGEMENT PLAN
Santa Clara County

FIGURE 13

Predicted Flame Lengths for Fuel Plots

Table 1
BYRAM'S FIRELINE INTENSITY

Intensity Value BTU/ft/s	Flame Length	Interpretations
< 100	< 4	Fires can generally be attacked at the head or flanks by persons using handtools. Hand line should hold the fire.
100 - 500	4 - 8	Fires are too intense for direct attack on the head by persons using handtools. Hand line cannot be relied on to hold fire. Equipment such as dozers, pumpers, and retardant aircraft can be effective.
500 - 1,000	8 - 11	Fires may present serious control problems - torching out, crowning and spotting. Control efforts at the fire head will probably be ineffective.
>1,000	> 11	Crowning, spotting and major fire runs are probable. Control efforts at head of fire are ineffective.

Source: Carol Rice, Wildland Resource Management

Table 2
RATE OF SPREAD VALUES AND INTERPRETATIONS
(Chains/hour or feet/minute)

Value	Typical Fire Situation	Equivalent to:
1 ch/hr	Litter fire (no wind, no slope)	Linebuilding rate for 1 man, heavy fuel
25	Aged medium slash, 100% slope	Backpacker going up 100% slope
250	Low sagebrush, Santa Ana wind	Brisk walk on level ground
800	Chaparral, Santa Ana wind	Good pace for a marathon run
1200	Dry, short grass, high wind	4-minute mile

Source: Carol Rice, Wildland Resource Management

of spread values. Table 3 shows the relative fire hazards of the plant communities in the Park by acreage.

a. Grassland. While the fuel loading of the plots of grass were the lowest of all the plots, the predicted rate of spread was the highest (with the exception of chaparral) with flame lengths of seven to nine feet and rates of spread of 66 to 77 feet per minute. Containment is challenging because of the high rates of spread, however, line building rates and backfiring possibilities are greatest in this fuel type. Even though grass can exhibit extreme fire behavior, grass is still considered one of the easiest fuel types in which to suppress a fire, and most fuel breaks are comprised of grass because the ease of containment is higher.[21] (See Figures 11 through 13.)

b. Oak-Madrone Forest. The leisurely spread rates, combined with the relatively short flame lengths of the predicted fire behavior demonstrate a manageable, moderate fire hazard in the this fuel type.

c. Chaparral. This fuel type has the highest hazard, based on the most severe fire behavior predicted. While fuel loadings were almost one-half of the fuels found in one of the Douglas fir plots, rates of spread were over six times greater than any of the forest fuel types, and flame lengths were over four times longer than any forest fuel type. Direct attack would not be possible, and containment efforts would need to rely on backfiring, or suppression strategies other than line building because the perimeter of the fire is likely to grow faster than line could be built.[22] In addition, spotting is likely in chaparral, which will present even more challenges to suppression efforts.[23] Once a fire starts to spot, suppression is difficult because the new fires have to also be located and extinguished, or they will burn together, and enlarge the fire rapidly. Often spot fires leap over containment lines already constructed.

d. Douglas Fir Forest. The hazard posed by the Douglas fir fuel type is moderate, based on the predicted fire behavior of the flaming front. In locations of a large quantity of logs, the difficulty of spread were slow to

[21] A hand-line is a bare line in the dirt that marks the area where firefighters hope to stop the fire.

[22] A backfire is a fire that is purposefully started as a means of stopping a progressing fire. When the progressing fire hits the backfire it should be extinguished because all available fuel has been consumed by the backfire.

[23] Spotting is the throwing of embers ahead of the fire. Eaeh new fire that starts from these embers is called a spot fire.

Table 3
FIRE HAZARD BY PLANT COMMUNITY

Plant Community	Acreage	Fire Hazard
Chaparral	65.3	high
Abandoned Tree Farm	36.7	high
Douglas fir forest	194.6	moderate
Oak-Madrone forest	680.4	moderate
Riparian forest	102.2	low
Grassland	15.8	low

Source: Wildland Resource Management

moderate, an spanned those predicted for all forest fuel types. The predicted flame lengths also were at the high and low extremes of those predicted for forest fuel types and were similarly moderate to moderately high.

e. Table Mountain: Abandoned Tree Farm. While no quantitative fire behavior prediction is available, the hazard posed by this fuel type is high to extreme, based on the probability of ignition and crowning and spotting behavior (which includes both the propensity of the fuels to spot, as well as the distance these embers are likely to travel).[24] Once fires get into the tree tops, fire spreads fairly quickly and is difficult to control.

f. Assessment. All of the vegetation types found in the Park (with the possible exception of the riparian corridor) have evolved with fairly frequent fires, as judged by their reproductive strategies, and usual age structure. The fact that Indians were common in the area further suggests that fire was a common event in Upper Stevens Creek Park.

When a vegetation type has evolved with fire, they are more likely to have adaptations to ensure they will burn. They also have developed survival strategies to ensure the species, if not the individuals, withstand the event. Also, it is likely that the time since the last fire is now at its longest, so the fuels have accumulated to an unprecedented level. A fire that would burn now

[24] Crowning occurs when flames are high enough to start fires in the tree tops.

would consequently burn hotter and produce more damage than would probably be "natural."

6. Factors Which Influence Fire Behavior

Weather, topography, slope, aspect and overall land form have a profound influence on fire behavior. For example, topography influences local weather patterns, vegetation types and distribution, and creates microclimates with localized moisture conditions. Thus, topography directly and indirectly effects the intensity, direction, and spread rate of wildfires. (See Figure 5. Slope Analysis and Figure 6. Aspect Map.)

a. Topography and Elevation. The topography of the Park is characterized as steeply sloped with several minor ridges dividing an east-facing slope. The steepness and slope of the land confounds access, makes the fire burn faster and funnels wind; however, the east-facing aspect somewhat ameliorates the expected fire behavior, and therefore may not be as severe as high intensity fires that develop on south- and west-facing slopes.

Large topographic features, such as mountains, effect the local weather patterns. For example, thunderstorms are formed when an air mass flows up a mountain slope, is cooled, and releases the moisture it can no longer hold. Also, Santa Ana or Mono winds form as dry air descends down the leeward side of a mountain and is warmed and channeled through saddles and mountain passes.

Slope position, lower, mid or upper, affects moisture availability. Mid-slope elevations actually have a higher average temperature, lower relative humidities, and higher potential fire hazard than the other elevations. In mountain regions, the less dense, sun-heated air rises upslope during the day, generating upslope afternoon winds. At night, the mountain air cools, and slides toward the valleys generating downslope drafts in the late night hours. The sun warmed air in the valley is displaced by the descending cool night air, and rises to the mid-slope zone. Surface winds can be slowed and dispersed into erratic gusts by rough, rocky, or forested terrain. The speed, regularity, and direction of the wind directly influences the rate and direction in which a wildfire burns. Sun and wind exposure are also greater along the upper third and ridgetops, making moisture less available than in the more protected areas along the lower slope and valley floor. As a result, lower elevation areas support more vegetation, and offer a larger fuel supply. These factors work together to influence the overall fire hazard associated with an area. For example, the low to mid-elevation, southwest facing steep slopes would have a

higher fire hazard than the high elevation northeast facing slopes. Although these hillsides are steep, they face north and east, and as a result are not extremely dry, high fire hazard areas.

b. Slope Steepness. Winds form when air, heated by either a fire or the sun, rises upslope. These winds are stronger along steep slopes than along gentle ones. As a result, fires travel up the steep slopes faster, and in a more narrow wedge than do those that occur along gentler slopes. Fires burning in flat or gently sloping areas tend to burn more slowly and to spread more horizontally than fires on steep slopes. Similarly, fires ignited at the base of a slope spread farther and more rapidly than those ignited at the top. In contrast, ridgetops, rivers, and roads act as natural fire breaks since they are devoid of fuel.

c. Aspect. Slope aspect, which is defined as a side facing a given direction, also influences fire behavior. South and southwest facing slopes receive the warmest direct sunlight for the longest period of the day. Therefore, these aspects tend to be drier and support more dry-site species, than do the north and northeast facing slopes. The soil and downed fuel along steep slopes also receive more direct sunlight, and are drier than those on gentler slopes.

d. Weather. Weather conditions significantly impact the potential for fire ignition as well as the rate, intensity, and direction in which fires burn. Wind, temperature, and humidity are the more important weather variables in fire behavior.

(1) General Description of Climate. The weather in Upper Stevens Creek Park is influenced by its proximity to the coast. It has warm, dry summers and cool, moisture winters characteristic of the fog belt area. On the average, the area receives about 45 inches of precipitation a year, primarily in the fall and winter. In general, most of the measurable rainfall occurs during the winter months (mid-October to mid-April). Thus, May to October is the time of highest fire danger and constitutes the fire season.

Summertime temperatures are usually quite warm, often well over 100 degrees; however, it is common for the fog to roll in during the early summer evenings. The seabreeze associated with fog is also associated with breezy conditions frequently found on the site. It is this wind in front of the fog that can pose frequent weather-related challenges for fire suppression. After hours of sunshine during the day, the fuels are dried out and require at least one hour (and most of the time, longer) to accept the moisture from the fog. In the

afternoon, the wind in front of the fog dramatically increases the fire's spread rate, for the winds "fan the flames."

While the wind normally blows from the west, the most severe fire weather occurs with strong north or northeast winds. Under these conditions (which are common in the fall), humidities drop to 20 percent and temperatures soar to over 100 degrees Fahrenheit. Northerly winds would be particularly troublesome because they would be aligned with Stevens Creek Canyon. This overall weather pattern creates extremely low humidities and enhances the possibilities of ignition and extreme fire behavior.

Because of its proximity to the coast, fog can keep summertime temperatures cool in Upper Stevens Creek Park; however, the Park is often above the fog, so is not always as well protected as county lands located at lower elevations.

(2) Weather Conditions of Concern. The weather of greatest concern for fire protection is characterized by hot, dry, windy days. These conditions maximize ignitability and make fire suppression difficult. While the wind normally blows from the west, the most severe fire weather occurs with strong north or northeast winds. Under these conditions (which are most common in the fall), humidities drop to 20 percent and temperatures soar to over 100 degrees F.

The steep topography in Upper Stevens Creek Park creates its own wind so that upcanyon drafts in the morning and down canyon drafts in the afternoon can be expected. Additionally, the canyon diverts the wind so that a prevailing westerly wind is oriented more to the south. Lastly, the bowl that is formed by the ridge along Charcoal Road and along Skyline Boulevard is the type of topography which is conducive to whirlwinds. Whirlwinds cause uncontrollable fire behavior, and complete consumption of all biomass.

(3) Humidity. Relative humidity describes the amount of water in the air in relation to the maximum water holding capacity of air at a given temperature. Warmer air is capable of holding more water than cooler air. Therefore, 80 percent humidity at 90 degrees F describes air with a high percentage of water. In terms of fire, warm air with low relative humidity is a stronger drying agent than cool air of the same relative humidity, because warm air can hold, or "steal" more water than cool air. Because it takes more energy for fire to heat up, "wet" air, conditions of high humidity tend to have a suppressing effect on fires. High temperatures and low humidity optimize conditions for the ignition and spread of wildfires.

Frequently, both temperatures and humidity oscillate diurnally, with the temperature climbing during the day to peak in mid-afternoon and sinking to a daily minimum in the early morning hours. Relative humidity usually varies inversely to the temperature, making late afternoons the driest and hottest periods of the day. Of course, temperature and humidity are affected by local weather patterns, which may blow in very dry and warm or cool and moist air masses at any time of the day.

(4) Wind. Wind is considered the most variable and difficult to predict weather element. However, wind direction and velocity profoundly affect fire behavior. Surface winds, which travel within 20 feet of the ground, affect fire intensity by supplying oxygen to the flames. Wind increases the flammability of the fuels by removing moisture through evaporation and by angling the flames to heat the fuels in the fire's path. The direction and velocity of surface winds can also control the direction and rate at which the fire spreads. Aloft winds, which move at least 20 feet above the ground, can carry embers and firebrands downwind, causing spot fires to precede the primary front. In closed canyons and narrow valleys, aloft winds can facilitate the development of convection columns, which dry surrounding fuels and carry firebrands to unburned areas. Gusty winds cause a fire to burn erratically, making it more difficult to contain.

7. Values at Risk

a. Risks to Adjacent Residential Development. The most obvious risk of a wildfire is to the welfare of the residences within and near the Park and the values that accompany those dwellings. The values accompanying these dwellings can include the possessions inside the structures, including secondary buildings (such as barns, sheds, and fences, as well as landscape construction). Additionally, landscaping features, which can represent up to 20 percent of the lot value) are at risk from wildfires. A final, yet important consideration is the lasting psychological impact caused by the trauma of experiencing losses in a wildfire. These detrimental effects have been shown to occur in both individuals who have lost their homes and in those whose homes have been saved but the surrounding environment destroyed.

b. Risks to Natural Vegetation Within the Park. The values at risk in the Park itself are inherent in the natural vegetation covering much of the acreage. Under current conditions, the scorch heights and heat output could reach a point where many of the oak trees would be damaged. While the dead oak trees and regenerating grasses in a burned oak woodland would present more habitats to wildlife, the visual impact would be significant.

Since annual grasslands are well adapted to frequent burns and grow back the following year, a wildfire would not cause long-lasting damage to grasslands. However, surface erosion caused by early, heavy rains in the fall should be a concern.

The grinding rocks and other archaeological sites located in the Park are not likely to be damaged from a wildfire, primarily because there are no structural remains exist.[25]

c. Risks to Wildlife. Usually following fire, populations of mice and seed eating birds increase temporarily due to increased availability of seeds exposed by the fire. A prompt, marked increase in herbivorous wildlife on burned areas is the usual response. Generally, wildlife populations will increase or decrease immediately after a fire, and will return to pre-fire numbers within a short time. Should any riparian zone burn, habitat for water-dependent birds, amphibians, and a host of non-vertebrate communities, plus cover for mammals, would be greatly damaged.

A major fire would result in the death of certain animals. While most birds and larger mammals can escape, many reptiles and amphibians, as well as many invertebrates might not be able to escape a fast moving wildfire. This situation is not likely to have long-term impacts on the populations of these animals.

8. Description of Current Hazards, Threats and Risks

Of the fuel types in Upper Stevens Creek, the most moderate hazards exist in the oak/madrone hardwoods, and the most extreme in the chaparral. Grasslands burn quite quickly but they do not have high fuel loads, therefore, they do not present high risks. The chaparral in the Park is old, fuel-laden, and would pose extreme difficulty in suppression; however, this fuel type is not particularly easy to ignite. Two areas present special challenges to management in Upper Stevens Creek Park: Table Mountain, because of its position in the local topography, and the vegetation below and surrounding adjacent residences, both of the western border and those on MROSD land.

[25] In fact, the very intense fire in Stanislaus County had not only no effect on the know sites, but also uncovered several unknown locations. Thus a wildfire could actually lead to the discovery of more midden sites in the Park.

a. Table Mountain Hazards. The plentiful grass on Table Mountain is conducive to ignitions during the summer months. Once ignited, the grass will serve as a wick to the declining conifers. The dead pine trees that are vertically continuous are likely to produce a shower of embers which can easily rain down on vegetation on all sides of the topographic peninsula. The small spot fires are likely to burn rapidly uphill and produce fire behavior that would challenge the best fire suppression efforts. Additionally, embers produced with a westerly wind would likely travel across Park boundaries and fall into the adjacent MROSD lands to the east and across Stevens Creek.

b. Risks to Residences. The residences adjacent to Upper Stevens Creek Park are generally located above an oak/madrone hardwood fuel type which poses a moderate fire risk according to Figure 10. The lots adjacent to the Park's western boundary are typically east-facing; however, some are protected by the uppermost ridge and face the west. Ignitions are not likely because of a lack of access and a lack of grass (and the hardwoods are relatively difficult to ignite). However, access to the slopes below residences inside the Park boundary is poor and slopes (which would speed fire's spread) are quite steep.

While CDF is within approximately five minutes response time to the structures, travel on foot with hoselines could easily take 10 to 15 minutes more. During this time, structures could be threatened by fire. The next station is some distance away with longer response times. Helicopters are available, but should be expected to arrive approximately 15 minutes after the fire is reported.

The combination of vegetation, access, response time, water supply, and slope, lead to a high hazard rating. The fuel types surrounding the residences pose moderate hazards; and because access to the western Park border and below the residences is poor, the risk is considered high. The slopes below these residences inside the Park boundary are quite steep. This would speed a fire's spread. Residences at the Park's eastern border in Stevens Canyon are not at great risk because they are located in the moist canyon bottom and fires move uphill. Access to the MROSD residences is adequate.

9. Summary of Conclusions

Overall, the Park contains some areas that pose a high fire hazard under certain conditions, primarily because of vegetative fuel load, compounded with other factors including, local weather, topography, accessibility and water supply. Access and water supply are poor. Topography is steep, which makes access to fire locations difficult. In addition, fires spread faster on steep slopes.

Local weather (especially wind and temperatures) create conditions which are optimum for very hot fires. Fuels exist that would burn with vigor (such as chaparral and the dead and diseased trees on Table Mountain). The number of fires is likely to be low, but the stage is set for an uncontrollable fire if one is started.[26]

When the vegetation, slope and aspect maps were overlain to verify which areas of the Park had the most extreme fire hazard, Table Mountain, the ridge area west of the southern leg of the Alternate Trail and a very small area at the Park's western boundary south of the Park house (adjacent to low density residential development) emerged as the highest hazard areas. These areas are characterized by vegetation with the highest fuel load (chaparral and the abandoned Christmas Tree Farm), south- and west-facing slopes, and slopes greater than 50 percent. While Table Mountain does not contain slopes greater than 50 percent, it is considered a high fire hazard area because it contains both a high fuel load and south- and west-facing slopes.

J. Staff Resources

1. County Park Staff Resources

Upper Stevens Creek Park is operated out of the Sanborn/Skyline Park Unit which is operated out of the Northwest Unit. The Northwest Unit includes nine of the County's Parks. The Sanborn/Skyline unit provides ranger patrol and maintenance for Sanborn, Skyline and Upper Stevens Creek Parks. This unit has one senior ranger, two permanent rangers, two full time maintenance staff, three seasonal rangers, one seasonal maintenance staff and two seasonal student professionals (who primarily take fees at the entrance to Sanborn Park).

Currently, rangers patrol the Park an average of 12 hours per week. Maintenance staff spends roughly six hours per week in the Park. Overall, staff spends more time in the Park in the summer than in the winter, because staff avoids driving in the Park when roads are wet in order to minimize erosion.

[26] For the purposes of comparison, the Park has greater fuel volumes than Mt. Tamalpais, which is adjacent to an urban area in Marin County.

2. Supplemental Staffing Sources

The County Parks and Recreation Department has several outside supplemental staffing opportunities available to them. Volunteer labor[27] is currently helping the County install step-overs on the Alternate Trail (as described in Chapter IV. Land Use and Recreational Factors).

Labor is also available from the County Department of Corrections (Elmwood Jail). Weekend crews provided by the Department of Corrections provide services such as fence building and construction of other structures. Some weekend crews include transportation by bus, a supervisor and tools, while others require the Parks and Recreation Department to provide tools and supervision. This group usually provides their own tools and does not require supervision. Free labor is also available from the Ben Lomond State Corrections Facility. This group typically provides labor for jobs such as fuel reduction and trail work. This group needs some supervision.

In addition, to this free labor, the County Parks and Recreation Department can also enter into a contracts with the California Conservation Corps (CCC) at a current labor rate of $11.50 per hour. The CCC works on projects such as construction of fuel breaks. The San Jose Conservation Corps has also contracted with the County in the past, at a cost of $850 per day, for a work crew of 10. This group provides their own supervision and tools.

Finally, local colleges, such as students from West Valley Community College's ranger and biology programs, may provide survey, research and operations labor pools.

[27] The Boy Scouts of America.

Chapter IV
MANAGEMENT PROJECTS

▪ ▪ ▪

A. Organization

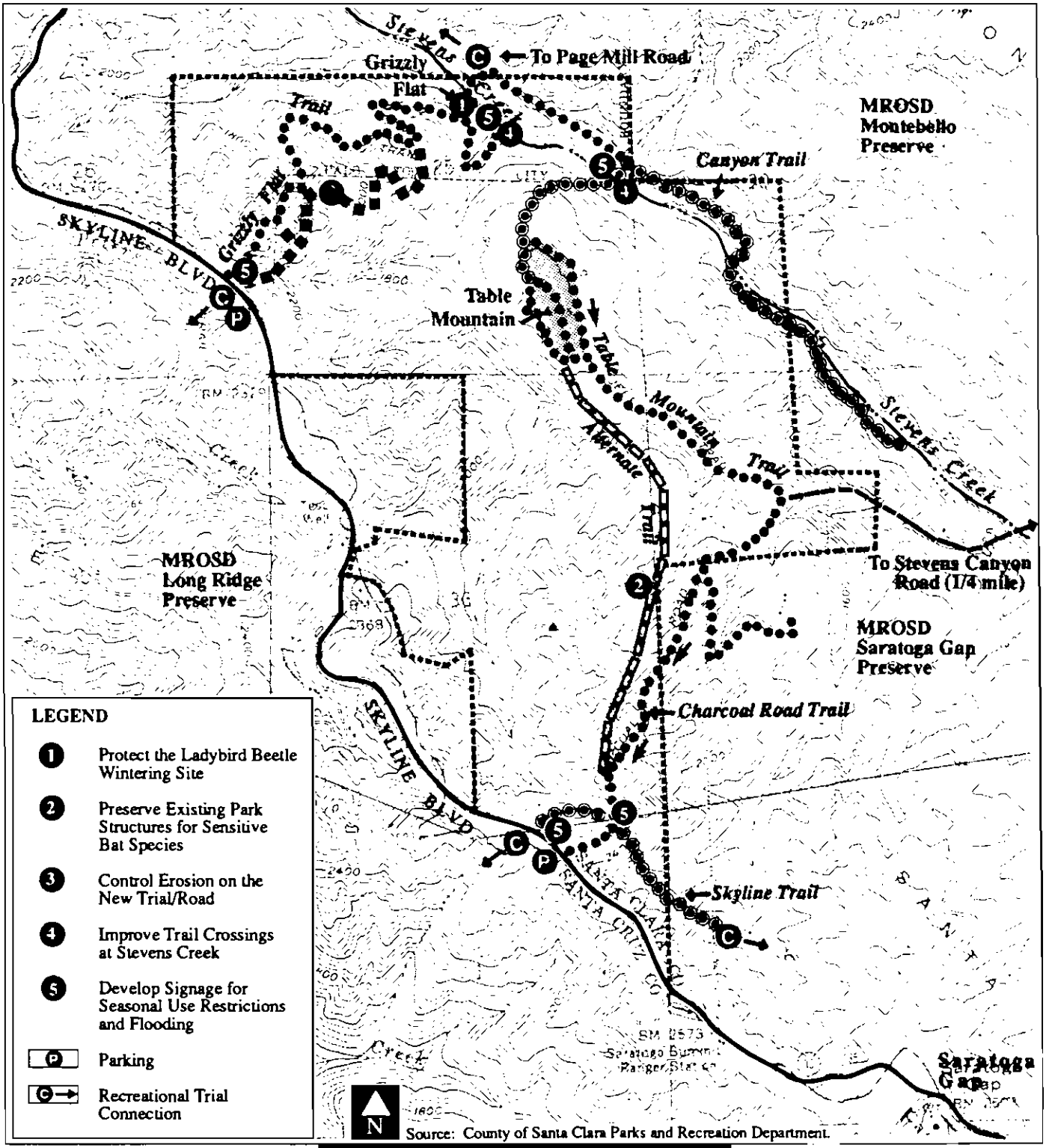
This chapter recommends management projects according to the goals established by the Park. Projects recommended in this chapter fall into three categories including 1) Biodiversity and Biotic Resource Projects; 2) Fire Hazard Management Projects; and 3) Land Use Practices. While there are no projects specifically categorized as "Viewshed Enhancement Projects", the Table Mountain projects will enhance views in this area, thereby meeting Park Department goals.

Each project is shown in order of priority within its category and contains a problem statement, describes the tasks required to carry out the project, discusses precautions that should be taken to avoid any resource impacts or hazards and identifies monitoring measures that should be taken to insure project success. Short-Term Projects are shown in Figure 14 and Ongoing Long-Term Projects are shown in Figure 15. Possible phasing is described for the larger understory removal projects and shown in Figure 16. Acreages are shown for vegetation and fire management projects. They are not estimated for wildlife management or erosion control projects, as the nature of the proposed projects do not lend themselves to acreage estimates.

Projects can be added to this Plan by the Parks and Recreation Department according to the Goals and Objectives described in Chapter II.

B. Priorities

The recommended management projects have been prioritized within three categories, (1) short-term projects, (2) ongoing long-term projects, and (3) other projects to be considered, which are included in Appendix I.

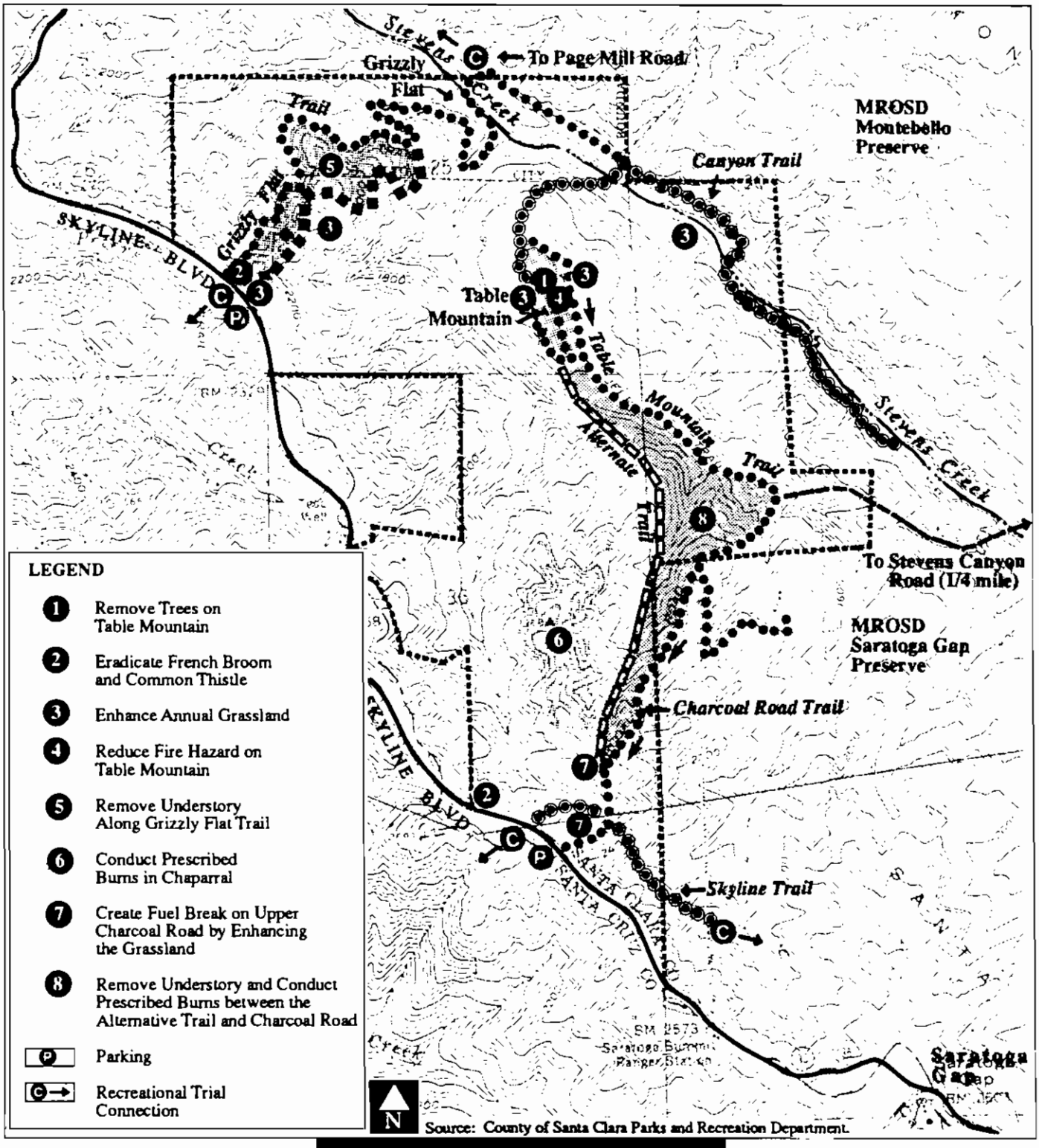


Scale in feet:
0 500 1000 2000 3000

UPPER STEVENS CREEK
RESOURCE MANAGEMENT PLAN
Santa Clara County

FIGURE 14

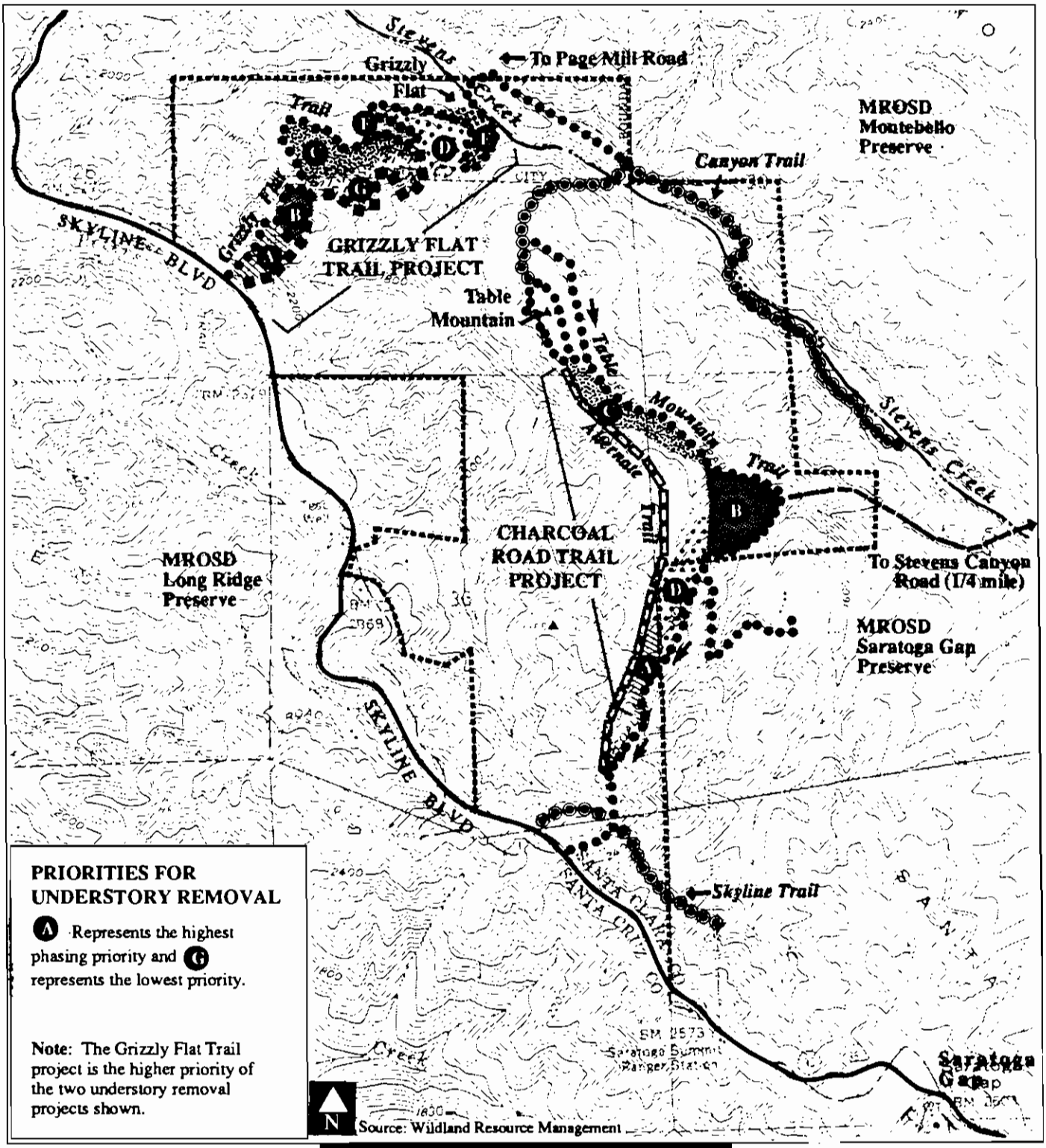
Short-Term Projects



UPPER STEVENS CREEK
RESOURCE MANAGEMENT PLAN
Santa Clara County

FIGURE 15

Ongoing Long-Term Projects



Scale in feet:
0 500 1000 2000 3000

UPPER STEVENS CREEK
RESOURCE MANAGEMENT PLAN

Santa Clara County

FIGURE 16

Grizzly Flat and Charcoal Road Understory Removal Projects

The short-term projects are projects that are easy to accomplish, can be done in a relatively short period of time and in general, are done once, and are not ongoing (with the exception of monitoring). These projects typically can be carried out using existing park staff. Ongoing long-term projects are projects that are ongoing and would occur over a longer-period of time. These projects may be labor intensive and can be undertaken at the County's convenience as staffing and funding become available. Projects would probably require large, outside work crews. While the projects could be accomplished within a relatively short time frame with a large work force, if the outside labor pool is not available, the project would need to occur over the long term. These long-term projects are primarily "funding-dependent". At present, funding is limited for these projects.

Other Projects to Consider are found in Appendix I. These projects include surveys and research projects that can be done to add to the overall knowledge of Park resources. The information gained can be used to develop more sophisticated biodiversity projects.

C. Required Oversight

The California Board of Foresters contends that activities which impact the ecology of wildlands and the quality of wildland environment require the oversight by professional foresters. This assumption is based on the Professional Foresters Law (Public Resources Code, Sections 750, et. seq.). Projects recommended in this Plan which could be subject to this interpretation include tree removal at Table Mountain and prescribed burns. The Plan has been reviewed by a licensed forester.

D. Prescribed Burn Projects

The Resource Management Plan recommends four projects that include prescribed burns. These projects include "Create Fuel Break on Upper Charcoal Road by Enhancing the Grassland", "Conduct Prescribed Burns in Chaparral Between Charcoal Road and Grizzly Flat", "Reduce Fire Hazard on Table Mountain" and "Remove Understory and Conduct Prescribed Burn Between the Alternate Trail and Charcoal Road". Because these projects include prescribed burns, which are not standard practice in the County, they are dependent on approval by the County Board of Supervisors. Currently the County is not engaged in any prescribed burn programming.

E. Pre-Project Surveys

Some pre-project surveys are common to many of the recommended projects. These studies include: (1) surveys for sensitive wildlife species in fire project areas (in the oak-madrone forest, between Grizzly Flat Trail and the New Trail, and the Charcoal Road Trial); (2) surveys for plant species of concern along trails, in grasslands, chaparral, and the Douglas fir forest where affected by other management projects, (3) surveys for the retention of snags, and (4) surveys for the retention of downed wood. Many of these are required for fire management projects. These surveys are discussed in detail in Appendix H. Each recommended project identifies which of these pre-project surveys should be undertaken.

F. Short-Term Projects

1. Biodiversity and Biotic Resource Projects

Protect the Ladybird Beetle Wintering Site at Grizzly Flat.

Problem Statement. The ladybird beetle wintering site at Grizzly Flat is accessible to Park visitors and can be subject to degradation, since a volunteer trail passes through the site. Although ladybird beetles are not considered sensitive species, their occurrence contributes to the biodiversity of the Park and, thus, they deserve protection.

Tasks.

Task 1. Prepare literature or signage at the wintering site that informs recreationists of the site's importance and discourages the use of the volunteer trail through the site.

Precautions. None.

Monitoring. Park staff can monitor the wintering site to document occurrence. More restrictive measures to discourage trail use in this area should be developed if site degradation due to excessive use of the trail is observed.

Preserve Existing Park Structures for Sensitive Bat Species.

Problem Statement. Sensitive bat species are known to roost at the structure on the former Rogers Property. The dilapidated structure between the Alternate Trail and Charcoal Road Trail may also serve as a bat roost. It is

anticipated that the structures could be removed in the future due to the liability they pose; however, the structures should be preserved as long as is practical.

Tasks.

Task 1. Park rangers should be informed that bats potentially roost in these structures and therefore, the structures should be preserved, as feasible. Artificial bat houses could be installed in the location of the structures if they must be removed for safety reasons.

Precautions. None.

Monitoring. None.

2. Land Use Practices

Control Erosion On The New Trail/Road (near Grizzly Flat Trail) By Minimizing Gradients and Grading To Control Drainage.

Problem Statement. The proposed alignment of the new trail/road includes gradients exceeding 15 percent in places. These gradients occur primarily in a midsection of the trail near the 2,000-foot elevation. This gradient poses safety hazards for emergency vehicles, conflicting with California Department of Forestry standards, and can cause serious erosion problems related to drainage and vehicular use. The use of switchbacks will greatly reduce the potential safety and erosion problems; however, if the road is not graded properly to direct water off the road, significant erosion can occur due to the high erodability of the soil in the Park (loamy, no clay). Although, most of the Park's roads are graded well, the "water bars" (elevated linear bars across the road) that are currently used to direct drainage, compact easily due to the soil type. "Rolling Dips". These are linear depressions across the road, similar in dimension to a water bar, but concave.

Tasks.

Task 1. Map the proposed trail/road on a topographic base map and identify sections that exceed fifteen percent.

Task 2. Realign sections that exceed 15 percent through the use of switchbacks. Field observations indicated that switchbacks appear feasible in the places in question.

Task 3. Construct "rolling bars" as water diversion devices in the new road to divert water. Use standard dimensions for these dips in the road so that large trucks can pass over them comfortably at slow speeds.

Pre-Project Survey. A survey for sensitive plant species should be conducted if the project affects any of the grassland which is located in the immediate vicinity.

Precautions. Standard dimensions should be used for the "rolling bars" so emergency vehicles and bicyclists can pass over them safely.

Monitoring. Check the road once during the rainy season and at the end of the rainy season to see if road repairs are necessary.

Improve Trail Crossings at Stevens Creek.

Problem Statement. Mountain bike and equestrian use at creek crossings on the Grizzly Flat, Table Mountain and Stevens Canyon Trail have created some erosion problem areas along the creek that could lead to sedimentation of aquatic habitat and reduction of riparian habitat values; however, the majority of sedimentation in the Creek is related to disturbance upstream, either natural or otherwise, outside the Park. The upstream source of siltation is by far more significant than the minor amount of siltation caused at creek crossings; however, improvements to trail crossings can reduce impacts on the environment.

Tasks.

Task 1. Install stepping stones at creek crossings to facilitate crossings, and if necessary, place logs or low wooden fence barriers on either side of the creek in the vicinity of the stepping stones to discourage crossings at undesignated points. According to the California Department of Fish and Game (CDF&G), a Streambed Alteration Permit would not be required for moving stones or logs by hand; however, if equipment is required or the stream bank is physically altered by the placement of barriers, CDF&G would need to be contacted to assess the need for a permit.

Task 2. Establish Park policies which prohibit mountain bike use in riparian corridors (e.g., within the streambed or through riparian vegetation) except at improved crossings, and provide supporting signs and literature. This task could be performed by Park staff, interns and students.

Precautions. None.

Monitoring. The creek crossings should be monitored yearly to ensure that stones are still in place. If the problem is still evident (i.e., bike usage through the streambed), then a foot bridge could be considered. Monitoring for erosion at trail creek crossings could be performed by Park staff.

Develop Signage for Seasonal Use Restrictions and Flooding.

Problem Statement. While the Parks and Recreation Department controls vehicular use in the Park when roads are wet to minimize erosion, they do not limit bicycle and equestrian use. Bicycle use, especially downhill travel, can cause significant erosion problems when trails/roads are wet. In addition, Stevens Creek experiences flooding along its entire length during heavy rains. This can cause safety problems for recreational users trying to cross the creek.

Tasks.

Task 1. Develop a temporary sign that can be used to inform bicyclists and equestrians that Park trails are closed due to the wet conditions and erosion potential. This seasonal closure should be coordinated with MROSD.

Task 2. Develop permanent signage that will clearly notify recreational users of periodic flood hazards associated with stream crossings during heavy rain. These signs should be posted at stream crossings.

Precautions. None.

Monitoring. Assess whether these signs are working after one year based on ranger observation and apparent erosion. Refine signage and alter signage location as necessary if violations continue to occur.

G. Ongoing Long-Term Projects

1. Biodiversity and Biotic Resource Projects

Remove Trees on Table Mountain (27 acres).

Problem Statement. The Table Mountain abandoned tree farm is dominated by conifer species which are not native to the local area. In addition, Monterey pine trees infested with bark beetles and disease are prevalent. The area is on a major trail and has potential for establishment as a destination for park

visitors. The area can also be managed as one of the few open viewsheds in the park because of its particular location. In order to do so many of the trees planted for the tree farm should be removed and the grasses, madrones and oaks which are more characteristic of the area, should be allowed to revegetate. The extent of this project will cover the majority of the wooded portions of Table Mountain, which is depicted in Figure 15.

Tasks.

Task 1. Park staff should tag diseased trees such as Monterey pine, Scotch pine, and white fir that are intended for removal. Although not native to the Santa Cruz Mountains, Sierra big tree (*Sequoiadendron giganteum*) should not be removed as it is not a threat to native species.

Task 2. Trees tagged for removal by Park staff should be verified by a certified arborist to insure that all diseased trees have been tagged. A wildlife biologist or Park staff should evaluate some trees in order to determine which ones should be saved for snags. Snags are dead trees which are still standing. (See Appendix H which describes how to determine which snags to preserve). It would be best if all pines are removed, since the bark-boring beetles are host specific to pines.[1]

Task 3. Trees planned for removal should be felled and sectioned by Park staff and disposed of on-site if they are infested with bark beetles. Dead and dying trees should be cut first to decrease fire hazard.

Task 4. Fallen wood should be properly disposed of by either burning on-site or by removing from the Park. The California Department of Forestry (CDF) should conduct the controlled burning of fallen trees.

Pre-Project Surveys. Surveys should be conducted prior to project implementation to identify valuable snags and downed wood, and to determine which trees are infested with bark beetles.

Precautions. There should be careful handling of fallen trees, since many of them are infested with insects and/or disease. Infested trees should not be exported off site.

If burning is used as a means of disposing fallen trees, measures should be taken to prevent uncontrolled fire. The fire hazard of Table Mountain is

[1] Ellen Cooper, Certified Arborist, personal communication, December 7, 1992.

generally high, depending on weather conditions, and controlled burning would require careful supervision and collaboration with Carol Rice (fire ecologist) and CDF.

Heavy truck trips should be prohibited when roads are wet and re-grading should be conducted as necessary to maintain adequate drainage.

It is not anticipated that controlled burns would cause negative, permanent impacts to the vegetation in Table Mountain.

Monitoring. Once the removal of selected trees is complete, there should be yearly monitorings for a period of ten years. The monitoring should focus on the detection of new non-native saplings that have germinated from the existing seed bed. Any noted saplings should be removed by hand.

Retained natives or non-native trees should be monitored for health and vigor on a yearly basis. If any trees are noted to have disease or insect problems, they should be removed. The objective is to encourage a mix of native vegetation, while allowing some non-natives. Replanting will probably not be necessary because the vegetation should naturally regenerate.

Eradicate French Broom and Common Thistle (3 acres).

Problem Statement. The eradication of common thistle and French broom would reduce competition with native plant species, would promote the goal of biodiversity, and improve habitat value for wildlife. Common thistle is the most prevalent invasive, non-native plant observed at the Park. It is found in open areas and along dirt roads at Table Mountain. Common thistle also occurs in some of the annual grassland along Skyline Boulevard in the vicinity of the entrance to Grizzly Flat. It is anticipated that there are scattered occurrences of common thistle elsewhere in the Park.

Two small populations (approximately 100 plants) of French broom were observed along Skyline Boulevard. The locations of these populations are depicted in Figure 8.

Tasks.

Task 1. French broom and common thistle should be removed from the locations discussed above as soon as possible to prevent the further spread of these species.

Removal of Common Thistle. Areas with large numbers of plants can be mowed to remove unwanted plants provided topography permits. Areas with small numbers of plants can be hoed by hand. Hoeing should be done below ground level at the base of the plant, and is most effective in the spring when plants are young. Two to three spring hoeings would be required in order to remove later germinating plants and exhaust the seed bank. Park staff could also use the chemical "Vanvel" and "Dicamba" to eradicate the thistle. These are broad leaf herbicides (used by the East Bay Regional Park District). A permit is required to use them.

Removal of French Broom. French broom is suited to manual control methods. A tool called a Weed Wrench has been specifically developed for controlling this invasive species. This tool is designed to remove woody plants by uprooting. Using a Weed Wrench, a person of ordinary strength can remove plants up to 3 inches in diameter. Care should be taken to disturb the soil as little as possible, since bare soil favors broom germination. Plant removal should be done during the rainy season when the soil is moist before the plants set seed.

Task 2. It is anticipated that there will be disturbed soil where invasive non-native plants have been removed. These areas should be seeded with native species in order to prevent the establishment of French broom, common thistle, or other weedy species. A native plant specialist could be consulted to determine which species should be used. The native plant specialist could evaluate the removal sites on a site-by-site basis to determine the native species that should be planted. These species should reflect the existing native species growing immediately adjacent to the disturbed area. In most cases, herbaceous species should be used. Appropriate species would include the following: California Blackberry *(Rubus ursinus)*, Wild Strawberry *(Fragaria californica)*, California Poppy *(Eschscholzia californica)*, Sky Lupine *(Lupinus nanus)*, Deerweed *(Lotus scoparius)*, Elegant Clarkia *(Clarkia unguiculata)*, Pursh's Trefoil *(Lotus purshianus)*, and Alkali Rye Grass *(Elymus triticoides)*.

Precautions. Precautions should be taken in handling removed plant material. Seeds of these species should not be spread to new areas, especially those with disturbed ground. For example, broom seed can be distributed by vehicles along roads.

Monitoring. Areas where common thistle and French broom have been removed should be monitored annually for a minimum of five to seven years to see if new seedlings have sprouted. Monitoring may need to be extended if regrowth is occurring at the end of this period. Any detected seedlings should

be destroyed. Follow-up is especially critical for French broom because the hard-coated seeds may remain viable for many years.

Enhance Annual Grassland (20 acres).

Problem Statement. The grasslands at the Park are diminishing in size from the encroachment of coyote brush and other plant species. This plant community is shown in Figure 8. During field reconnaissance, grassland areas were noted to be dominated by non-native species. The habitat value of the grassland could be improved by restoring these areas to native perennial bunchgrass habitat (such as a Valley Needlegrass Grassland), which is beneficial for weed and erosion control, and its low growth provides suitable foraging habitat for predatory birds and habitat for wildflowers. The Park already has a nice population of bunchgrass, more prevalent than in many parts of the Bay Area. From a fire hazard reduction standpoint, grassland patches are a good idea because grass is one of the easiest plant communities in which to suppress fires once they are started.

This Plan includes two projects affecting grasslands in the Park. This particular project affects roughly 20 of the 25 plus acres of grasslands in the Park. These grassland areas would be enhanced to increase biodiversity in the Park. In addition to these grasslands, a 5-acre project is recommended under "Fire Projects" (entitled "Create Fuel Break on Upper Charcoal Road by Enhancing the Grassland") to create a fire break along Upper Charcoal Road. While biodiversity will be enhanced with the implementation of this project, its primary goal is to minimize the spread of fire. As a result, the grassland projects have been separated since they address different issues and would be prioritized differently.

Tasks.

Task 1. A native habitat restoration specialist with demonstrated experience in the conversion of non-native annual into native perennial grassland should design and oversee the project.

The specialist should prioritize the grasslands to be restored. Assigning priority should consider the following factors: access, existing habitat value, encroachment of coyote brush, and how the grassland contributes to the overall mosaic of the different plant communities at the Park.

Task 2. All existing shrubs and seedlings of coyote brush should be removed from the site to discourage succession into scrub habitat, which has

lower habitat value compared to grassland. The removal should be done in spring when the soil is moist and prior to seed set. The size of the removal area would be determined by a revegetation specialist based on a site-specific analysis.

Shrubs can be removed with hand labor or they can be cut down and mulched with machinery such as a brush hog. This option may be quicker in the short run, however, the coyote brush will need to be treated in the subsequent year to prevent regrowth. Depending on the cost of hand labor, machinery may be more cost-effective. Coyote brush sprouts can be cut again by hand and mowed.

Task 3. Although little is known about the make-up of the historical native grasslands (now containing non-native species), it would be appropriate to try to restore the grasslands to a "valley needlegrass grassland" because species of this grassland type can be found in the coastal mountains. The goal is to achieve a mix of native grasses. Seeds of native bunchgrasses and wildflowers could be collected at the Park or from a native plant nursery. Suitable species include alkali rye grass (*Elymus triticoides*), valley needlegrass (*Stipapulchra*), common yarrow (*Achillea millefolium*), blue-eyed grass (*Sisyrinchium bellum*), lupine (*Lupinus nanus*), and California poppy (*Eschscholzia californica*). At the north end of Table Mountain, there is a large patch of alkali rye grass that could be used as a seed source.

Task 4. Areas planned for seeding need to prepared by first controlling any weeds at the site. Weeds should be identified and mowed to a height of about 2"-4" inches in early May, when the annual grasses and weeds are just beginning to flower. After mowing the area should be cultivated to a depth of 4".

Task 5. Seeding should be done in early October and can be done in several ways. Techniques include broadcast seeding, hydroseeding, drilling, and spreading native perennial grass straw. The seeding method used would depend on the particular grassland being restored. It is important to seed the disturbed soil where coyote brush was removed.

Task 6. Seeded areas will need follow-up weed control to reduce competition with non-native herbs and grasses. In early March, weeds in the revegetation areas should be removed either by hand or mowed to a height of 4". A second or third mowing may be needed if the weeds are vigorous. If staffing is available, weed eaters are an alternate way to cutback non-native species and would prove useful in areas having difficult access.

Task 7. The revegetation specialist should design a maintenance program that schedules irrigation (by truck, if needed), mowing, and reseeding.

Pre-Project Surveys. Surveys should be conducted prior to project implementation to identify sensitive plant species.

Precautions. Non-native species such as french broom should be prevented from spreading into the newly created grasslands by seeding the area. Seeds should be collected from the Park, as feasible, and spread wherever bare spots are created. Seed can be collected by volunteers such as Boy Scouts or the CNPS. Appropriate care with hand tools and poison oak would be a necessary precaution.

Monitoring. The monitoring should evaluate the success of the restoration project. Success may be measured by native plant diversity, weed reduction, site equilibrium, and vegetation stability. Percent vegetative cover should also be evaluated. If the percent cover is not 60.0 percent or greater, then the revegetation area should be reseeded. The revegetation specialist managing the project or a graduate student should carry out the monitoring.

Prior to any manipulations of grassland areas, there should be documentation on the composition of the species present (i.e., the proportion of native species to non-native species). This baseline information will provide a way to evaluate changes that will occur after revegetation.

Ideally there should be a quantitative sampling protocol that uses techniques such as control plots, experimental plots, quadrant and/or line transects. It is also recommended that permanent photograph points be established and that there is yearly photodocumentation to record the changes in vegetation. The California Native Grass Association may be contacted for more specific information on monitoring methods.

2. Fire Management

Fuel management can serve as a mitigation measure for poor access and water supply. If water supply and access were plentiful, less fuel management would be necessary to ensure the same level of protection against damage from wildfire.

Much discussion has revolved around concerns for liability stemming from a wildfire. Generally, cases have been based on negligence, which has been defined as not taking "reasonable" actions to protect against a known hazard. Thus, the projects that follow are considered what can "reasonably" be done.

Once accomplished, these projects serve to increase the possibility of a fire from leaving the Park uncontrolled, and from entering the Park and burning large portions of the Park. Not only will the acreage burned likely be reduced, but the damage the fire would induce is likely to be less severe. The specific benefits of each project are stated in the *Problem Statement.*

Fire hazard reduction measures achieve benefits even when the entire project area has not been completed. Work can be done in an incremental fashion, however, the debris generated from thinnings and prunings should not be left over a summer because they constitute an increased hazard themselves. Please refer to the description of individual projects for more detailed discussion regarding the scheduling of work.

Fire management is likely to achieve many biodiversity goals. These are stated for each project. All of these projects occur in the short-term category because of their importance for reducing hazards; however, staffing and financing will dictate what can be accomplished when.

Monitoring steps are described at the end of this section, rather than after each project.

Reduce Fire Hazard on Table Mountain (27 acres).

Problem Statement. Tasks 1-4 described in the Table Mountain Tree Eradication Project, also achieve the fire hazard reduction objectives for the area. This section adds one task to augment these tasks.

A main goal of this project is to reduce the distance that embers are likely to be thrown in a wildfire, and thus the effective rates of spread. In addition, actions are needed to reduce the intensity of the fire burning in that location.

The project is expected to result in a patchy mosaic of woodlands comprised of oak and madrone, mixed with grasslands. The acreage of young woodlands, and grasslands is expected to increase, thereby enhancing the variation in age classes in the Park (increasing biodiversity).

Tasks.

Task 1. Removal of Debris. Replace with: "Debris generated from the operation should be cut into lengths no longer than 10 feet and scattered away from young woodland species, and away (at least 5 feet) from the canopy of mature woodland species (trees to remain).

The following spring or fall, the area should be burned in a broadcast fashion to remove the debris and woody material that had fallen before the non-native trees were removed. Debris can also be fed into a stationery fire. Minor amounts of debris should be left in accordance with the recommendations of the wildlife biologist.

The prescribed burn should also include the area of north coastal scrub in order to enlarge the grass lands and encourage native grasses.

California Department of Forestry and Fire Protection should conduct the burn under the department's Vegetation Management Program, whereby costs of the project (up to 90 percent) may be shared with the State. It is likely that the County Board of Supervisors will need to approve of the proposed controlled burn before it is undertaken.

Pre-Project Surveys. Surveys should be conducted prior to project implementation to identify valuable snags and downed wood.

Precautions. The concern for escape is heightened at that time of year because the adjacent chaparral has lower foliar moisture in the fall and is thus more flammable. Spring burning can enhance native grasses if it is done before the perennial species start to flower. A fire would reduce competition with the native grasses by killing the year's crop of non-native annual grasses.

Caution is also necessary to prevent all young oaks and madrone trees from being consumed in the broadcast fire. Decisions regarding density of trees, and size of patches will need to be made before the burn, and incorporated into the ignition pattern and holding plan. The alternative to broadcast burning is to pile the debris and simply burn the piles, or feed the debris into a stationery fire. However, the restorative properties of fire would not be exercised (i.e. no wildflowers, bulbs, fire-following species, or removal of old duff build-up).

The removal of the trees will result in numerous additional trips on the Charcoal Road. These will need to be managed so as not to increase dust, or to increase erosion.

If burning is to be conducted in the spring, the site should be surveyed to establish if ground-nesting birds need protection.

Retention of selected woody logs over 6 inches in diameter should be done with application Class A foams during the fire. The logs would be selected by the Fire Boss.

Remove Understory Along Grizzly Flat Trail (6 acres treated area).

Problem Statement. This project is intended to aid containment of a fire traveling southward, and prevent a fire from burning the interior of the Park. The action will also provide greater safety for access by reducing the radiant heat along the roadside. In addition, this project would enhance existing oak woodlands by protecting them from a wildfire that could cause mortality. The oaks are further protected from decreasing light limited by Douglas fir overtopping the oaks. The project will create opportunities for regeneration of oaks, wildflowers, and early successional-stage species.

The project entails removal of fuels under the canopy of the oak/madrone woodland and Douglas fir forests. The area of the project will also extend generally 100 feet north of the road. Where an old road generally parallels Grizzly Flat Trail, the road should be used as the boundary. This project (in addition to the project "Remove Understory and Conduct Prescribe Burn Between Alternate Trail and Charcoal Road") can be done incrementally and still result in significant benefits to fire safety. It is likely the entire project may take three to five years to complete.

The understory should be removed for a distance of 30 feet from both sides of the road during the first year. The branches left should be preferably chipped, but alternately hauled away from the road so that roadside ignitions are not an increased possibility. This action alone will enhance fire safety of those wishing access during a wildfire. The remaining work can be divided into areas defined by the switchbacks in the road so that the prescribed burn can use the road for three sides of the burn boundary. One area (starting at the top) would be thinned, pruned then burned, then another area would be thinned, pruned and burned (see Figure 16 which prioritizes sections of work). Thus a benefit to fire containment, and reduction of fire damage would result immediately, and increase as more areas were treated.

Scheduling and Priorities.

It is expected that the rigor with which understory shrubs are removed will decline as the experience with prescribed burning increases because prescribed burning can consume many of the shrubs. The clearing of larger Douglas fir trees will not change. Pruning is likely to be eliminated as a task after the second year. For example, the California Department of Parks and Recreation conducts no pruning in prescribed burns in this vegetation type. It can be expected that understory clearing would occur closest to roads to better minimize aesthetic impacts of the prescribed burn. In summary, the staff time necessary to treat an area will significantly decline in future years.

The project has been divided into six parts to facilitate prioritization. These parcels should be treated after the roadside buffer of 30 feet on both sides is cleared.

Areas A and B, as shown on Figure 16, have already had work started and also have sparse vegetation. This would be a good project for the first year after roadside clearing is done.

Area C is the unit defined by the two trails. It can be divided into two subunits if the entirety cannot be treated at one time. Considerably more time would be required to build containment lines for the prescribed fire.

Areas D, E, and F, which are the remaining units, can be accomplished as time permits according to the numbered order.

Area G can be considered a low priority and done as time allows.

Tasks.

Task 1. The Park staff will need to establish an outside labor force, which will most likely be a government subsidized labor pool. Development of a firewood contract is not likely because of the extra work involved besides cutting oak wood; however, this option should be explored further as a means to generate revenue. The hand work can be accomplished any time of the year, if access can be provided without causing erosion or damaging the road grading.

Task 2. The laborers should remove smaller Douglas fir trees - those under 8 inches in diameter. The branches of remaining trees (of all species) should be pruned as high as possible (8 - 10 feet). Shrubs under the canopy of the woodland trees should also be cut.

The boles of the trees over 3 inches in diameter should be cut into firewood lengths and sold for revenue, or otherwise removed. Material under 3 inches should be cut into lengths not to exceed 6 ft in length and left scattered on the ground. No concentrations of debris should be located under the canopy of oak trees.

Task 3. The site should be prescribe burned in early spring or fall (after the grass greens). It is likely that the County Board of Supervisors will need to approve of the proposed burn before it is undertaken. The California Department of Forestry and Fire Protection should conduct this and all other burns under the Vegetation Management Program. Thus, an application for

participation in the VMP should be obtained and filled out so that the two agencies can work together and cost-sharing can be realized.

The portion of the cost borne by the County (as little as 10 percent of the cost of the project) is determined by the proportion of hazard reduction (vs. other benefits) of the project. The costs of the project can also be provided by work in lieu of money. Because substantial work (such as thinning and pruning the understory) would already by done by the County, it is possible the burn would be accomplished without further expenditure of funds.

Pre-Project Surveys. Surveys should be conducted prior to project implementation to identify sensitive plant species, and valuable snags and downed wood.

Precautions. The recommendations of the wildlife biologist should be followed regarding leaving a minimum number of snags and downed logs over 6 inches in diameter. Even if the minimum is not present before the action, no increase in snags or downed logs should result from the action. Rather than clear a line around each log and snag to be saved, application of Class A foam is the preferred method to prevent consumption of these features.

Another precaution to be taken is the scheduling of the work in several phases. The work should be accomplished in successive years so that there will be variability in ages of new vegetation, the conditions under which the burning, pruning, thinning are accomplished, and variability in the weather afterward.

Conduct Prescribed Burns in the Chaparral Between Charcoal Road and Grizzly Flat (22 acres).

Problem Statement. This project would benefit both fire hazard reduction objectives as well as biodiversity objectives. The prescribed burns reduce the flammability of chaparral as well as the rates of spread and intensity of a wildfire in the vegetation. This is the result of reducing the amount of fuel available to burn, and greatly increasing the proportion of living material (vs. dead material) in the stand.

Additionally, the project promotes the regeneration of species which require fire to trigger germination of seeds (this is common in both chaparral and herbaceous species). This project will therefore result in a renewal of seed banks in the soil and thus preserve (and possibly increase) the biodiversity of the vegetation.

Tasks.

Task 1. Prepare application for Vegetation Management Plan (VMP) with CDF to conduct a prescribed burn. It is likely that the County Board of Supervisors will need to approve of the proposed burn before it is undertaken. Install any minor hand lines required, and conduct necessary thinning and pruning of adjacent woodlands to increase fire safety around the borders of the burn unit. The areas within 100 feet of the burn units should be thinned and pruned according to recommendations in the Understory Removal Along the Grizzly Flat Trail Project.

Hand lines will probably be recommended in the Burn Plan developed by the CDF. Wherever possible, the Alternate Trail should be used as the eastern boundary of the burn because it minimizes the necessity for construction of additional hand lines.

The suggested time for the burns would be in the late fall, after the grass has grown at least one inch. This is likely to occur in November, but can also be as late as December. However, the exact prescription would be developed by the CDF VMP Coordinator.

Under the best weather conditions, the burns would be done in a three year period, and would cover approximately 85 percent of the chaparral. However, burning windows are often rare, and burns can only be done when conditions are acceptable. Approximately 30 percent of the area should be burned initially. The distribution of the burn areas should connect in a linear fashion, in clumps with narrow strips left unburned, instead of large patchy areas that do not connect at all. The exact size and location of these patches will be determined with CDF. They cannot be determined at this time due to variations in the physical conditions at the site. Another 30 percent of the chaparral should be burned in five years, located generally below and around the newly burned areas. Another 25 percent should be burned after another five years (approximately 2006). This would produce an even greater variety of age classes in chaparral, and further enhance fire safety.

Pre-Project Surveys. Surveys should be conducted prior to project implementation to identify sensitive plant and wildlife species of concern, and valuable snags and downed wood.

Precautions. The scheduling of burns in a variety of years produces greater variability in burning conditions, and therefore probably greater variation in results.

Precautions to enhance the ease of control of fires in chaparral are always warranted. These include construction of hand lines, application of foam on the borders of the burn unit, and pruning, and thinning adjacent woodlands prior to the burn.

Precautions should also be taken to ensure the fire behavior is conducive for seed germination. While control of the fire is required, so is a fire that is "hot" enough to germinate the seeds. This indicates a need for a significant residence time, a great degree of fuel consumption, and probably dramatic flame lengths. These attributes are required so the soil will be heated at sufficient temperatures and at sufficient depth to trigger germination in the seeds.

Create Fuel Break on Upper Charcoal Road by Enhancing the Grassland (5.2 acres).

Problem Statement. While grass is easy to ignite, and fires in grass spread rapidly with long flames, fires in grass are actually among the easiest to control and produce the least damage. Thus, expansion of grasslands in two select areas along the upper reach of Charcoal Road will reduce fuel volumes, increase the areas in the Park where fires can be easily contained, and increase areas where access can be obtained in an emergency. Coupled with the chaparral burns and roadside treatments, a fuel break would be established along the ridgeline by Charcoal Road.

Because grasslands cover the least area in the Park, this project would also create a more even distribution of vegetation types. Grasslands historically covered a much greater percentage of the Park so this project can also be considered a restoration project to enhance the biodiversity. A wealth of species are endemic to grasslands and these will augment the species already present to enhance the biodiversity.

Scheduling and Priorities. This work can be done incrementally, so that one grassland patch may be treated one year, another the next, etc. The more that can be accomplished, the faster the fire safety will be enhanced.

Tasks.

Task 1. The shrubs (which are predominantly coyote brush) should be removed for 100 feet around the perimeter of the existing border of the grassland to create an adequate fire break. The roots should preferably be taken out with a weed wrench rather than simply cut because this species

sprouts vigorously. The number of individual shrubs is not great, so the added time for root removal is not significant.

The Douglas fir should likewise be cut for 100 feet perimeter along the existing grassland border. Tree boles over 3 inches should be cut into firewood lengths and removed. The remaining material of the tree removal and the debris from the shrub removal operation should be placed in the existing grassy area. The shrubs and branches need not be cut into any particular length.

Shrubs and trees can be removed with hand labor or they can be cut down and mulched with machinery such as a brush hog. This option may be quicker in the short run, however, the coyote brush will need to be treated in the subsequent year to prevent regrowth. Depending on the cost of hand labor, machinery may be more cost-effective. Coyote brush sprouts can be cut again by hand and mowed. If the shrubs are cut in the spring and burned that fall (or the next spring), probably no further treatment of the coyote brush would be required.

Optional Approaches to Task 2

There are two approaches to enhancing a grassland. The first is through mowing and reseeding, as described previously under the grassland enhancement project within the Biodiversity Project list. The second is to use prescribed burns. The mowing and reseeding method may be more desirable to the County because it does not involve prescribed burns, a method not currently employed by the County. The use of this method is likely to require approval by the County Board of Supervisors. While both approaches would achieve the same goal, prescribed burns are more effective at promoting native species by removing a large portion of the annual grass crop, as well as providing growing conditions for wildflowers that require an abundance of light and space, and possibly fire. In addition, they allow for natural revegetation of species rather than seeding.

For a description of the mowing and reseeding method, please refer to the project entitled "Enhance Annual Grassland". The following task describes the prescribed burn approach.

Task 2. An application for participation in the VMP should be processed with the CDF. The portion of the existing grassland with debris included should be burned in the fall after the annual grasses have grown between 1/2 to 2 inches. It is expected approximately one-third to two-thirds of the existing grassland would be burned.

Pre-Project Surveys. Surveys should be conducted prior to project implementation to identify sensitive plant and wildlife species of concern, and valuable snags and downed wood.

Precautions. Non-native species such as french broom should be prevented from spreading into the newly created grasslands by seeding the area. Seeds should be collected from the Park, as feasible, and spread wherever bare spots are created. Seed can be collected by volunteers such as Boy Scouts or the CNPS. Appropriate care with hand tools and poison oak would be a necessary precaution. Scouts would not be involved during the prescribed burn.

Do not burn adjacent meadows in the same year.

Leave some portion of the grassland unburned wherever possible. Look for areas of low fuel, for trails that bisect the meadow. If these do not exist, use a foam a wet line rather than scrape a hand line to keep the entire grassland from burning at once.

Remove Understory and Conduct Prescribed Burn Between the Alternate Trail and Charcoal Road (9 acres of treated area).

Problem Statement. The same actions and precautions should be followed as in the Removal of Understory on the Grizzly Flat Trail and the Prescribed Burn on Charcoal Road and the Grizzly Flat Trail Projects. It is likely that the County Board of Supervisors would need to approve of the controlled burn before it is undertaken.

The same increase in labor productivity will be observed in understory clearing and pruning as in the Grizzly Flat Understory Removal Project.

The work along Charcoal Road should start with clearing of 30 feet on both sides of the road. Then the project can be divided into four units (A through B); one unit can be expected to be done each year (see Figure 15). The first unit to treat would be the topmost. The area to be treated is probably smaller than that shown on Figure 15, because the treatment boundary should stay uphill of the riparian vegetation. Area A extends from 30 feet east of Charcoal Road to the Alternative Trail to the property boundary. Area B is formed by the Charcoal Road and jeep trail and 30 feet east of the road. Area C is bounded by riparian vegetation to 30 feet east of Charcoal Road. Area D is the land 30 feet east of Charcoal Road to the riparian vegetation and between the jeep trail west to Area A.

Monitoring for Fire Management Projects

Monitoring programs that collect basic information are required to enable managers to judge the success of the projects or to trigger actions.

If no other data can be collected, a permanent photograph plot should be established so that pictures can record any changes. These photographs can be interpreted at later dates for fuel type, dominant vegetation, and, possibly, successional trends. Photographs should be taken in representative areas, with location and direction of photograph marked in the Park files.

During any prescribed burn, much information regarding the burn data, terrain data, weather data (temperature, wind direction and speed) will be collected by the agency conducting the burn (probably the California Department of Forestry and Fire). This information should be copied into Park files. The information should be augmented, possibly via a video camera, with fire behavior data that includes the rate of spread, flame length and flame residence time.

In chaparral, information such as average brush height, dominant species, and percent cover of each of those species should be recorded prior to ignition in order to compare species composition after the burn. The Park should also map the burned areas on the county aerial photographs which are available at 1:500.

To compare the fuel characteristics before and after project completion, the Park should run linear transects similar to those conducted in the baseline report. There should be three per forest type (Douglas fir and oak/madrone hardwood) collected in each of the forested project areas. These should be collected in the spring, after at least four months from any prescribed burning order to allow for germination and growth to occur.

At the same time, the Park should collect information regarding biodiversity. This would include counting the number of species and the number of individuals per species in representative areas of all vegetation types.

The same fuel and biodiversity samples should be collected in ten years to establish the rate of change, and indicate any need for action.

The above information can be collected by Park staff or student interns. Linear transects take approximately 20 minutes per transect; training would require approximately one hour.

Chapter V
PROJECT SCHEDULING AND STAFFING REQUIREMENTS

■ ■ ■

A. Criteria for Setting Priorities for Project Implementation

1. Project Categories

As described in Chapter IV, the recommended management projects have been generally prioritized within three categories, short-term projects, ongoing long-term projects, and other projects to be considered (see Appendix I). The short-term projects can be implemented in several years; Long-term projects can begin immediately and be implemented in the next 10 years or more, as feasible. Other projects that are valuable and should be considered by the Parks and Recreation Department are recommended, however, they are not recommended as priority projects.

The short-term projects can be accomplished in a short period of time and can be done with a small Parks and Recreation Department crew. Ongoing long-term projects may be done in phases because they are, in general, labor-intensive projects. These projects may require outside work crews. For illustrative purposes, we have estimated labor hours for these projects assuming a 10-person crew. Under this assumption, these projects could be undertaken in a relatively short amount of time; however, if the labor is not available, they would occur over the long-term. As a result, these projects are considered long-term projects. These long-term projects are "funding-dependent" because funding is not available for their implementation in the immediate future. The use of outside volunteer or prison labor pools, however, can greatly reduce project costs.

2. Criteria for Prioritizing Projects

The criteria used to prioritize projects in this chapter include the following:

a. Staffing requirements. How many Parks and Recreation staff hours are currently available compared with how many staff hours could be required?

b. Level of Concern. Is there an immediate safety hazard or ecological disturbance which must be rectified?

c. Logical phasing. Does the project need to occur prior to implementation of another based on seasonal or other requirements?

B. Available Staffing and Requirements for Projects

1. Available Staffing

As described in Chapter III.J., the Parks and Recreation Department currently has one senior ranger, two permanent rangers and two full time maintenance staff, three seasonal rangers, one seasonal maintenance staff and two seasonal student professionals that work out of the Sanborn/Skyline Unit, which includes Upper Stevens Creek Park. Rangers patrol the Park an average of 12 hours of week.

In addition to the Parks and Recreation Department staff, there are several outside supplemental staffing sources such as volunteer labor (West Valley Community College students, Boy Scouts, etc.), free labor from the County Department of Corrections and the State Corrections facility in Ben Lomond, as well as paid labor from the California Conservation Corps and the San Jose Conservation Corps.

2. Estimated Staffing Requirements

Staffing requirements have been very generally estimated for each project so that the Parks and Recreation Department can make decisions about prioritizing the implementation of projects based on the likely labor demands.

Factors for estimating the amount of staff time required for specific tasks were developed based on the experience of both the Parks and Recreation Department and the consultant team. These were applied to the recommended projects to derive general staffing requirements for each project. These estimates are limited in that the method for each task, such as the types of tools (mechanical or hand tools) and the exact acreages are not known at this time.

The following broad approximations were used for calculating these labor requirements[1]:

TASK	APPROXIMATE HOURS
Clear 1 acre of understory:	200
Fell and cut up 1 acre of trees:	24 hours to fell, 200 hours to clear.
Reroute 1 mile of trail 10 feet wide:	1,000 hours
Revegetate 1 mile of trail 10 feet wide:	112 hours
Mow 1 acre	4 hours
Seed 1 acre	4 hours

Table 4 presents the recommended projects prioritized within each management area, staffing requirements (total labor hours), and the size of the project (acreage or miles, as applicable). For illustration purposes only, total labor hours have also been converted in the table to number of days, with an assumption about the number of staff persons. This estimate is a very general approximation meant to provide an understandable unit of labor, rather than a recommendation.

C. Recommended Priorities for Project Scheduling

Table 4 categorizes projects according to management goal (biodiversity, fire, etc.) within the short- and ongoing long-term categories. The top priority project within each category is the first priority and the projects are listed in decending order of priority.

Table 5 shows the top priority projects for the entire Park. These projects have been selected from the entire list of projects, both short- and long-term. The projects are listed in the order they should be implemented. These either represent the greatest concern in the Park or can be easily accomplished. These projects can be completed within the next two to three years depending on staffing and funding.

[1] Allan Wiegman, Park Ranger, Santa Clara County Parks and Recreation Department, personal communication, December 1992; estimates verified by Carol Rice, Wildland Resource Management.

Table 4
ESTIMATED STAFFING REQUIREMENTS AND PRIORITIES

Projects[1]	Staffing Requirements[2]	Acreage/Miles
SHORT-TERM PROJECTS		
Vegetation and Wildlife		
Protect the Ladybird Beetle Wintering Site	Minor	N/A
Preserve Existing Park Structures for Sensitive Bat Species	N/A	N/A
Land Use Practices		
Control Erosion on the New Trail/Road	250 hours 31 days/ 1 person	1/4 mile of rerouting maximum (depending on how much of the road has been constructed and where it exceeds 15%)
Improve Trail Crossings at Stevens Creek	Minor	N/A
Develop Signage for Seasonal Use Restrictions and Flooding	Minor	N/A
ONGOING LONG-TERM PROJECTS		
Vegetation and Wildlife		
Remove Trees on Table Mountain	Depends on number of trees removed.	27 acres of selective thinning
Eradicate French Broom and Common Thistle	612 hours 7.5 days/ 10 persons	3 acres of understory removal and reseeding
Enhance Annual Grassland	160 hours 20 days/ 1 person (understory removal not estimated)	20 acres of mowing and reseeding (acreage of understory removal must be determined in the field)

Projects[1]	Staffing Requirements[2]	Acreage/Miles
Fire		
Reduce Fire Hazard on Table Mountain	Depends on number of trees removed.	27 acres of selective thinning
Remove Understory Along Grizzly Flat Trail	498 hours 6 days/ 10 persons	6 acres with 30 feet of clearing on both sides of trail
Conduct Prescribed Burns in Chaparral	1,000 hours 12.5 days/ 10 persons CDF does burn	5 acres of clearing 22 acres burn
Create Fuel Break on Upper Charcoal Road by Enhancing the Grassland	41 hours/ 1 person if mowing and reseeding is done (understory removal not estimated). If a burn is selected, CDF does burn.	5.2 acres of mowing and reseeding or burn (acreage of understory removal must be determined in the field)
Remove Understory and Conduct Prescribed Burns between the Alternate Trail and Charcoal Road	747 hours 9 days/ 10 persons CDF does burn.	9 acres with 30 feet of clearing on each trail

[1] Projects are listed in order of priority within each management area.
[2] Staffing requirement estimates are based on Parks and Recreation Department or Consultant estimates. Hours have been converted to days with assumptions about number of staff persons for illustration only. The estimates assume an 8-hour day and do not include travel time.

Table 5
PRIORITY PROJECTS

Project Priority	Project Title
1.*	a. Remove Trees on Table Mountain b. Reduce Fire Hazard on Table Mountain
2.	Eradicate French Broom and Common Thistle.
3.	Control Erosion on the New Trail/Road.
4.	Remove Understory Along Grizzly Flat Trail

* These projects require that certain site-specific surveys be conducted prior to project implementation to identify sensitive plant or wildlife species, and valuable snags and downed wood. Pre-survey requirements are described for each project in Chapter IV.

Chapter VI
LIST OF PREPARERS

■ ■ ■

1. **Brady and Associates**

   Nancy Wakeman, Principal, Project Director
   Diane Kay, Project Manager
   Diana Murrell, Assistant Planner

2. **The Habitat Restoration Group**

   Kathy Lyons, Project Manager
   Valerie Haley, Plant Ecologist
   Brian Mori, Wildlife Biologist

3. **Wildland Resource Management**

   Carol Rice, Principal

4. **John Nicoles, Licensed Forester**

Chapter VII
BIBLIOGRAPHY

■ ■ ■

Abrams, L. Volumes I-V, 1940, 1944, 1951, and 1960. Illustrated Flora of the Pacific States. Stanford University Press, Stanford, CA.

Adams, L.W. and L.E. Dove. 1989. Wildlife Reserves and Corridors In the Urban Environment. National Institute for Urban Wildlife.

Amme, David. 1987. Annadel State Park unit prescribed fire management plan. California Department of Parks and Recreation Santa Rosa, CA. 137 p.

Anderson, H. 1982. Aids to determining fuel models for estimating fire behavior. USDA Interior Forest and Range Experiment Station General Technical Report INT-122.

Axelrod, D.I. 1989. Age and origin of chaparral. In: The California Chaparral: Paradigms Reexamined, ed. S.C. Keeley, 7-20. No. 34, Science Series Natural History Museum of Los Angeles County, 1989.

Balda, R.P. 1975. The relationship of cavity nesters and snag densities in western California forests. USDA Forest Service Wildlife Habitat Technical Bulletin 1, Southwestern Region, Albuquerque, NM.

Barbour, M.G. 1987. Community ecology and distribution of California hardwood forests and woodlands. pp. 18. In: Proceedings of the Symposium Multiple-Use management of California's hardwood resources. Plumb, T.R. and N.H. Pillsbury (eds.) USDA For. Serv. Gen. Tech. Rep. PSW-110.

Barro, S.C., P.M. Wohlgemuth, and A.G. Cambell. Post-fire interactions between riparian vegetation and channel morphology and the implications for stream channel rehabilitation choices. pp. 51-53. In: Proceedings of the California riparian systems conference. Abell, D. (Tech. Coord.) USDA For. Serv. Gen. Tech. Rep. 110.

Barry, W.J. 1972. The central valley prairie. California Department of Parks and Recreation, Sacramento, CA.

Beard, Vicki. 1992. California Archaeological Inventory, Northwest Information Center, Letter to Brady and Associates.

Biswell, H.H. 1974. Effects of fire on chaparral. Chapter 10 in: Kozlowski, T.T. and C.E. Ahlgren. Fire and Ecosystems Academic Press.

Block, W.M., M.L. Morrison, and J. Verner. 1990. Wildlife and Oak Woodland Interdependency. Fremontia, July Edition.

Byram, G.M. 1959. Combustion of forest fuels. In: Forest Fire: Control and Use. Davis, K.P., McGraw-Hill.

California Department of Fish and Game. August 1991. Natural Diversity Data Base Special Animals (species list).

California Department of Fish and Game Commission. 1987. The Status of Wetland Habitat and its Protection, Enhancement, and Expansion. 18 pp.

California Department of Fish and Game. 1986. California Wildlife Habitat Relationships System (species notes).

California Native Grass Association. October 1992 Newsletter. Grassland Restoration in California. California Native Grass Association, Dixon, CA.

California Natural Diversity Data Base. 1990. Mindego Hill Quadrangle. Sacramento, CA.

California Natural Diversity Data Base. Data Base Printout for Montara Quadrant. California Department of Fish and Game, Sacramento.

Chapel, M., S. Monk, K. Sonksen, G. Terrazas and J. Lorenzana. 1983. Wildlife Habitat Planning Demonstration.

Christensen, N.L. and C.H. Muller. 1975. Effects of fire on factors controlling plant growth in Adenostoma Chaparral. Ecol. Mon. 45:29-55.

Conrad, C.E., G.A. Roby, and S.C. Hunter. 1986. Chaparral and associated ecosystems management: a 5-year research and development program. USDA For. Serv. Gen. Tech. Rep. PSW-91.

County of Santa Clara. 1974. A Plan for the Monte Bello Ridge Mountain Area. Amendment to the Land Use Element of the General Plan. County of Santa Clara, CA.

Crampton, B. 1974. Grasses in California. University of California Press, Berkeley, CA.

Cunningham, J.B., R.P. Russell and W.S. Gand. 1980. Selection and Use of Snags by Secondary Cavity-Nesting Birds of the Ponderosa Pine Forest. USDA Forest Service Research Paper RM-222.

David, F.W., M.I. Borchert, and D.C. Odion. 1989. Establishment of microscale vegetation pattern in maritime chaparral after fire. Vegetation 84:53-67.

Davis, F.W., E.A. Keller, A. Parikh, and J. Florsheim. 1989. Recovery of the chaparral riparian zone after wildfire. In: Proceedings of the California Riparian Systems Conference, eds. D.L. 194-203 Abell. USDA Pacific Southwest For. and Rng. Exp. Sta. Gen. Tech. Rep., PSW-110.

Dunn, P.H. 1980. Nutrient microbial considerations in oak management. In: Proceedings of the Symposium on the Ecology, Management and Utilization of California Oaks, eds. T.R. Plumb. USDA Pacific Southwest For. and Rng. Exp. Sta. Gen. Tech. Rep., PSW-44.

Florence, M. 1986. Plant succession on prescribed burn sites at Pinnacles National Monument. Fremontia, October.

Green, L.R. 1980. Prescribed burning in California oak management. In: Proceedings of the Symposium on the Ecology, Management and Utilization of California Oaks, eds. T.R. Plumb. USDA Pacific Southwest for. and Rng. Exp. Sta. Gen. Tech. Rep., PSW-44.

Griffin, J.R., and P.C. Muick. 1990. California native oaks: past and present. Fremontia 18(3):4-12.

Harris, L.D. 1984. The Fragmented Forest; Island Biogeography Theory and the Preservation of Biotic Diversity. Univ. of Chicago Press.

Harrison, H.H. 1979. A Field Guide to Western Birds' Nests. Houghton Mufflin Company, Boston.

Hayes, M.P. and M.R. Jennings. 1988. Habitat Correlates of Distribution of the California Red-legged Frog (*Rana aurora draytoni*) and the Foothill Yellow-legged Frog (*Rana boylii*): Implications for Management. *In* R.C. Szaro, K.E. Severson, and D.R. Patton (tech. coord.), Management of Amphibians, Reptiles, and Small Mammals in North America. USDA, Forest Service, Rocky Mountain Forest and Range Experiment Station. Gen. Tech. Rpt. RM-166.

Heady, H.F. 1977. Valley grassland. pp. 491-514. In: Terrestrial vegetation of California. Barbour, M.G. and J. Major (eds.) Wiley.

Heady, H.F. 1972. Burning and the grasslands in California. In: Proceedings of the Tall Timbers Fire Ecological Conference. 12:97-107.

Holland, R. 1986. Terrestrial Plant Communities of California. California Department of Fish and Game, Sacramento.

Jameson, E.W., and H.J. Peeters. 1988. California Mammals. University of California Press, Berkeley.

Keeley, J.E. and S.C. Keeley. 1987. Role of fire in the germination of chaparral herbs and suffrutescents. Madrono. 34(3):240-249.

Keeley, J.E. 1987a. Role of fire in seed germination of woody taxa in California chaparral. Ecology 68(2):434-443.

Keeley, J.E. 1981. Reproductive cycles and fire regimes. pp. 231-277. In: Fire Regimes and Ecosystem Properties, H.A. Mooney et al. USDA For. Serv. Gen. Tech. Rep. WO-26.

Keeley, J.E. The California valley grassland. In: Endangered Plan Communities of Southern California, ed. A.A. Schoenher. Southern California Botanist Special Publication Number 3.

Keeley, J.E. In Print a. Fire management for maximum biodiversity.

Keeley, J.E., and S.C. Keeley. 1989. Allelopathy and the fire induced herb cycle. In: The California Chaparral: Paradigms Reexamined, ed. S.C. Keeley, 65-72. No. 34, Science Series Natural History Museum of Los Angeles County, 1989.

Keeley, J.E., P.H. Zelder, and C.A. Zammit. 1989. Fire and Demography in the California Chaparral: Paradigms Reexamined, ed. S.C. Keeley, 151-153. No. 34, Science Series Natural History Museum of Los Angeles County, 1989.

Kellogg, Elizabeth M. and James L. 1990. A study of the distribution and pattern of perennial grassland on the Camp Pendleton Marine Corps Base. Unpub. rep. to Camp Pendleton. Contract No. MOO681-88-P-3161.

Kellogg, Elizabeth M. and James L. 1988. Soil erosion assessment for the Camp Pendleton Marine Corps Base. Unpub. rep. to Camp Pendleton. Contract No. MOO681-86-c-0119.

Kelly, V.R. and V.T. Parker. 1990. Seed bank survival and dynamics in sprouting and nonsprouting Arctostaphylos species. Am. Mid. Nat. 124:114-123.

Leidy, R.A. 1984. Distribution and Ecology of Stream Fishes in the San Francisco Bay Drainage. University of California Division of Agriculture and Natural Resources.

Lundquist, R.W. and J. Mariani. 1991. Nesting Habitat and Abundance of Snag-Dependent Birds in Southern Washington Cascade Range. *In* Wildlife and Vegetation of Unmanaged Douglas-Fir Forests. USDA Forest Service. PNN-GTR-285.

McBride, Joe, Steve Barnhart, and Pater Warner. 1988. Douglas fir invasion of the northern oak woodland at Annadel State Park. Unpublished report submitted to the California Department of Parks and Recreation, Santa Rosa, CA. 35 pp.

McBride, J. and H.F. Heady. 1968. Invasion of grassland by Baccharis pilularis D.C. J. Range Manage. 21:106-108.

McClaran, M.P. and J.W. Bartolome. 1989. Fire-related recruitment in stagnant Quercus douglasii populations. Can. J. For. Res. 19:580-585.

McCreary, D.D. 1990. Native oaks - The next generation. Fremontia 18(3):44-47.

Malanson, G.P. and J.F. O'Leary. 1982. Post-fire regeneration strategies of California coastal sage shrubs. Oecologia 53:355-358.

Menke, J.E. 1989. Role of prescribed fire and livestock grazing in the conservation of native species in California grasslands. Final Report to Public Service and Dissemination Program, Department of Agronomy and Range Science, University of California Davis.

Marks, J.S. 1986. Nest Site Characteristics and Reproductive Success of Long-eared Owls in Southwestern Idaho. Wilson Bulletin 98(4):547-560.

Maser, C., R.G. Anderson, K. Cromack, J.T. Williams and R.E. Martin. 1979. Dead and Down Woody Material. *In* J.W. Thomas, ed., Wildlife Habitats in Managed Forests. USDA Forest Service. Agriculture Handbook No. 553.

Mayer, K.E. and W.F. Laudenslayer (eds). 1988. A Guide to Wildlife Habitats of California. California Department of Forestry and Fire Protection.

Mensing, S. 1989. Population structures of blue oak in central California. M.S. Thesis. U.C. Berkeley.

Minnich, R.A. 1989. Chaparral fire history in San Diego County and adjacent northern Baja California - An Evaluation of Natural Fire Regimes and the Effects of Suppression Management. In: The California Chaparral Paradigms Reexamined, Edited by Sterling C. Keely, No. 34 Science Series Natural History Museum of Los Angeles County.

Minnich, R.A. 1987. Fire behavior in southern California chaparral before fire control: the Mount Wilson burns at the turn of the century. Ann. Assoc. Am. Geog. 77(4):599-618.

Minnich, R.A. 1983. Fire mosaics in southern California and northern Baja California. Science 219:1287-1294.

Minnich, R.A. 1978. The geography of fire and conifer forest in the Eastern Transverse Ranges. California. Ph.D. Dissertation, University of California, Los Angeles.

Moreno, J.M. and W.C. Oechel. Fire intensity and herbivory effects on postfire resprouting of Adenostoma fasciculatum in southern California chaparral.

Morrison, M.L., W. M. Block and J. Verner. 1991. Wildlife-Habitat Relationships in California's Oak Woodlands: Where Do We Go From Here? *In* Proceedings of the Symposium on Oak Woodlands and Hardwood Rangeland Management. USDA Pacific Southwest Research Station GTR PSW-126.

Moyle, P. B. 1973. Effects of Introduced Bullfrogs, *Rana catesbeiana*, on Native Frogs of the San Joaquin Valley, California. Copeia 1973:18-22.

Muick, P.C. and J.W. Bartolome. 1987. Factors associated with oak regeneration in California. pp. 86-91. In: Proceedings of the Symposium Multiple-Use management of California's hardwood resources. Plumb, T.R. and N.H. Pillsbury (eds.) USDA For. Serv. Gen. Tech. Rep. PSW-1100.

Muller, C.H. 1968. The role of chemical inhibition (allelopathy) in vegetation composition. Bull. Torrey Bot. Club 93:332-351.

Munz, P.A. and D. Keck. 1968. A California Flora and Supplement. University of California Press, Berkeley, CA.

Nature Conservancy, no date. Element Stewardship Abstract for *Cytisus monspessulanus*. The Nature Conservancy, Arlington, Virginia.

Nicoles, J. 1992. *In Lit.* Letter dated Nov. 16, 1992.

Noble, P.L. 1990. Distribution and Density of Owls at Monte Bello Open Space Preserve, Santa Clara County, California. Western Birds 21:11-16.

Parker, V.T. 1989. Maximizing vegetation response on management burns by identifying fire regimes. pp. 87-91. In: Proceedings of the Symposium on Fire and Watershed Management. USDA For. Serv. Gen. Tech. Rep. PSW-109.

Parsons, D.J. and T.J. Stohlgren. 1989. Effects of varying fire regimes on annual grasslands in the southern Sierra Nevada of California. Madrono 36(3):154-168.

Philpot, C.W. 1969. Seasonal changes in heat content and ether extractive content of chamise. USDA For. Serv. Res. Pap. INT-61.

Pierson, E.D. 1990. Proposed Mitigation Plans for the Pallid Bat (*Antrozous pallidus*), and Townsend's Big-eared Bat (*Plecotus townsendii*) at the Cloverdale Project (letter).

Pierson, E.D. 1988. The Status of Townsend's Big-eared Bat (*Plecotus townsendii*) in California Preliminary Results: *P.T. townsendii* in Coastal California 1987-1988. Wildlife Management Division, Nongame Bird and Mammal Section, California Department of Fish and Game.

Plumb, T.R. 1980. Response of oaks to fire. In: Proceedings of the Symposium on the Ecology, Management and Utilization of California Oaks, eds. T.R. Plumb. USDA Pacific Southwest Forest and Range Experiment Station General Technical Report, PSW-44.

Quinn, R.D. 1990. Habitat Preferences and Distribution of Mammals in California Chaparral. USDA Forest Service Pacific Southwest Research Station Research Paper PSW-202.

Radtke, K.W.H., A.M. Arndt, and R.H. Wakimoto. 1982. Fire history of the Santa Monica mountains. pp. 431-437. In: Dynamics and Management of Mediterranean-type Ecosystems. USDA For. Serv. Gen. Tech. Rep. PSW-58.

Reed, L.J. and N.G. Sugihara. 1987. Northern oak woodlands - ecosystems in jeopardy or is it already too late? pp. 59-63 In Plumb and N.H. Pillsbury, Proceedings of the Symposium on Multiple-Use Management of California's Hardwood Resources. Nov. 12-14 1986. San Luis Obispo, CA. Gen. Tech. Rep. PSW-100.

Remsen, J.V. June 1978. Bird Species of Special Concern in California. California Department of Fish and Game.

Rice, C.L. and R.E. Martin. 1985. The use of BEHAVE on the shrublands at the urban interface. pp. 270-275. In: Proceedings, 8th Conf. on Fire and For. Meteorology. Linda Donaghue and Robert E. Martin, Editors. May, 1985. Society of American Foresters. 303p.

Rice, Carol L. 1983. Fire history and ecology of the North Coastal Range Preserve. pp. 367-372. In Proceedings - Symposium and Workshop on Wilderness Fire, November 15-18, 1983. Lotan James, E., Kilgore, Bruce, William Fischer, Robert Mutch, Tech. Coords. Gen. Tech. Rep INT-182. Ogden, UT. 434 p.

Rogers, C., V.T. Parker, V.R. Kelly, and M.K. Wood. 1988. Maximizing chaparral vegetation response to prescribed burns: experimental considerations. p. 158. In: Proceedings of the Symposium on Fire and Watershed Management. USDA For. Serv. Gen. Tech. Rep. PSW-109.

Rothermel, R.C. 1983. How to predict the spread and intensity of forest and range fires. Department of Agriculture, USFS General Technical Report, INT-143.

Rundel, P.W. 1982. Successional dynamics of chamise chaparral: the interface of basic research and management. pp. 86-90. In: Dynamics and Management of Mediterranean-type Ecosystems. Conrad, C.E. and W.C. Oechel (eds.) USDA For. Serv. Gen. Tech. Rep. PSW-58.

San Mateo County Division of Parks and Recreation. 1979. The Natural Resources Management Plan for Pescadero Creek County Park. San Mateo County Division of Parks and Recreation, San Mateo, CA.

Santa Clara Valley Audubon Society. 1992. The Avocet. The Newsletter of the Santa Clara Valley Audubon Society June-August Edition.

Sapsis, David. 1991. Marin Municipal Water District/Marin County Open Space District fuel inventory/fire behavior study. Unpublished report submitted to MMWD and MCOSD. Corte Madera, CA. 29 pp.

Sawyer, J.O. , D.A. Thornburg, and J.R, Griffin. 1977. Mixed evergreen forest. pp. 359-381 In M.G. Barbour and J. Majors, eds. Terrestial Vegetation of California. Wiley-Interscience, N.Y.

Smith, J. and K. Berg. 1988. Inventory of Rare and Endangered Vascular Plants of California. California Native Plant Society, Sacramento, CA.

Soule, M.E. 1991. Land Use Planning and Wildlife Maintenance; Guidelines for Conserving Wildlife In an Urban Landscape.

Stebbins, R.C. 1985. A Field Guide to Western Reptiles and Amphibians, Second Edition, Revised. Houghton Mifflin Co., Boston.

Stohlgren, T.J., P.W. Rundel, and D.J. Parsons. 1989. Stable population size class distribution in mature chamise chaparral. In: The California Chaparral: Paradigms Reexamined, ed. S.C. Keeley, 57-64. No. 34, Science Series Natural History Museum of Los Angeles County, 1989.

Sugihara, N.G. and L.J. Reed. 1988. Vegetation ecology of the bald hills oak woodlands of Redwood National Park. Tech. Rep. 21.

Syon et al. 1978. Effects of fire on Fauna. In: A State of Knowledge Review Forest Service National Fire Effects Workshop, USDA Gen. Tech. Rep. WO-6.

Thomas, C.M. and S.D. Davis. 1989. Recovery patterns of three chaparral shrub species after wildfire. Oecologia 80:309-320.

Thomas, J. 1961. Flora of the Santa Cruz Mountains of California. Stanford University Press, Stanford, CA.

Thomas, J.W., R.G. Anderson, S. Maser, and E.L. Bull. 1979. Snags. *In* J.W. Thomas, ed., Wildlife Habitats in Managed Forests. USDA Forest Service. Agriculture Handbook No. 553.

Tietje, W. 1990. Acorns: Planning for Oak Woodland Wildlife. Fremontia, July Edition.

United States Soil Conservation Service, 1968. Soils of Santa Clara County.

University of California. 1991. Division of Agriculture and Natural Resources. The Grower's Weed Identification Handbook. University of California, Agriculture and Natural Resources, Oakland, CA.

Vogl, R.J. 1982. Chaparral succession. pp. 81-85. In: Dynamics and management of Mediterranean-type ecosystems. Conrad, C.E. and W.C. Oechel (eds.) USDA For. Serv. Gen. Tech. Rep. PSW-58.

Volland, Leonard, and John D. Dell. 1981. Fire effects on Pacific Northwest forest and range vegetation. USDA Forest Service Range Management and Aviation and Fire Management Staff, Pacific Northwest Region, Portland, Oregon.

Wells, P.V. 1962. Vegetation in relation to geological substratum and fire in the San Luis Obispo quadrangle, California. Ecol. Mon. 32(1):79-103.

Wells et al. 1978. Effects of fire on soils. In: A State of Knowledge Review Forest Service national Fire Effects Workshop, eds. R.E. Martin et al. USDA Gen. Tech. Rep. WO-7.

Westman, W.E. 1981a. Factors influencing the distribution of species of California coastal sage scrub. Ecology 62:170-174.

Williams, D.F. June, 1986. Mammalian Species of Special Concern in California. California Department of Fish and Game.

Young, M., E. Young, R. Current, and L. Gomez. 1983. Table Mountain: Resource Restoration and Management. Santa Clara County Department of Parks and Recreation, Santa Clara, CA.

Young, Michael. 1984. Table Mountain Resource Management Plan. Santa Clara County.

Zelder, P.H. and C.A. Zammit. 1989. A population based critique of concepts of change in the chaparral. In: The California Chaparral: Paradigms Reexamined, ed. S.C. Keeley, 73-84. No. 34, Science Series Natural History Museum of Los Angeles County, 1989.

Chapter VIII
LIST OF PERSONS CONTACTED

■ ■ ■

A. Santa Clara County Parks and Recreation Department

Allan Weigman, Ranger, Sanborn Park
Red Bell, Senior Ranger, Sanborn Park
Raleigh Young, N.E. Unit District Ranger

B. Other

Alice Cummings, Environmental Analyst, MROSD
John Escobar, Maintenance, MROSD
Del Woods, Planner, MROSD
Ellen Cooper, Certified Arborist
Toni Correlli, Rare Plant Coordinator, Santa Clara Chapter of the California Native Plant Society
Bousman, W., Santa Clara Valley Audubon Society and Project Coordinator of the Santa Clara County Breeding Birds Atlas Project
Mike Rock, Business Manager, Central Fire District
California Department of Forestry, Summit Station
Gary Colmes, California Department of Fish and Game, Santa Clara/Santa Cruz Unit

APPENDICES

■ ■ ■

Appendix A
WILDLIFE SPECIES OF SPECIAL STATUS

■ ■ ■

A. Wildlife Study Methodology

A literature review was conducted to augment information on wildlife use in the study area gathered through reconnaissance-level field surveys. This process involved reviewing the *Table Mountain Resource Management Plan* (Santa Clara County Department of Parks and Recreation 1984), preliminary results of the Santa Clara County Breeding Birds Atlas Project, and consultations with William Bowman of the Santa Clara Valley Audubon Society and David Suddjian of the Santa Cruz Bird Club. The CNDDB was accessed to identify any records of sensitive species occurring on or immediately adjacent to the study area.

Reconnaissance-level field surveys were conducted on September 24, and October 13 and 26, 1992 to qualitatively assess the wildlife habitat value of Upper Stevens Creek County Park. Aerial photographs of the project site (County of San Mateo 1982) were used as guides during the field investigation. Where possible the study area was traversed on foot with observations aided by binoculars. In some cases, a vehicle was used to investigate areas more efficiently. All species observed and their signs of occurrence were recorded in a field notebook and significant wildlife resources observed were delineated on a basemap. Focused wildlife surveys were not conducted as part of the workscope.

Based on the literature review and field reconnaissance, resource management units were created, and issues and concerns for each unit identified.

1. California Red-legged Frog

The California red-legged frog is a State species of special concern and Candidate 2 species for Federal listing. This species is found in quiet pools along streams, in marshes, and ponds. Red-legged frogs are closely tied to aquatic environments, and favor intermittent streams which include some areas with water at least 0.7 meters deep, a largely intact emergent or shoreline

vegetation, and a lack of introduced bullfrogs and non-native fishes. They are generally found on streams having a small drainage area and low gradient (Hayes and Jennings 1988). The red-legged frog occurs west of the Sierra Nevada-Cascade crest and in the Coast Ranges along the entire length of the state. Much of its habitat has undergone significant alterations in recent years, leading to extirpation of many populations. Other factors contributing to its decline include its former exploitation as food, water pollution, and predation and competition by the introduced bullfrog and green sunfish (Moyle 1973, Hayes and Jennings, *ibid.*). This species' reproductive season spans January to March (Stebbins 1962). Females deposit 2000 to 4000 eggs on submerged vegetation at or near the surface.

The project area provides breeding habitat for the red-legged frog.

2. Foothill Yellow-legged Frog

The foothill yellow-legged frog is a State species of special concern. It is found in or near rocky streams in a variety of habitats, including valley foothill hardwood, valley-foothill riparian, coastal scrub, mixed conifer, mixed chaparral, and wet meadows (CDFG 1986). This species is very closely tied to its aquatic habitat, and is rarely found far from perennial or intermittent streams (Stebbins ibid.). Foothill Yellow-legged Frogs are typically found in shallow water of partly shaded streams. They prefer sites with riffles and at least cobble-sized substrates (Hayes and Jennings 1988). Adults seek moving but usually not swiftly flowing water (Stebbins ibid.). Pools are used on intermittent streams during the dry season (Hayes and Jennings ibid.). The female attaches egg clusters to gravel or rocks in moving water near stream margins.

The pool and riffle habitats observed within Stevens Creek indicated that it may provide potential habitat for foothill yellow-legged frogs.

3. Sharp-shinned Hawk

The Sharp-shinned hawk is a State species of special concern. This species may be the rarest breeding raptor in the Santa Cruz Mountains (Suddjian 1990). Potentially suitable breeding habitat occurs over much of the forested mountainous terrain of the Santa Cruz Mountains. Sharp-shinned hawks prefer to build their stick nests in conifers in thick cover. Migrant and wintering individuals frequent a variety of habitats, but favor wooded habitats. The local breeding season spans April to July. This species is uncommon throughout the study region from September to early May.

Potentially suitable breeding habitat for this species may occur in the mixed-evergreen and douglas fir forests within the project site. Suitable wintering habitat occurs throughout the park.

4. Cooper's Hawk

The Cooper's hawk is a State species of special concern. Like the Sharp-shinned hawk, this species is a rare breeder in the Santa Cruz Mountains, but is somewhat more numerous than the former. Cooper's Hawks prefer forested habitats in mountainous region, but also use riparian woodlands. Cooper's hawks build stick nests in similar situations to the Sharp-shinned hawk. The local breeding season probably spans March/April through July. Cooper's hawks are uncommon migrants and winter visitors. Migrant and wintering individuals occur in a variety of habitats, including oak woodland, conifer and mixed broadleaf forests, grasslands, residential areas and riparian woodland. Habitat destruction and falconry practices have been attributed to this species' decline in California (Remsen 1978).

Potentially suitable breeding habitat occurs throughout the forested habitats within the project site and Cooper's hawks are known to nest north of the park in Monte Bello Open Space Preserve (Suddjian, pers. comm.). Wintering and migrating individuals occur throughout the site.

5. Golden Eagle

The golden eagle is a State species of special concern and considered "sensitive" by the U.S. Forest Service. Golden eagles require extensive areas of habitat as territory for feeding and nesting. Grasslands and open wooded habitats are needed for hunting, with ground squirrels and black-tailed hare being the primary prey species of golden eagles. Nests are built at sites with a good view of the surrounding area, and are usually placed on cliffs, in trees, or occasionally on transmission towers. Golden eagles are very sensitive to human disturbance at nest sites. Agricultural and urban development of grasslands has led to this species' decline in California (Remsen *ibid.*).

Golden eagles are suspected to nest in the project vicinity with pairs resident in the Black Mountain Area (Suddjian, pers. comm.), and along the crest of the Santa Cruz Mountains. The project site provides nesting habitat for golden eagles, although no nest is known at this time.

6. Long-eared Owl

The Long-eared owl is a State species of special concern. This species is a rare breeding species in the Santa Cruz Mountains. Two confirmed breeding records are known from recent years in the project vicinity: Monte Bello Open Space Preserve (Noble 1990; Santa Clara County Breeding Bird Atlas Project, unpub. data). Long-eared owls occur in a variety of wooded habitats. However, all of the breeding season sightings in the Santa Cruz Mountains have been in mixed-evergreen forests with Douglas firs and live oaks. They typically use abandoned nests of other raptors and tree squirrels, occasionally in tree cavities, and rarely in hollows on the ground (Harrison 1979; Marks 1986). A nest in Monte Bello Open Space Preserve was in an old gray squirrel nest. The local breeding season spans February through July.

The forested habitats within and surrounding the project vicinity offer potentially suitable breeding habitat for long-eared owls.

7. Pallid Bat

The pallid bat is a state species of special concern. Pallid bats are found in a variety of habitats. This species moves about locally on a seasonal basis, but is not considered to be migratory (Jameson and Peeters 1988). During the day pallid bats roost in buildings, crevices, caves, mines, and hollow trees (CDFG 1986). Maternity roosts are colonial, while males and feeding bats roost singly. This species is very sensitive to disturbances at roost sites (E. Pierson, pers. comm.). During the night, pallid bats glean moths from leaves and forage on the ground for invertebrates, especially Jerusalem crickets.

The oak trees and annual grassland on the project site provide foraging habitat for the pallid bat, while abandoned buildings provide potential roost sites. A structure on the Rogers property supports roosting bats and may support this species. (A. Wigman, Sanborn Park, pers. comm.).

8. Townsend's Big-eared Bat

The Townsend's big-eared bat is a federal Candidate 2 species for listing as threatened or endangered, and a state species of special concern (Williams 1986). Big-eared bats occur in a variety of plant communities throughout California, including coastal conifer and broad-leaf forests, oak and conifer woodlands, arid grasslands and high elevation forests (Williams *ibid.*). In coastal California, the big-eared bat is primarily associated with riparian forests, where it gleans insects from leaf surfaces. Roosting sites for Townsend's big-

eared bat include limestone caves, lava tubes, mine tunnels, buildings, and other human-made structures within 100m of riparian habitat (Williams *ibid.*, Pierson 1988). Townsend's big-eared bats are extremely sensitive to human disturbances at roost sites.

Townsend's big-eared bats may roost in abandoned buildings on the project site. Foraging habitat occurs along Stevens Creek and its major tributaries.

9. American Badger

The American badger is a State species of special concern. This species primarily occurs in grassland and savannah habitats with friable soils. However, a variety of other habitats are utilized including shrub and open stages of forests. The abundant supply of prey species (especially fossorial mammals) is an essential habitat requirement. Badgers excavate burrows for denning sites, and dig for ground squirrels, gophers, and other prey species. Once fairly widespread, this species has declined or disappeared over large areas of the state, due to agriculture and urban development (Williams *ibid.*).

Badgers are known to occur in the Santa Cruz Mountains in extensive grasslands in the project vicinity. The grassland patches on the project site may support minor use by badgers foraging in larger areas grasslands adjacent to the park. However, this species has not been recorded on the park.

Appendix B
WILDLIFE SPECIES KNOWN OR PREDICTED TO OCCUR IN THE UPPER STEVENS CREEK COUNTY PARK AREA

■ ■ ■

Key:

O-
Wildlife species observed on the project site (based on field surveys, consultation with knowledgeable persons and literature review).

P-
Wildlife species predicted to occur on the project site.

a-
Bird species expected to occur on or immediately adjacent to the site only as an aerial transient.

n-
Bird species known or predicted to nest on or immediately adjacent to the site.

Seasonal Occurrence and Abundance of Bird Species: Notations showing the occurrence and abundance of the various bird species during spring, summer, fall and winter are also provided. The abundance codes are:

c-
Common: Easily found during the proper season, sometimes in large numbers; typically widespread in the area.

f-
Fairly common: Easily found during the proper season, in moderate numbers, never as numerous as a "common" species; may be restricted to only a portion of the study area.

u-
Uncommon: Present in moderate to small numbers; may require some searching to locate; may be widespread, or restricted to only a portion of the study area.

r-

Rare: Present in very small numbers, but of regular occurrence; may be difficult to locate, and typically restricted to a portion of the study area.

o-

Occasional: May occur in very small numbers, typically only one or two individuals; occurrence is not regular or predictable.

BIRD SPECIES	Key	Season			
		S	S	F	W
CLASS: AVES					
ORDER: CICONIIFORMES (Herons, Egrests and Allies)					
FAMILY: ARDEIDAE (Herons and Bitterns)					
Great Blue Heron	P	o	o	o	o
ORDER: ANSERIFORMES (Screamers, Ducks, and Relatives)					
FAMILY: ANATIDAE (Swans, Geese, and Ducks)					
Mallard (*Anas platyrhynchos*)	P	r		r	r
ORDER: FALCONIFORMES (Vultures, Hawks, and Falcons)					
FAMILY: CATHARTIDAE (American Vultures)					
Turkey Vulture (*Cathartes aura*)	O,n?	f	f	f	u
FAMILY: ACCIPITRIDAE (Hawks, Old World Vultures, and Harriers)					
Osprey (*Pandion haliaetus*)	O,a	o		o	
Sharp-shinned Hawk (*Accipiter striatus*)	O,n,?	u	r	u	u
Cooper's Hawk (*Accipiter cooperii*)	P,n	u	u	u	u
Red-tailed Hawk (*Buteo jamaicensis*)	O,n	f	f	f	f
Golden Eagle (*Aquila chrysaetos*)	P,n,?	r	r	r	r
FAMILY: FALCONIDAE (Caracaras and Falcons)					
American Kestrel (*Falco sparverius*)	P,n	r	r	r	r
Merlin (*Falco columbarius*)	P	r	r	r	r
ORDER: GALLIFORMES (Megapodes, Currassows, Pheasants, and Relatives)					
FAMILY: PHASIANIDAE (Quails, Pheasants, and Relatives)					
California Quail (*Callipepla californica*)	O,n	c	c	c	c
ORDER: CHARADRIIFORMES (Shorebirds, Gulls, and Relatives)					
FAMILY: CHARADRIIDAE (Plovers and Relatives)					
Killdeer (*Charadrius vociferus*)	P			r	r

BIRD SPECIES	Key	Season			
		S	S	F	W
ORDER: COLUMBIFORMES (Pigeons and Doves)					
FAMILY: COLUMBIDAE (Pigeons and Doves)					
Band-tailed Pigeon (*Columba fasciata*)	O,n	f	f	c	c
Mourning Dove (*Zenaida macroura*)	O,n	f	f	f	f
ORDER: STRIGIFORMES (Owls)					
FAMILY: TYTONIDAE (Barn Owls)					
Common Barn Owl (*Turo Alba*)	P	r	r	r	r
FAMILY: STRIGIDAE (Typical Owls)					
Western Screech-Owl (*Otus asio*)	O,n	f	f	f	f
Great Horned Owl (*Bubo virginianus*)	O,n	u	u	u	u
Northern Pygmy-Owl (*Glaucidium gnoma*)	P,n	r	r	r	r
Long-eared Owl (*Asio otus*)	P,n	r	r	r	r
Northern Saw-whet Owl (*Aegolius acadicus*)	P,n	u	u	u	u
ORDER: APODIFORMES (Swifts and Hummingbirds)					
FAMILY: APODIDAE (Swifts)					
Vaux's Swift (*Chaetura vauxi*)	P,a	u	r	u	
White-throated Swift (*Aeronautes saxatalis*)	O,a	r	r	r	r
FAMILY: TROCHILIDAE (Hummingbirds)					
Anna's Hummingbird (*Calypte anna*)	O,n	f	f	f	f
Rufous Hummingbird (*Selasphorus rufus*)	P	u	r		
Allen's Hummingbird (*Selasphorus sasin*)	O,n	f	u		
ORDER: PICIFORMES (Woodpeckers and Relatives)					
FAMILY: PICIDAE (Woodpeckers and Wrynecks)					
Acorn Woodpecker (*Melanerpes formicivorous*)	O,n	c	c	c	c
Red-breasted Sapsucker (*Sphyrapicus ruber*)	P	r		u	u
Nuttall's Woodpecker (*Picoides nuttallii*)	O,n	c	c	c	c

BIRD SPECIES	Key	Season			
		S	S	F	W
Downy Woodpecker (*Picoides pubescans*)	P,n	r	r	u	u
Hairy Woodpecker (*Picoides villosus*)	O,n	u	u	u	u
Northern Flicker (*Colaptes auratus*)	O,n	u	u	c	c
ORDER: PASSERIFORMES (Perching Birds)					
FAMILY: TYRANNIDAE (Tyrant Flycatchers)					
Olive-sided Flycatcher (*Contopus borealis*)	P,n	u	u		
Western Wood-Pewee (*Contopus sordidulus*)	O,n	f	f	r	
Pacific-slope Flycatcher (*Empidonax difficilis*)	P,n	f	f	u	
Black Phoebe (*Sayornis nigricans*)	O	u	u	u	u
Say's Phoebe (*Sayornis saya*)	P			r	r
Ash-throated Flycatcher (*Myiarchus cinerascens*)	O,n	f	f		
FAMILY: HIRUNDINIDAE (Swallows)					
Purple Martin (*Progne subis*)	O,a	r			
Violet-green Swallow (*Tachycineta thalassina*)	P,n	f	f	u	
Northern Rough-winged Swallow (*Stelgidopteryx serripennis*)	P,a	r		r	
Cliff Swallow (*Hirundo pyrrhonota*)	P,a	u	u		
Barn Swallow (*Hirundo rustica*)	P,a	u	u		
FAMILY: CORVIDAE (Jays, Magpies, and Crows)					
Steller's Jay (*Cyanocitta stelleri*)	O,n	c	c	c	c
Scrub Jay (*Aphelocoma coerulescens*)	O,n	c	c	c	c
Common Raven (*Corvus corax*)	O,n	u	u	u	u
FAMILY: PARIDAE (Titmice)					
Chestnut-backed Chickadee (*Parus rufescens*)	O,n	c	c	c	c
Plain Titmouse (*Parus inornatus*)	O,n	f	f	f	f
FAMILY: AEGITHALIDAE (Bushtit)					
Bushtit (*Psaltriparus minimus*)	O,n	c	c	c	c

BIRD SPECIES	Key	Season			
		S	S	F	W
FAMILY: SITTIDAE (Nuthatches)					
White-breasted Nuthatch (*Sitta carolinensis*)	O,n	f	f	f	f
Red-breasted Nuthatch (*Sitta canadensis*)	O,n,?	r	r	u	u
Pygmy Nuthatch (*Sitta pygmaea*)	P,n	u	u	u	u
FAMILY: CERTHIIDAE (Creepers)					
Brown Creeper (*Certhia americana*)	P,n	c	c	c	c
FAMILY: TROGLODYTIDAE (Wrens)					
Bewick's Wren (*Thryomanes bewickii*)	O,n	c	c	c	c
House Wren (*Troglodytes aedon*)	O,r	f	f		
Winter Wren (*Troglodytes troglodytes*)	O,n	u	u	u	u
FAMILY: MUSCICAPIDAE (Old World Warblers, Gnatcatchers, Kinglets, Thrushes, Bluebirds, and Wrentit)					
Golden-crowned Kinglet (*Regulus satrapa*)	O	r		u	u
Ruby-crowned Kinglet (*Regulus calendula*)	P	u		c	c
Blue-gray Gnatcatcher (*Polioptila caerulea*)	P,n	f	f		
Western Bluebird (*Sialia mexicana*)	P,n	u	u	u	u
Swainson's Thrush (*Catharus ustulatus*)	P,n	u	u	u	
Hermit Thrush (*Catharus guttatus*)	O	r		c	c
American Robin (*Turdus migratorius*)	O,n	c	c	c	c
Varied Thrush (*Ixoreus naevius*)	P			f	f
Wrentit (*Chamaea fasciata*)	O,n	c	c	c	c
FAMILY: MIMIDAE (Mockingbirds and Thrashers)					
California Thrasher (*Toxostoma redivivum*)	O,n	u	u	u	u
Northern Mockingbird (*Mimus polyglottos*)	O			r	r
FAMILY: BOMBYCILLIDAE (Waxwings)					
Cedar Waxwing (*Bombycilla cedrorum*)	O	c		c	c

BIRD SPECIES	Key	Season			
		S	S	F	W
FAMILY: STURNIDAE (Starlings)					
European Starling (*Sturnus vulgaris*)	O,n	c	c	c	c
FAMILY: VIREONIDAE (Typical Vireos)					
Solitary Vireo (*Vireo solitarius*)	P,n	u	u		
Hutton's Vireo (*Vireo huttoni*)	P,n	f	f	f	f
Warbling Vireo (*Vireo gilvus*)	P,n	f	f	r	
FAMILY: EMBERIZIDAE (Wood Warblers, Sparrows, Blackbirds, and Relatives)					
Yellow Warbler (*Dendroica petechia*)	P	r		u	
Orange-crowned Warbler (*Vermivora celata*)	O,n	c	c	r	
Nashville Warbler (*Vermivora ruficapilla*)	P	r		r	
Yellow-rumped Warbler (*Dendroica coronata*)	O	f		f	f
Black-throated Gray Warbler (*Dendroica nigrescens*)	P,n	f	f		
Townsend's Warbler (*Dendroica townsendi*)	P	f		f	f
Hermit Warbler (*Dendroica occidentalis*)	P	u		r	
MacGillivray's Warbler (*Opopornis tolmiei*)	P	r		r	
Common Yellowthroat (*Geothlypis trichas*)	O			r	r
Wilson's Warbler (*Wilsonia pusilla*)	P,n	u	u	u	
Western Tanager (*Piranga ludoviciana*)	P,n	f	u	f	
Black-headed Grosbeak (*Pheucticus melanocephalus*)	P,n	c	c	u	
Lazuli Bunting (*Passerina amoena*)	P,n	f	f		
Rufous-sided Towhee (*Pipilo erythropthalmus*)	O,n	c	c	c	c
California Towhee (*Pipilo crissalis*)	O,n	c	c	c	c
Chipping Sparrow (*Spizella passerina*)	P,n	f	f		
Lark Sparrow (*Chondestes grammacus*)	P,n	r	r	r	r
Savannah Sparrow (*Passerculus sandwichensis*)	O,n,?	?	?	u	u
Fox Sparrow (*Passerella iliaca*)	P			c	c

BIRD SPECIES	Key	Season			
		S	S	F	W
Song Sparrow (*Melospiza melodia*)	O,n	u	u	f	f
Lincoln's Sparrow (*Melospiza lincolnii*)	P			r	r
Rufous-crowned Sparrow (*Aimophila ruficeps*)	P,n	r	r	r	r
Sage Sparrow (*Amphispiza bellii*)	P,n	r	r	r	r
Black-chinned Sparrow (*Spizella atrogularis*)	P,n	r	r		
White-throated Sparrow (*Zonotrichia albicallis*)	P			r	r
Golden-crowned Sparrow (*Zonotrichia atricapilla*)	O	u		c	c
White-crowned Sparrow (*Zonotrichia leucophrys*)	P			u	u
Dark-eyed Junco (*Junco hyemalis*)	O,n	c	c	c	c
Red-winged Blackbird (*Agelaius phoeniceus*)	P			u	u
Western Meadowlark (*Sturnella neglecta*)	P			u	u
Brewer's Blackbird (*Euphagus cyanocephalus*)	O,n	u	u	u	u
Brown-headed Cowbird (*Molothrus ater*)	P,n,?	r	r		
FAMILY: FRINGILLIDAE (Finches)					
Purple Finch (*Carpodacus purpureus*)	O,n	u	u	f	f
House Finch (*Carpodacus mexicanus*)	P,n	u	u	u	u
Red Crossbill (*Loxia curvirostra*)	P	o	o	o	o
Pine Siskin (*Carduelis pinus*)	P,n	r	r	c	c
Lesser Goldfinch (*Carduelis psaltria*)	O,n	c	c	u	u
American Goldfinch (*Carduelis tristis*)	P	u		c	c
Evening Grosbeak (*Coccothraustes vespertinus*)	P			o	o
FAMILY: PASSERIDAE (Weaver Finches)					
House Sparrow (*Passer domesticus*)	O,n	r	r	r	r

OTHER WILDLIFE SPECIES	Key
CLASS: AMPHIBIA	
ORDER: CAUDATA (Salamanders)	
FAMILY: AMBYSTOMATIDAE (Mole Salamanders and Relatives)	
Pacific Giant Salamander (*Dicamptodon ensatus*)	P
FAMILY: SALAMANDRIDAE (Newts)	
Rough-skinned Newt (*Taricha granulosa*)	P
California Newt (*Taricha torosa*)	O
FAMILY: PLETHODONITDAE (Lungless Salamanders)	
Ensatina (*Ensatina eschscholtzi*)	O
California Slender Salamander (*Batrachoseps attenuatus*)	O
Black Salamander (*Aneides flavipunctatus*)	P
Arboreal Salamander (*Aneides lugubris*)	P
ORDER: SALIENTIA (Frogs and Toads)	
FAMILY: BUFONIDAE (True Toads)	
Western Toad (*Bufo boreas*)	P
FAMILY: HYLIDAE (Treefrogs and Relatives)	
Pacific Treefrog (*Hyla regilla*)	O
FAMILY: RANIDAE (True Frogs)	
California Red-legged Frog (*Rana aurora draytoni*)	P
Foothill Yelow-legged Frog (*Rana boylii*)	P
CLASS: REPTILIA	
ORDER: SQUAMATA (Lizards and Snakes)	
SUBORDER: SAURIA (Lizards)	
FAMILY: IGUANIDAE (Iguanids)	
Western Fence Lizard (*Sceloporus occidentalis*)	O

OTHER WILDLIFE SPECIES	Key
FAMILY: SCINCIDAE (Skinks)	
Western Skink (*Eumeces skiltonianus*)	O
FAMILY: ANGUIDAE (Alligator Lizards and Relatives)	
Southern Alligator Lizard (*Gerrhonotus multicarinatus*)	O
Northern Alligator Lizard (*Gerrhonotus coeruleus*)	O
SUBORDER: SERPENTES (Snakes)	
FAMILY: BOIDAE (Boas)	
Rubber Boa (*Charina bottae*)	O
FAMILY: COLUBRIDAE (Colubrids)	
Ringneck Snake (*Diadophis punctatus*)	O
Sharp-tailed Snake (*Contia tenuis*)	O
Racer (*Coluber constrictor*)	O
California Whipsnake (*Masticophis lateralis*)	O
Gopher Snake (*Pituophis melanoleucus*)	O
Common Kingsnake (*Lampropeltis getulus*)	O
California Mountain Kingsnake (*Lampropeltis zonata*)	O
Common Garter Snake (*Thamnophis sirtalis*)	P
Western Terrestrial Garter Snake (*Thamnophis elegens*)	O
Western Aquatic Garter Snake (*Thamnophis couchii*)	P
FAMILY: VIPERIDAE (Vipers)	
Western Rattlesnake (*Crotalus viridis*)	O
CLASS: MAMMALIA	
ORDER: MARSUPIALIA (Opossums, Kangaroos, and Relatives)	
FAMILY: DIDELPHIDAE (Opossums)	
Virginia Opossum (*Didelphis virginiana*)	O

OTHER WILDLIFE SPECIES	Key
ORDER: INSECTIVORA (Shrews and Moles)	
FAMILY: SORICIDAE (Shrews)	
Vagrant Shrew (*Sorex vagrans*)	O
Ornate Shrew (*Sorex ornatus*)	P
Trowbridge's Shrew (*Sorex trowbridgii*)	P
FAMILY: TALPIDAE (Moles)	
Shrew-mole (*Neurotrichus gibbsii*)	P
Broad-footed Mole (*Scapanus latimanus*)	O
ORDER: CHIROPTERA (Bats)	
FAMILY: VESPERTILIONIDAE (Vespertilionid Bats)	
Little Brown Myotis (*Myotis lucifugus*)	O
Yuma Myotis (*Myotis yumanensis*)	P
Long-eared Myotis (*Myotis evotis*)	P
Fringed Myotis (*Myotis thysanodes*)	P
Long-legged Myotis (*Myotis volans*)	P
Red Bat (*Lasiurus borealis*)	P
Western Pipistrelle (*Pipistrellus hesperus*)	P
Big Brown Bat (*Eptesicus fuscus*)	P
Silver-haired Bat (*Lasionycteris noctivagans*)	P
Hoary Bat (*Lasiurus cinereus*)	O
Pallid Bat (*Antrozous pallida*)	P
FAMILY: MOLOSSIDAE (Free-tailed Bat)	
Brasilian Free-tailed Bat (*Tadarida brasiliensis*)	P
ORDER: LAGOMORPHA (Rabbits, Hares, and Pikas)	
FAMILY: LEPORTIDAE (Rabbits and Hares)	

OTHER WILDLIFE SPECIES	Key
Brush Rabbit (*Sylvilagus bachmani*)	O
Audubon's Cottontail (*Sylvilagus audubonii*)	O
Black-tailed Hare (*Lepus californicus*)	O
ORDER: RODENTIA (Squirrels, Rats, Mice, and Relatives)	
FAMILY: SCIURIDAE (Squirrels, Chipmunks, and Marmots)	
Merriam's Chipmunk (*Tamias merriami*)	P
Western Gray Squirrel (*Sciurus griseus*)	O
FAMILY: GEOMYIDAE (Pocket Gophers)	
Botta's Pocket Gopher (*Thomomys bottae*)	O
FAMILY: HETEROMYIDAE (Pocket Mice and Kangaroo Rats)	
California Pocket Mouse (*Perognathus californicus*)	P
Heermann's Kangaroo Rat (*Dipodomys heermanni*)	P
FAMILY: CRICETIDAE (Deer Mice, Voles, and Relatives)	
Western Harvest Mouse (*Reithrodontomys megalotis*)	P
California Mouse (*Peromyscus californicus*)	O
Deer Mouse (*Peromyscus maniculatus*)	O
Brush Mouse (*Peromyscus boylii*)	P
Dusky-footed Woodrat (*Neotoma fuscipes*)	O
California Vole (*Microtus californicus*)	P
FAMILY: MURIDAE (Old World Rats and Mice)	
Norway Rat (*Rattus norvegicus*)	O
House Mouse (*Mus musculus*)	P
ORDER: CARNIVORA (Carnivores)	
FAMILY: CANIDAE (Foxes, Wolves, and Relatives)	
Coyote (*Canis latrans*)	O

OTHER WILDLIFE SPECIES	Key
Gray Fox (*Urocyon cinereoargenteus*)	O
FAMILY: PROCYONIDAE (Raccoons and Relatives)	
Ringtail (*Bassariscus astutus*)	P
Raccoon (*Procyon lotor*)	O
FAMILY: MUSTELIDAE (Weasels, Badgers, and Relatives)	
Long-tailed Weasel (*Mustela frenata*)	O
Western Spotted Skunk (*Spilogale gracilis*)	P
American Badger (*Taxidea taxus*)	P
Striped Skunk (*Mephitis mephitis*)	O
FAMILY: FELIDAE (Cats)	
Mountain Lion (*Felis concolor*)	O
Bobcat (*Lynx rufus*)	O
ORDER: ARTIODACTYLA	
FAMILY: SUIDAE (Pigs)	
Wild Boar (*Sus scrofa*)	P
FAMILY: CERVIDAE (Deer, Elk, and Relatives)	
Black-tailed Deer (*Odocoileus hemionus*)	O

Source: Habitat Restoration Group

Appendix C
LIST OF VASCULAR PLANT SPECIES OBSERVED AT UPPER STEVENS CREEK COUNTY PARK

■ ■ ■

Field observations and literature review formed the basis of the investigation. Prior to the field survey, the California Natural Diversity Data Base (CNDDB, 1990 and 1991) for the Mindego Hill quadrangle and the Inventory of Rare and Endangered Vascular Plants (Smith and Berg, 1988) were reviewed for the potential presence of rare, threatened, and endangered plant species. TheSanta Clara Chapter of the California Native Plant Society was contacted for information on rare plants in the Park's vicinity.

The following documents were also reviewed: Table Mountain Resource Management Plan (Young, 1984), Pescadero Creek Natural Resources Management Plan (1979), and A Plan for the Monte Bello Ridge Mountain Area (1974).

The study area was traversed on foot September 24 and October 13 and 21, 1992, using U.S.G.S. and aerial maps (scale 1"=500'; County of Santa Clara, June 1986) as guides. The plant communities observed were delineated onto the U.S.G.S. map (see Figure 8). The habitat mapping was done at a general level because some areas could not be field checked due to poor access or visibility. Most of the mapping relied on aerial photograph interpretation. It was not possible to delineate the various types of riparian habitats observed at the Park, since there was a limited amount of field time and limited resolution of the aerial maps. Therefore, the riparian habitats have been lumped into the general designation of riparian forest.

Plant species observed during the fall survey were identified using A California Flora and Supplement (Munz and Keck, 1968), Grasses of California (Crampton, 1974), and Flora of the Santa Cruz Mountains of California (Thomas, 1961). A list of plant species observed is included as Appendix C. Since the survey was performed in September and October when many plants were past their bloom period, the list is incomplete. In some cases, identification was only possible to the genus level.

The following list, arranged by family according to A California Flora (Munz and Keck, 1968), contains all plant species observed at Upper Stevens Creek County Park during Fall 1992. Most of the plants have been identified to species, but a few could only be identified to genus. This is not intended to be a complete list due to the timing and reconnaissance-level of the survey. More species would be expected to be observed during a spring survey.

SCIENTIFIC NAME	COMMON NAME
ACERACEAE	
Acer macrophyllum	Big Leaf Maple
AMARYLLIDACEAE	
Dichelostemma pulchella	Blue Dicks
Triteleia sp.	Triteleia
ANACARDIACEAE	
Toxicodendron diversilobum	Poison Oak
APIACEAE	
Anthriscus scandicina *	Bur Chervil
ASTERACEAE	
Achillea millefolium	Common Yarrow
Anaphalis margaritacea	Pearly Everlasting
Arnica discoidea	Rayless Arnica
Artemisia douglasiana	California Mugwort
Aster sp.	Aster
Baccharis pilularis var. *consanguinea*	Coyote Brush
Centaurea solstitialis *	Star Thistle
Cirsium vulgare *	Common Thistle
Eriophyllum lanatum	Common Wooly Sunflower
Grindelia hirsutula	Hirsute Grindelia
Hemizonia corymbosa	Coast Tarweed
Hypochaeris glabra *	Cat's Ear
Madia elegans	Common Madia
Petasites frigidus var. *palmatus*	Western Coltsfoot
Sonchus oleraceus *	Common Sow Thistle
Solidago californica	California Goldenrod
Taraxacum officinale *	Dandelion

BETULACEAE	
Alnus rhombifolia	White Alder
BLECHNACEAE	
Woodwardia fimbriata	Western Chain Fern
BRASSICACEAE	
Dentaria californica	Milk Maids
Nasturium officinale *	Water Cress
CAPRIFOLIACEAE	
Lonicera hispidula	Hairy Honeysuckle
Sambucus mexicana	Blue Elderberry
Symphoricarpos mollis	Creeping Snowberry
Stellaria media *	Chickweed
CHENOPODIACEAE	
Chenopodium album *	Lamb's Quarters
CORYLACEAE	
Corylus californica	California Hazel
CUCURBITACEAE	
Marah fabaceus	Wild Cucumber
CYPERACEAE	
Carex sp.	Sedge
Cyperus sp.	Cyperus
EQUISETACEAE	
Equisetum arvense	Common Horsetail
Equisetum telmateia var. *brauni*	Giant Horsetail
ERICACEAE	
Arbutus menziesii	Madrone
Arctostaphylos andersonii var. *andersonii*	Heart-leaved Manzanita
Arctostaphylos canescens	Hoary Manzanita
Arctostaphylos crustacea var. *crustacea*	Brittle-leaved Manzanita
EUPHORBIACEAE	
Euphorbia peplus *	Petty Spurge

Eremocarpus setigerus	Turkey Mullein
FABACEAE	
Cytisus monspessulanus *	French Broom
Lotus scoparius	Deerweed
Lupinus sp.	Lupine
Pickeringia montana	Chaparral Pea
Trifolium subterraneum *	Subterranean Clover
Trifolium pratense *	Red Clover
Vicia sp.	Vetch
FAGACEAE	
Lithocarpus densiflorus	Tan Bark Oak
Quercus agrifolia	Coast Live Oak
Quercus chrysolepis	Canyon Oak
Quercus dumosa	Scrub Oak
Quercus kellogii	Black Oak
Quercus wislizeni	Interior Live Oak
HIPPOCASTANACEAE	
Aesculus californica	California Buckeye
HYDROPHYLLACEAE	
Eriodictyon californicum	Yerba Santa
IRIDACAE	
Iris sp.	Iris
Sisyrinchium bellum	Blue-eyed Grass
JUNCACEAE	
Juncus patens	Common Rush
LAMINACEAE	
Marrubium vulgare *	Common Hoarhound
Satureja douglasii	Yerba Buena
Stachys bullata	Hedge Nettle
LAURACEAE	
Umbellularia californica	California Bay

LEMNACEAE	
Lemna sp.	Duckweed
LILIACEAE	
Chlorogalum pomeridianum	Soap Plant
MALVACEAE	
Malva parviflora *	Cheese-weed
ONAGRACEAE	
Clarkia sp.	Clarkia
Epilobium paniculatum	Panicled Willow Herb
PAPAVERACEAE	
Eschscholzia californica	California Poppy
PINACEAE	
Abies concolor *	White Fir
Abies magnifica *	Red Fir
Abies procera *	Noble Fir
Pinus attenuata	Knobcone Pine
Pinus coulteri *	Coulter Pine
Pinus radiata *	Monterey Pine
Pinus sylvestris *	Scotch Pine
Pseudotsuga menziesii	Douglas Fir
PLANTAGINACEAE	
Plantago lanceolata *	English Plantain
PLANTANACEAE	
Platanus racemosa	Western Sycamore
POACEAE	
Aira caryophyllea *	Silvery Hair Grass
Avena barbata *	Slender Wild Oat
Avena fatua *	Wild Oat
Bromus carinatus	California Brome
Bromus diandrus *	Ripgut Brome
Bromus mollis *	Soft Chess
Elymus triticoides	Alkali Rye Grass

Festuca sp.	Fescue
Hordeum leporinum *	Farmer's Foxtail
Lolium perenne *	Perennial Ryegrass
Melica imperfecta	Small-flowered Melica
Poa annua *	Annual Blue Grass
Polypogon monspeliensis *	Rabbit's Foot Grass
Stipa pulchra	Purple Needle Grass
Vulpia myuros *	Rattail Fescue
POLYGONACEAE	
Polygonum punctatum	Water Smartweed
Rumex acetosella *	Sheep Sorrel
Rumex crispus *	Curly Dock
POLYPODIACEAE	
Dryopteris arguta	Coastal Wood Fern
Polypodium californicum	California Polypody
Polystichum munitum	Western Sword Fern
PORTULACACEAE	
Montia perfoliata	Miner's Lettuce
PTERIDACEAE	
Adiantum jordanii	Maiden Hair Fern
Pityrogramma triangularis	Goldenback Fern
Pteridium aquilinum	Bracken Fern
RANUNCULACEAE	
Ranunculus californicus	California Buttercup
RHAMNACEAE	
Rhamnus californicus	California Coffee Berry
Rhamnus crocea ssp. *crocea*	Red Berry
Ceanothus incanus	Coast Whitethorn
Ceanothus thyrsiflorus	Blue Blossom
ROSACEAE	
Adenostoma fasciculatum	Chamise

Cercocarpus betuloides	Mountain Mahogany
Fragaria californica	Wild Strawberry
Heteromeles arbutifolia	Toyon
Holodiscus discolor	Ocean Spray
Prunus ilicifolia	Holly-leaved Cherry
Rosa californica	Wild Rose
Rubus parviflorus var. *velutinus*	Thimbleberry
Rubus ursinus	California Blackberry
Sanguisorba minor	Burnet
RUBIACEAE	
Galium aparine *	Bedstraw
SALICACEAE	
Salix laevigata	Red Willow
Salix lasiolepsis	Arroyo Willow
SAXIFRAGACEAE	
Boykinia elata	Brook Foam
Heuchera micrantha	Alum Root
Ribes sp.	Currant
SCROPHULARIACEAE	
Cordylanthus rigidus	Stiff Bird's Beak
Diplacus aurantiacus	Sticky Monkey Flower
Scrophularia californica	California Bee Plant
SOLANACEAE	
Solanum nodiflorum	Small-flowered Nightshade
TAXACEAE	
Torreya californica	California Nutmeg
TAXODIACEAE	
Sequoiadendron giganteum *	Sequoia Big Tree
Sequoia sempervirens	Coast Redwood
TYPHACEAE	
Typha angustifolia	Narrow-leaved Cattail
URTICACEAE	

Urtica dioica ssp. *holosericea*	Stinging Nettle
Urtica urens *	Dwarf Nettle

VIOLACEAE

Viola sp.	Violet

* Indicates non-native plant species (to California and/or this region)

Appendix D
POTENTIAL PLANT SPECIES OF CONCERN IN THE PARK

■ ■ ■

POTENTIAL PLANT SPECIES OF CONCERN
UPPER STEVENS CREEK COUNTY PARK

Plant Species	S[a]	F[b]	CNPS[c]	Habitat	Blooming Dates
Acanthomintha lanceolata Santa Clara Thorn Mint	-	-	4	Chaparral (shale scree)	March-June
Balsamorhiza macrolepis var. *macrolepis* Balsamroot	-	-	3	Grassland and foothill woodland, below 2,000′	March-June
Calochortus umbellatus Oakland Star-tulip	-	-	4	Chaparral, montane coniferous forest, 1,000′ - 2,000′	March-May
Calyptridium parryi var. *hesseae* Santa Cruz Mountains pussypaws	-	C2	1B	Chaparral	June-July
Cypripedium fasciculatum Clustered Lady's Slipper	-	C3c	4	Lower montane coniferous forest, moist woods	April-May
Delphinium californicum ssp. *interius* Hospital Canyon Larkspur	-	C2	3	Cismontane woodland	April-June
Dirca occidentalis Western Leatherwood	-	-	4	Mixed evergreen forest, chaparral, wet areas below 1,500′	Jan. - March
Elymus californicus California Bottlebrush Grass	-	C2	4	Coniferous forest, often associated with Douglas fir	June-Aug.
Eriogonum argillosum Clay-loving Buckwheat	-	-	4	Cismontane woodland on clay or serpentine soil	March-June
Eryngium aristulatum var. *hooveri* Hoover's Button Celery	-	C2	4	Areas of standing water in mixed evergreen forest	May-Aug.
Fritillaria liliacea Fragrant Fritillary	-	C2	1B	Coastal scrub, grassland	March-May

Plant Species	S[a]	F[b]	CNPS[c]	Habitat	Blooming Dates
Hesperolinon congestum Marin dwarf flax	-	C1	1B	Grassland and dry slopes on serpentine	May-June
Lasthenia conjugens Contra Costa Goldfields	-	C2	1B	Moist area, grasslands	April-May
Malacothamnus arcuatus Arcuate Bush Mallow	-	-	4	Chaparral and oak-madrone forest	April-July
Penstemon rattanii ssp. *kleei*	-	-	3	Sandy soil in chaparral	May-June
Quercus lobata Valley Oak	-	-	4	Foothill woodland, grassland, riparian, below 2,000'	March-April
Tropidocarpum capparideum Caper-fruited Tropidocarpum	-	C2	1A	Grasslands	March-April
Ribes divaricatum var. *publiflorum* Straggly Gooseberry	-	-	4	Riparian woodland	March-May

a State Listings: C=Endangered, CR=Rare, CT=Threatened

b Federal Listings: FE= Endangered, FT=Threatened, C1=Enough data on file to support listing, C1*=Enough data to support listing but plant presumed extinct, C2=Threat and/or distribution data insufficient to support listing, C2*=Threat and/or distribution data insufficient to support listing, presumed extinct, C3a=Extinct, C3b=Taxonomically invalid, C3c=Not threatened;

c CNPS Listing[1]: List 1A=Plants presumed extinct, List 1B=Plants rare throughout their range and considered vulnerable due to limited habitat or low numbers of individuals per population, List 2=Rare, threatened or endangered in California, but common elsewhere, List 3=Review list of species which may be rare, threatened or endangered but additional data is needed, List 4=A watch list of species with a limited distribution which are not currently threatened

1 Species on Lists 1A, List 1B and List 2 are protected by Section 1901, Chapter 10 of the California Department of Fish and Game Code (Native Plant Protection).
2 Source: California Natural Diversity Data Base
3 Source: California Native Plant Society's Inventory of Rare and Endangered Plants of California (Smith and Berg, 1988)
4 Source: CNPS local chapter rare plant committee
5 Source: California Native Plant Society's Inventory of Rare and Endangered Vascular Plants of California

Appendix E
FUEL MODEL METHODOLOGY AND RESULTS

■ ■ ■

A. Fuel Model Methodology

1. Using the Model

The fire behavior prediction model, BEHAVE, was developed by the USDA Forest Service to help in predicting the movement and burning intensity of wildfires. This model, which can be run on a personal computer, uses site-specific weather, fuel, and topographic data to predict various components of fire behavior. These components include the rate of fire spread, flame length or height, and heat intensity at the fire front.

The following categories of weather and topographic information are integrated into the model: (1) temperature; (2) relative humidity; (3) fuel supply and moisture content; (4) wind direction and speed; and (5) slope percent and aspect.[1]

The variables actually used can be quite specific. More site-specific data yields more reliable results. Wildland managers use the worst case and 90th percentile fire hazard data to predict fire behavior under the most severe conditions. By estimating the worst case scenario, the fire planner can identify potential hazard areas and direct their land management plants to minimize those risks.

A number of assumptions are woven into BEHAVE, and should be considered when interpreting the model's output. For example, one must assume that the variables described (such as fuel supply, moisture content, slope and aspect) are consistent throughout the study area. Although the wind conditions at the base, midline and top of the slope can be specified, very local, erratic shifts in

[1] Weather data was collected from a nearby CDF station (Morgan Hill) located to the south of the project site. CDF uses this data throughout the area (including around Upper Stevens Creek) to determine the most efficient level of fire fighting response. The weather database was selected in consultation with the California Department of Forestry (CDF), David Wachtel.

wind direction and intensity are certainly possible. Experience with actual wildfires in helpful in interpreting model outputs.

2. Sampling in the Park

Fuel samples were collected in seven plots which represented the structure and species composition of the fuel types found in Upper Stevens Creek Park. Fuel samples were collected in two manners. Dead and downed wood fuels in all forest/woodland types were sampled using the planar-intersect method (Brown 1974). The number of intersections of small, medium and large fuels were counted along lengths of 6 to 35 feet in length, depending on the size of the woody material. Litter from a square foot quadrate was collected to obtain the weight of this component of the fuel type. Relationships developed between the number of intersections for each size of woody material and the fuel loading were developed by Brown (1974) and employed in this study. The fuel loading of chaparral type was estimated using a height-to-weight relationship developed by Sapsis (1991). Fuel bed heights, dead-to-live ratios, proportion of material in various size classes, and duff depth were estimated in the field.

Overall, fuel types corresponded well with vegetation-habitat types described in Chapter III.

B. Results of the Fire Behavior Prediction Model

Figures 11 through 13, and Tables 1 and 2 (see Chapter III.I), illustrate the fuel characteristics and predicted fire behavior of the fuel types sampled (based on the plot samples). Figure 11 shows the amount of fuel in tons per acre by vegetation type. Figure 12 shows the predicted rates of spread if ignition occurs, by vegetation type. Figure 13 shows the predicted flame lengths by vegetation type. Combined, these characteristics, fuel loading, predicted rates of spread and predicted flame lengths, indicate which plant communities contain the highest fire hazard. Table 1 provides an interpretation of the rates of spread values. Table 2 provides an interpretation of flame lengths.

1. Annual Grasslands as a Fuel Type

Annual grasses are characterized as follows according to the USDA Forest Service Fire Behavior Prediction System:

> "Fire spread is governed by the fine herbaceous fuels that have cured or nearly cured. Fires move rapidly through cured grass and associated material. Very little shrub or timber is present, generally less than one-third in this fuel model.
>
> Grasslands and savanna are represented along with stubble, grass tundra, and grass-shrub combinations that meet the above area constraint. Annual and perennial grasses are included in this fuel model."

The amount of fuel found on Upper Stevens Creek Park was greater than the average defined by the Northern Forest Fire Laboratory (NFFL) models. Upper Stevens Creek Park contains 2 to 3.2 tons/acre of fuel on grassland along Charcoal Road. This sampled fuel loading also exceeds the estimates of yearly soil productivity for grassland provided by the U.S. Geologic Survey. The accumulation of a thick layer of thatch as well as a significant amount of bracken fern could explain the greater amount of fuel that is currently present at the Park.

These greater fuel loads result in exciting fire behavior, with flame lengths of 7 to 9 feet, rates of spread of 66 to 77 feet per minute (or chains per hour, a chain/hour is approximately one foot/minute). Heat per unit area is 330-495 BTM/ft2 and the heat released per foot per second is 400 to 700 BTM.

Conclusions. While the fuel loading of the plots of grass were the lowest of all the plots, the predicted fire behavior was the most challenging, with the exception of chaparral. Flame lengths of seven to nine feet suggest direct attack of the fire would be futile; rates of spread of 66 to 77 feet per minute indicate that hand-line building efforts would be out-paced by the fire.

2. Oak/Madrone Hardwood as a Fuel Type

Oak/madrone hardwoods are characterized as follows in the same system:

> "Slow-burning ground fires with low flame heights are the rule, although the fire may encounter an occasional "jackpot" or heavy fuel concentration that can flare up. Only under severe weather conditions involving high temperatures, low humidities, and high winds do the fuels pose fire hazards. Closed canopy stands of short-needle conifers or hardwoods that have leaved out support fire in the compact litter layer. This layer is mainly needles, leaves, and some twigs since little undergrowth is present in the stand."

The oak/madrone woodland is one of the predominant vegetation types in the Park. The oak/madrone woodlands fuel type likewise has a small amount of biomass: total tonnage/acre is five tons/acre, 30% of which is under 1/4 inch in diameter, 20% from 1/4 inch to one inch in diameter, and 50% from one inch to three inches in diameter. The fuel bed height is two feet; the moisture of extinction is 30%.

Oak/madrone hardwoods in the Park are well described by the NFFL fuel model. Typically, the total fuel for this vegetation type ranges from 8 tons/acre to 14 tons/acre, with the greatest proportion of the fuel residing in the litter and duff on the ground.

The resulting fire behavior is rather benign. Rates of fire spread are slow - from 4 feet per minute to 12 feet per minute. Maximum flame lengths are 2.8 to 5 feet. Heat per unit area was 305, 470, and 805 BTU/ft2, and fireline intensities ranged from 23 to 195BTU/ft/sec.

Conclusions. The leisurely spread rates, combined with the relatively short flame lengths of the predicted fire behavior demonstrate a manageable, moderate fire hazard in the this fuel type.

3. Chaparral as a Fuel Type

Chaparral is characterized as follows in the same system:

> "Fire intensity and fast-spreading fires involve the foliage and live and dead fine woody material in the crowns of a nearly continuous secondary overstory. Stands of mature shrub, six or more feet tall, such as California mixed chaparral . . . are typical candidates. Besides flammable foliage, there is dead woody material in the stand that significantly contributes to the fire intensity. Height of stands qualifying for this model depends on local conditions. There may be also a deep litter layer that confounds suppression efforts."

The total tonnage/acre of mature chaparral typically is sixteen tons/acre, ten of which is evenly divided between live foliage and dead twigs under 1/4 inch in diameter. There are four tons/acre from 1/4 inch to one inch in diameter (25% of the fuel load), and two tons (12.5%) from one inch to three inches in diameter. The fuel bed height is six feet; the fire will be extinguished when the moisture is 20%. This fuel load is much higher than that of grassland areas and the oak/madrone forest in terms of tons/acre.

Sapsis (1991) found that fuel loading was well correlated to fuel bed height. Where the depth was five feet, the total fuel load was 18 tons/acre. This corresponds well to the fuel bed height (and expected fuel loads) in Upper Stevens Creek Park. Approximately 70% of the fuels are estimated at under 1/4 inch in diameter, and 30% of the material still connected to the shrub is dead in the chaparral stands in Upper Stevens Creek Park. A litter/duff layer is estimated at one inch.

This chaparral fuel type produces the most severe fire behavior, but with lower rates of spread before spotting is expected. The fire spread rate is predicted to be 100 feet per minute. Flame lengths would be 24 feet and the fireline intensity is predicted as 5800 BTU/ft/sec, which is extremely high.

Conclusions. This fuel type consists of the highest hazard, based on the most severe fire behavior predicted. While fuel loadings were almost one-half of the fuels found in one of the Douglas fire plots, rates of spread were over six times greater than any of the forest fuel types, and flame lengths were over four times longer than any forest fuel type. Direct attack would not be possible, and containment efforts would need to rely on backfiring, or suppression strategies other than line building because the perimeter of the fire is likely to grow faster than line could be built. In addition, spotting is likely in chaparral, which will present even more challenges to suppression efforts.

Spotting is the throwing of embers ahead of the fire. Each new fire that starts from these embers is called a spot fire. Once a fire starts to spot, suppression is difficult because the new fires have to also be located and extinguished, or they will burn together, and enlarge the fire rapidly. Often spot fires leap over containment lines already constructed.

4. Douglas Fir Fuel Type

The Douglas fir forest found on Upper Stevens Creek Park can be characterized by the USDA Forest Service system as follows:

> The fires burn in the surface and ground fuels with greater intensity than the other timber litter models. Dead down fuels include greater quantities of 3-inch or greater limbwood resulting from overmaturity or natural events that create a large load of dead material on the forest floor. Crowning out, spotting, and torching of individual trees is more frequent in this fuel situation, leading to potential fire control difficulties. Any forest type may be considered if heavy down material is

present: for example, insect-disease-ridden stands, windthrown stands, and overmature stands with deadfall.

The greatest fuel loadings in this vegetative community were found principally in the form of large logs. Duff, which is decomposing vegetative materials, and fine fuels were minor components of the fuel bed. Because the large logs contribute to the heat of the fire after the flaming front is generally passed, the BEHAVE model tends to discount the role of these logs in the fire behavior predictions. Consequently, fire spread was predicted to be slow, at 4 to 15 feet/per minute, and flame lengths ranged from two to five feet. The head per unit area (of the flaming front vs. firefront only) was predicted to be from 270 to 676 BTM/ft2. Fireline intensities were estimated at 20 to 191 BTM/ft/sec.

Conclusions. The hazard posed by the Douglas fir fuel type is moderate, based on the predicted fire behavior of the flaming front. In locations of a large quantity of logs, the difficulty of spread were slow to moderate, an spanned those predicted for all forest fuel types. The predicted flame lengths also were at the high and low extremes of those predicted for forest fuel types and were similarly moderate to moderately high.

5. Table Mountain: Abandoned Tree Farm Fuel Type

The fuel conditions on Table Mountain are quite explosive; however, previous management has reduced the amount of large diameter logs. The understory is covered with grass and herbs (blackberry), with an overstory of mixed hardwoods and dead (and dying) conifers. Sampling techniques have not been developed to capture the lack of litter and dead material on the ground, combined with the continuous vertical arrangement of dead fuels in the form of dead pine needles. Similarly, no fuel model has been developed for the condition that exists on Table Mountain and is becoming more common in the beetle-infested regions of the Sierra Nevadas.

The fire behavior is predicted to be quite variable, with rapid rates of fire spread on the ground and frequent spotting in pockets of conifers. Where hardwoods dominate, flame lengths are expected to decrease; spread rates will slow in areas of blackberry cover.

Conclusions. While no quantitative fire behavior prediction is available, the hazard posed by this fuel type is high to extreme, based on the probability of ignition and crowning and spotting behavior (which includes both the propensity of the fuels to spot, as well as the distance these embers are likely to travel). Crowning occurs when the tops of trees flame.

Appendix F
FIRE ECOLOGY AND AGE STRUCTURE OF VEGETATION

■ ■ ■

Relationships between fire and vegetation are best expressed through the concept of a fire regime. A fire regime is comprised of the patterns of variation in fire characteristics and effects over time and space. Components of a fire regime include: (1) fireline intensity; (2) fuel consumption; (3) variations fire intervals; (4) variations in seasonal or phenological condition of the plant when it is burned; and (5) variations in size or patchiness of the burned area. Variation in all its features and effects is the essential element of a fire regime.

Fire regime and the variation in fire characteristics directly and indirectly affect vegetation. In turn, fires are affected by the responses of existing vegetation (fuels) to previous fire and post-fire conditions. Efficient and effective management of flora, fuels, and fires requires knowledge of their interactions.

To describe the general interactions of fire ecology, and age structure of vegetation on Upper Stevens Creek Park, the existing vegetation can be grouped into five types: grasslands, oak woodland, chaparral, and riparian areas.

1. Grasslands

In general, grassland vegetation in California is very resilient to fire. The fire ecology of grasslands (particularly perennial grasslands), however, is only recently being studied. Heady (1977) states that fire has not been found to be important in the ecology of California grasslands. He also states all established fire effects on grasslands are temporary, lasting no more than a few years. Menke (1991) also found that the effects of fire on perennial grasslands last approximately three years. However, Kellogg and Kellogg found that areas without a fire during the previous 16 years were dominated by annual grasses, whereas with at least one fire, dominance by perennials was much more common.

Fire history of California perennial grassland is largely unknown (Heady 1989) although both lightning and Native Americans were probably common ignition sources. Few fire scar records exist in adjacent oak forests because few oaks survive from these periods. Rapid recovery of grass and herbaceous vegetation after burning would contribute to frequent burning, possibly on an annual basis. Better direct fire history evidence (fire scars in neighboring oak forests) exists for the period following introduction of annual exotic grass species and their supplanting of the native flora in the mid-1800s (Heady 1977). Studies by Sugihara and Reed (1988), McClaran and Bartolome (1989), Mensing (1989), reveal individual fire intervals in adjacent oak forests shorter than 10 years until fire suppression became effective in the early to mid 20th century. Nothing is yet known about properties of other historic fire regime parameters such as season, fuel and soil moistures, etc.

The fire ecology of perennial grasses is just beginning to be discerned. Summer fires of low intensities cause some mortality (1 - 3%) of perennial bunchgrasses, but also increase stolon and tiller production. Fire tends to divide mature bunches into vigorous daughter plants. Fire also removes thatch, which enhances seed germination of perennial grasses. Fire can cause greater mortality (20%) when fuel loadings and fire intensities are higher (Menke 1991). Menke (1991) found fires in late spring and summer reduce seed germination, but this effect lasts less than three years. Kellogg and Kellogg (1990) found annual grasses were dominant in areas that had not burned for 16 years, but with one or more fires in that time period, perennials were dominant in over 50% of the transects.

2. Chaparral

Chaparral fires burn with great intensity, involving all of the crown. The crown fire consumes all of the above-ground biomass and total mortality of above-ground portions of all plants. While this is probably an accurate description of most acreage burned by contemporary fires, the behavior and effects many fires on chaparral species in neighboring vegetation (oak forests) are not as extreme. Minnich (1983, 1987) offers compelling evidence that many fires occurring prior to suppression burned for many months; newspaper accounts describe fires of varying characteristics which increased in intensity when weather, topography, and fuels were conducive. Fires often moved slowly and surrounded unburned islands of vegetation. These fire characteristics and sizes would interact differently with the various shrub biologies, likely permitting survival of some seed on shrubs and trees and possibly some individuals within a fire perimeter.

The general pattern of responses to fire by chaparral species has been the subject of substantial research. Many discussions of shrub biology in relation to fire begin with a discussion of post-fire establishment strategies classified according to a matrix of sprouting and seeding capabilities (e.g. facultative resprouters) vs. necessities (obligative seeders or obligative sprouters). This framework is convenient for grouping species and initiating a general discussion about expected shrub responses.

Facultative resprouters are those species which typically reproduce from seed either currently produced or stored in soil seed banks. They have the capability to regenerate top-killed individuals from below-ground burls or lignotuber tissues. Keely (1977) notes that the proportion of sprouting vs. seedlings during post-fire stand establishment varies by population and species.

Some species consistently regenerate exclusively from sprouts because seeds are typically killed by fire (e.g. some scrub oaks) - they have been termed obligate resprouters. Obligate seeder species are incapable of vegetative regeneration. Most manzanita and ceanothus species fall into this category (Keely 1977). Also included with obligative seeders are the so-called "fire-followers" or herbaceous plants that become conspicuous only during the first several post-fire years. Seeds of many herbaceous plants can remain dormant in the soil until germination is triggered directly or indirectly by fire. For example, a fire may produce heating for a certain combination of time and temperatures, may produce sunlight, and create aleachate of charred wood (Keeley 1987a, Keeley and Keeley 1987). All these constitute triggers for see germination for some species in chaparral stands.

A fraction of the seeds produced by many shrub and herbaceous species, however, require little more than adequate moisture for germination. This ability to germinate at various times lends flexibility to a species survival. It can persist and recover from variations in disturbance (including fire), assuming environments are favorable for growth after germination.

The effect of aging during long fire-free periods on chaparral population dynamics and post-fire recovery are not well understood. Chaparral vegetation is likely to be resilient to a fairly broad range of fire intervals because of great diversity in life history attributes of individuals and seeds. The traditional notion is that after several decades without fire, senescence of chaparral shrubs results in disintegration of population and stand structure. However, this idea has been questioned recently (Zedler and Zammitt 1989). Effects of time since fire on chaparral varies by species and life history characteristics. For example, fire survival and consequent sprouting of chamise burls was found to

increase with the size (and presumably age) of chamise plants (Stohlgren et al. 1984), although old plants of many species have diminished resprouting potential.

In order to predict the effects of long intervals between fires on species which reproduce from seed, the changes in seed bank over time - including seed input, longevity, predation, etc. (Parker and Kelley 1989, Kelley and Parker 1990) - are important to understand. However, this area has been little investigated. Zammit and Zedler (1988) found that seed densities of some shrub species increased while others decreased with time since last fire. The see bank of annuals and herbaceous plants which produce seed only during immediate post-fire years is subject to continual depletion by predators (rodents, insects) and decay (Zedler and Zammit 1988). Similarly, a series of fires at short intervals can trigger germination of annual and herbaceous seeds, but not allow seed formation before the next burn, which would also result in seed bank depletion.

Short fire intervals, (1 to 5 years as with grasslands) are less likely to occur in chaparral because of the longer time required to produce a continuous fuel bed. Additionally, the foliage in young chaparral plants have a much higher moisture content and a much lower oil content, making them much less prone to burning. Short intervals between fires in chaparral are likely to be more detrimental to these shrubs because time required for individuals can produce seed is long.

3. Oak Woodlands

The fire ecology of coastal live oak woodlands is not well documented. Fire scar records from blue oak *(Quercus douglasii)* woodlands in central California suggest intervals between fires generally decreased from 25 years before Anglo-American settlement in the mid 1800's to 7 years through the mid 1900's (McClaran and Barolome 1989). These fire history data from pre-Anglo periods are likely to be conservative because older data are lost where old trees have died or scars have rotted or been burned away by later fires; older fire scar evidence was principally derived from scars on healed-over trees which are less sensitive to scarring and provide less complete records of fires (McClaran 1986). Little is known about the historical seasonal distribution of fires in oak forests; if native-Americans were responsible for burning in oak forest types, then burning during all seasons would have been likely.

Little is known about actual fire behavior or direct fire effects on oaks. Plumb (1980), Green (9180), and Plumb and Gomez (1983) rank coast live oak among

the most fire resistant oaks based on bark characteristics and post-fire observations. Fire scars on many tree-form oaks testify to survival of past fires. However, assessments of "typical" fire resistance of a species depends largely on tree size and assumed fire behavior; the latter are partly determined by fuels. Surface fuels typical of coast live oak stands include some dead and downed woody material and leaf litter along with varying proportions of grass, forbs, and shrub components of north coastal scrub and chaparral. Thus, potential fire behavior would vary. Slow-moving fires of low intensity in relatively moist understory leaf and grass fuels beneath closed woodlands are likely in moderate weather conditions. However, high intensity crown fires which climb from burning shrubs growing among more open oak stands are also possible during extreme weather conditions. Accumulation of larger diameter fuels (from fallen oak tree branches) offer the potential for greater heat release and consequent damage to trees and seedlings.

Sprouting of oaks following fire is likely important to the population and stand dynamics. Snow (9180) found that coast live oak seedlings resprouted slower and relatively less frequently than Englemann oak seedlings to simulated heat treatments. Fewer basal buds on all species survived longer heat exposure. Lathrop and Osborn (1990) reported substantial sprouting responses of seedlings and saplings killed by wildfires and prescribed burns. Sprouting responses could change with age and size. In other oaks and hardwoods for example, the probability of sprouting, numbers of sprouts, or sprout growth rate, are known to decrease with age or size after a certain age- or size-dependent optimum (Solomon and Blum 1967, Johnson 1975, 1977, Griffin 1980).

Besides direct fire effects, post-fire influences - including insect defoliation (Batzer 1973), mildew attack on sprouts (Griffin 1980), and browsing - can initiate and modify sprouting response and establishment. Stand characteristics (openness, amount of mortality) may also contribute to initiation and development of sprouts by increasing light (Vogt and Cox 1970, Trimble and Smith 1970) and permitting greater insolation to raise soil temperatures (Maini and Horton 1966, Zasada and Schier 1973).

Low intensity underburns are known to damage some acorns on the ground and on lower canopy positions. Fire damaged acorns will germinate but at a lower percentage (Griffin 1977, Sugihara and Reed 1987). Damage to current crops of acorns still on the tree are likely to be proportional to crown damage and thus, fire intensity, air temperature, and windspeed. Lower air temperatures, flame lengths and windspeeds limit the height of lethal crown scorch. Differences in the amount of live overstory following fires and

resulting tree mortality could also affect understory microclimate and related seedling establishment. Actual effects of tree mortality on subsequent seedling reproduction is uncertain considering the effects of seasonal and yearly fluctuations in weather, predation, and later fires. However, site specific stand structure and fire history information (above) suggest a positive association between recruitment of a variety of oak species and past fire events. Seedling and sapling mortality varies by oak species and by season. Depending on other mortality factors, this could result in a species composition shift which might eventually be reflected in the overstory.

4. Riparian Woodlands

Very little is known about general fire interactions with riparian vegetation. Barro et al. (1989) recently documented substantial successes of top-killed sycamore, oaks, and cottonwoods, but not alder. Similar findings were reported by Davis et al. (189) for trees as well as woody shrubs. Few tree seedlings were observed until several years after the burn. The relatively moist condition of most riparian areas throughout much of the year would reduce the spread and intensity of fires burning into this vegetation. The specific effect of green vegetation and surface moisture would depend on the local drainage site which may or may not run dry at some point during summer months. Since Stevens Creek and many of its tributaries run all year long, fires are not expected to burn with great intensity.

Appendix G
SAMPLE CALIFORNIA NATIVE SPECIES FIELD SURVEY FORM

■ ■ ■

CALIFORNIA NATIVE SPECIES FIELD SURVEY FORM

OFFICE USE ONLY

Source Code _____ Quad Code _____
Element Code _____ Occ # _____
Copy Sent To _____ MS # _____

PLEASE ENTER ALL INFORMATION AVAILABLE TO YOU. USE THE BACK FOR COMMENTS IF NECESSARY. *PLEASE ATTACH OR DRAW A MAP ON BACK.*

Scientific name (no codes): _____

Reporter: _____ Phone: ( ) _____

Address: _____

Date of Field Work: ___ (mo.) ___ (day) —19___ (yr) County: _____ Collection? If yes, # _____ Mus./Herb _____

Location: _____

_____

_____

_____

Quad Name: _____ T _____ R _____ ___ ¼ of ___ ¼ Sec ___

___7½'___15' Elevation: _____ ft(m) T _____ R _____ ___ ¼ of ___ ¼ Sec ___

Landowner/Manager _____

Species found? ___ Yes ___ No If not, reason: _____

Is this a new location record?___ Yes ___ No___Unknown

Total # of Individuals=___ Is this a subsequent visit? __ Yes __ No Compared to your last visit: __ more __ same __ fewer

Phenology (plants): _____ # vegetative _____ # flowering _____ # fruiting

Population Age Structure (animals): _____ # adults _____ # juveniles _____ # others

Site Function for Species (animals): ___ breeding ___ foraging ___ wintering ___ roosting ___ denning ___ other

Habitat Description: (plant communities, dominants, associates, other rare spp., substrate/soils, aspect/slope)

Current Land Use/Visible Disturbances/Possible Threats

Overall Site Quality: ___ Excellent ___ Good ___ Fair ___ Poor
Comments:

Should/Could this site be protected? How?

Other comments:

DETERMINATION (Check one or more, fill in blanks)

___ Keyed in a site reference: _____
___ Compared with specimen housed at: _____
___ Compared with photo/drawing in: _____
___ By another person (name): _____
___ Other _____

OTHER KNOWLEDGEABLE INDIVIDUALS (Name/Address/Phone)

PHOTOGRAPHS (Check one or more)

Subject	Type
___ Plant/Animal	___ Slide
___ Habitat	___ Print
___ Diagnostic Feature	
___ Other	

May we obtain duplicates at our cost?
___ Yes ___ No

MAIL TO: NATURAL DIVERSITY DATA BASE, CALIFORNIA DEPARTMENT OF FISH AND GAME, 1416 NINTH ST., SACRAMENTO, CA 95814

Appendix H
PRE-PROJECT SURVEY DESCRIPTIONS

■ ■ ■

(1) Species of Concern Surveys along Trails, Grasslands and Fire Management Project Areas.

Problem Statement. The Park has not been surveyed for potential plant species of concern. Appendix D of this report lists 17 potential species of concern that may occur at the Park, five of which are legally protected. These species may occur in chaparral, grassland or the Douglas fir forest. Grasslands have been selected as high priority areas for surveying, since wildflowers and species of concern are commonly associated with grassland. The range of bloom periods for these species is from March through August. Although the legal status of these species is variable, all are valuable and are acknowledged by the California Native Plant Society's *Inventory of Rare and Endangered Vascular Plants*. If any of these species are found at the Park they would be considered a significant botanical resource, contributing to the goal of biodiversity of native plant species. Such plants merit protection and should be surveyed for along at the appropriate bloom period.

Areas adjacent to existing trails in potential habitat for species of concern should be surveyed first due to the high level of human activity associated with them (i.e., mountain bikes). If any plant species of concern occur along Park trails, their populations could be negatively impacted by human activities. It is important to verify if any species of concern do exist adjacent to trails. If any are found, their locations should be recorded and protected. For example, trails should be rerouted, if necessary (based on the surveyor's recommendations).

Tasks.

Task 1. Park staff should organize survey volunteers from the Santa Clara Chapter of the California Native Plant Society (CNPS) or plant taxonomy students from San Jose State University (SJSW). Toni Correlli, the rare plant coordinator of the local chapter of the CNPS, or plant taxonomy professor Dr. Rodney Myatt of SJSU could be contacted in this regard.

A qualified botanist familiar with rare plant survey methods should oversee the project.

Task 2. The species of concern surveys should focus on the 17 species of concern listed in Appendix D. Park staff and the survey volunteers should be familiarized with the identification of these species. Line drawings and species descriptions can be obtained from Illustrated Flora of the Pacific States (Abrams, Volumes I-V, 1940, 1944, 1951, and 1960).

Task 3. Surveys should be conducted on monthly intervals from March through August to cover the range of bloom periods. Existing trails and trails under construction should be surveyed. The surveys should cover the trail and the 20-foot wide strips on both sides of the trail.

In addition to trails, management project areas that have physical manipulations of substrate and/or vegetation (i.e., grading, clearing, and burning) and occur in grassland, chaparral or Douglas fir forest, should be surveyed for species of concern.

Annual grasslands commonly support wildflowers and species of concern and should also be included in the survey. The extent of annual grassland is depicted in Figure 9 and the trails are shown in Figure 3.

It is recommended that the California Department of Fish and Game's California Native Species Field Survey Form be used to record information when a species of concern is found. A sample form is provided in Appendix G.

Task 3. If a species of concern is found, the location should be demarcated in the field and mapped on a topographic map of the Park. Locations should be assigned an identification code and the population size recorded.

Photocopies of completed survey forms should be sent to the Natural Diversity Data Base, California Department of Fish and Game.

Task 4. Areas with species of concern should be protected from human activities and other negative impacts (i.e., erosion). Protective measures should be determined on a site-by-site basis. Protective measures include trail rerouting, informational signs, and protective fencing.

Precautions. Since survey volunteers are likely, an agreement regarding liability should be worked out.

Negative impacts are not anticipated, provided that the surveyors are instructed to minimize damage to vegetation. If voucher specimens are needed for plant identification, only portions of plants should be taken.

Monitoring. Locations supporting species of concern should be monitored on a yearly basis during the appropriate bloom period. The monitoring should evaluate changes in population size compared to the size recorded at detection. Is the population healthy and increasing in size? Are protective measures successful? Have there been any shifts in species composition? If new species are noted, this would contribute to the goal of biodiversity. If any non-native species appear to be competing with the species of concern, they should be removed.

(2) Conduct Surveys for Sensitive Wildlife Species in Fire Project Areas. (In the oak-madrone forest, between Grizzly Flat Trail and the New Trail, and Charcoal Road Trail).

Problem Statement. Sharp-shinned and Cooper's hawks, golden eagle and long-eared owl are potential breeders in the oak woodland fire management area and in forested areas in the vicinity of the Charcoal Road Trail fire management area. These species are of limited occurrence in the project region, and if they occur on site, deserve protection by virtue of their rarity. Fuel removal activities in nesting areas could disrupt reproductive success of these species, if they nest on the site. Therefore, surveys for these species in fire management areas should be conducted prior to fuel removal activities. In the event that these species occur, vegetation manipulation should be scheduled outside of the breeding seasons of these species (breeding season will vary depending upon species). Information on their occurrence in fire management areas would serve as baseline data from which the effects of fuel reduction can be monitored, and to guide future Park management actions. This is considered a high priority project, for the reasons discussed for the aforementioned projects.

Tasks.

Task 1. Conduct a survey for breeding bird species of concern in forested fire hazard management areas prior to the fuel removal activities. The survey should be conducted by persons knowledgeable on birds, including Park staff, interns, local Audubon Society members and students.

Task 2. The survey should consist of three site visits per each management area during late May and early June.

Task 3. All observations of bird species of concern and nest sites should be recorded on topographic site maps.

Precautions. In the event that nesting by the bird species of concern are observed, special precautions should be taken to reduce the amount of disturbance by the surveyor.

Monitoring. The goal of this project is to prevent disruption of nesting activities of these species by fire management activities. Data could be collected that could be used to develop recommendations for habitat protection and enhancement. Active nest sites observed in fire management areas could be monitored annually from the year following treatment to determine if vegetation manipulation affected use of the sites. Monitoring could be performed by trained Park staff, interns, local Audubon Society members and students.

(3) Retain Snags in Fire Project Areas.
(At Table Mountain, the oak-madrone forest between Grizzly Flat Trail and the New Trail, and Charcoal Road Trail fire management areas).

Problem Statement. Snags are critical resources for cavity-dependent wildlife. Snag removal in fire hazard management areas could reduce populations of cavity-nesting birds or denning mammals by the reduction of foraging, cover, and breeding sites. This in turn would reduce the biodiversity of the Park. Therefore, snags should be retained at densities that would maintain optimal levels of cavity-nesting species. In anticipation that fire management activities would be scheduled early in the implementation of the Resource Management Plan, snag retention projects are considered high-priority.

Tasks.

Task 1. Retain snags in fire hazard management areas at a density of 6/acre. All snags to be retained should possess the following characteristics: (1) a minimum height of 20 feet; (2) dbh of ≥12 inches; (3) a minimum of 65% bark coverage; and (4) acorn woodpecker granary snags. Snag clusters are preferable to stand-alone snags (Lindquist 1991, Chapel *et al.* 1983). All snags ≤24 inches should be retained to the greatest extent possible. In areas where snag dbh measurements are <12 inches, the minimum dbh of retained snags should be 6 inches. All snags that do not meet these criteria can be removed

to reduce fire hazard. This task could be performed by trained Park staff, interns and students.

Precautions. Snag removal should occur from August-November.

Monitoring. Studies on snag use by cavity-nesting birds have shown that snag densities from 1-3/acre are adequate to maintain viable population levels (Thomas *ibid.*; Balda 1975; Scott 1983). Therefore, the proposed snag density of 6/acre is considered conservative, and is expected to help maintain cavity-dependent bird species populations in managed areas at optimal levels. Monitoring is not required because it would require labor intensive collection of quantitative data on the snag use by cavity-nesting species in fire management areas. If the Parks and Recreation Department were interested, data collection should occur over a three-year period after treatment. The data to be collected would include diameter at breast height (dbh), species, height, percent of bark cover and stage of decay of all snags used as nest sites. Monitoring could be performed by trained Park staff, interns, local Audubon Society members and students. The monitoring data should be analyzed together with long-term snag inventories of the Park to modify recommendations for snag removal on future fire management areas, as needed.

(4) Retain Down Wood in Fire Project Areas.
(At Table Mountain, the oak-madrone forest between Grizzly Flat Trail and the New Trail, and Charcoal Road Trail fire hazard management areas).

Problem Statement. Down wood is an important resource for many species of amphibians, reptiles and rodents, for cover, foraging and breeding. Micro-climatic conditions provided by down wood are especially critical for amphibians. Removal of down wood in fire hazard management areas would reduce populations of wildlife species dependent on down wood as habitat. This in turn would reduce the biodiversity of the Park. Therefore, down wood should be retained at densities that would maintain viable populations of wildlife associated with this resource. In anticipation that fire management activities would be scheduled early in the implementation of the Resource Management Plan, down wood retention projects are considered high-priority.

Tasks.

Task 1. In fire hazard management areas, identify and retain logs ≥12 inches diameter at breast height (dbh) and a minimum length of 20 feet, at a

density of 2/acre for Class 1 and 2 logs. All Class 3, 4 and 5 logs should be retained. This task could be performed by trained Park staff, interns and students.

Precautions. Removal of down wood should occur from August to November to avoid potential for significant impacts to wildlife.

Monitoring. The density of retained logs is intended to be used as a general guideline for initial fire management projects. Monitoring the success of this project would require the collection of quantitative data on specific key wildlife species associated with down wood resources in fire management areas. Baseline data could be collected in the Parks and Recreation Department chose to. This data collection should occur over a three-year period after treatment. Collection of monitoring data could be performed by trained Park staff, interns and students. The monitoring data should be analyzed together with Park-wide down wood inventories to modify recommendations for down wood removal on future fire management areas, as needed

Appendix I
OTHER PROJECTS TO CONSIDER

■ ■ ■

Conduct Park-Wide Surveys for Species of Concern.

Problem Statement. This vegetation project would allow for thorough documentation of species of concern at the Park. The information collected would provide accurate baseline data that could be valuable for future management actions. The long-term surveys would ideally cover most of the accessible areas of the Park and would concentrate on a given plant community type at a time, starting with higher priority plant communities first. Concurrent with the long-term surveys, comprehensive plant species lists can be compiled by plant community type.

In addition to mapping locations of species of concern based on the results of Project BIO-3 and these surveys, the long-term surveys should also map any detected areas having serpentine rock, since serpentine rock provides habitat for species of concern and endemic species.

Tasks.

Task 1. A qualified botanist familiar with rare plant surveys should oversee the surveys and use the same methods used in the short-term surveys. These methods may need to be refined, according to what worked well during the earlier surveys.

Task 2. Survey areas need to be prioritized by habitat and accessibility. Grasslands and serpentine areas should have highest priority. Grassy patches also occur in Table Mountain and within the oak-madrone mixed hardwood forest. Survey priority (high to low) by habitat is as follows: grasslands and serpentine, northern mixed chaparral, oak-madrone mixed hardwood forest, riparian forest, and Douglas fir forest.

Task 3. Areas with species of concern should be protected from human activities and other negative impacts (i.e., erosion). Protective measures should

be determined on a site-by-site basis. Protective measures include trail rerouting, informational signs, and protective fencing.

The precautions, impacts, and monitoring methods would be similar to those given for the short-term surveys for species of concern.

Conduct Survey for Sensitive Amphibians and Fisheries Resources of Stevens Creek.

Problem Statement. California red-legged frog, foothill yellow-legged frog and native trout may occur in the portion of Stevens Creek within the Park. These species are of limited occurrence in the project region and, if they occur on site, deserve protection by virtue of their rarity. As described in Chapter III, current trail crossings along Stevens Creek and its tributaries (Alternate and Canyon Trails) could have a minor contribution to sedimentation of the creek, which in turn could degrade aquatic habitat conditions for these species. While sedimentation from upstream sources is much greater, it may be helpful to determine exactly which species are in the Parks streams to determine exactly where resources could be enhanced. Debris removal from the creek associated with post-flood periods, would be likely to adversely impact aquatic habitat, depending on the extent and timing of such activities. In the event that these species occur, information on their occurrence and habitat conditions would serve as baseline data from which the stream enhancement recommendations could be developed as future management actions.

Tasks.

Task 1. Conduct a fisheries survey including fish sampling, documentation of aquatic habitat conditions (e.g., percent shade, substrate, pools and riffles), and identification of erosion problem areas. The survey should be conducted in spring, when flows are suitable to document habitat conditions. The fisheries survey should be conducted by a qualified fisheries biologist.

Task 2. Conduct a survey for amphibian species of concern in Stevens Creek. All observations of species of concern and aquatic breeding sites should be recorded on topographic site maps. Conditions at breeding sites, such as aquatic habitat type, amount of streamside and emergent vegetation, percent shade cover and substrate should be recorded at each location. The amphibian survey could be performed by persons trained in amphibian identification such as Park staff, interns and students, and permitted by California Department of Fish and Game.

Task 3. Qualified fisheries and wildlife biologists should analyze the results of the surveys and prepare recommendations for stream protection and enhancement that will optimize fisheries and wildlife habitat values, as well as recommendations for selective debris removal.

Precautions. None.

Monitoring. Fisheries and sensitive amphibian breeding sites in Stevens Creek should be monitored yearly to determine continued presence and habitat conditions. The monitoring data collected will be used to refine or develop additional recommendations for habitat protection and enhancement for amphibians of concern and native trout. Fisheries monitoring should be performed by a qualified fisheries biologist; while monitoring sensitive amphibians could be performed by trained Park staff, interns and students.

Prepare and Implement a Park-wide Wildlife Monitoring Program.

Problem Statement. The wildlife assessment conducted for the Resource Management Plan was qualitative in nature, based on limited reconnaissance-level surveys and literature review. Additional detailed information would be helpful to develop detailed recommendations to maintain optimal wildlife population levels in the Park over the long-term. Quantitative baseline data on the numbers of species and their populations within the Park would be helpful in deriving indices of wildlife diversity, from which changes in species diversity in the Park can be monitored through time. Quantitative data on the occurrence and distribution of significant resources, such as snags and down wood, also be useful. Baseline information is important for the development of long-term wildlife management decisions regarding vegetation manipulation to optimize wildlife habitat and possible future siting of roads, trails and recreational activities. Additionally, baseline data is important in evaluating whether Park management activities are achieving the goal of restoring and enhancing biodiversity in the Park.

Tasks.

Task 1. A wildlife biologist should select management priority species that will be the focus of baseline wildlife surveys. These should include: (1) species of rare occurrence, (2) keystone species (species which play a critical role in the occurrence of other species), (3) species that serve as indicators of environmental change, and (4) species that are feasibly surveyed. This list should be based on the wildlife species list developed for the Resource

Management Plan. The list should be refined as the knowledge base of the wildlife community of the Park grows.

Task 2. Conduct Park-wide surveys for management priority species in all of the habitats in the Park. Surveys should be conducted in each habitat type as part of a long-term program to document species occurrence, distribution and abundance. These surveys should be conducted by qualified wildlife biologists or persons trained in wildlife surveys, which could include Park staff, interns and students.

Task 3. Analyze three years baseline inventory data and develop indices of wildlife diversity for the Park. This task should be performed by a qualified wildlife biologist.

Task 4. Conduct a snag inventory in all forested habitats of the Park. Identify the species and tag, map and measure the dbh, height, stage of decay and percent of bark cover of all snags 6 inches dbh. This task could be performed by trained Park staff, interns and students.

Precautions. Non-targeted species populations are not to be considered unimportant and should not be overlooked when developing recommendations. Initially, some species that should be considered management priority species may not be considered as such. Thus, the initial list should be refined as the database grows.

Monitoring. This project is essentially a monitoring program.

Conduct Site-specific Wildlife Corridor Assessments for Possible Future Park Projects (e.g., Possible New Trail Locations).

Problem Statement. Two major wildlife corridors identified in the Park include the Charcoal Road Trail and Stevens Creek. At this time, there doesn't appear to be any significant threat to wildlife movement through these corridors based on current use of the Park and proposed fire management activities. If future Park plans involve creation of facilities that could hinder the movement of wildlife sensitive to the presence of people, such as mountain lion and ring-tailed cat, wildlife corridor studies should be done.

Tasks.

Task 1. Conduct wildlife corridor assessments for future projects that may hinder wildlife movement through the Park. This survey should be

conducted by a qualified wildlife biologist or persons trained in wildlife tracking, which could include Park staff, interns and students.

Task 2. Through the use of infra-red camera systems and tracking mediums, document the species and frequencies of occurrence along potentially affected movement corridors, and map observations.

Task 3. Based on results of the assessment, develop recommendations for siting of possible future projects to protect corridors which receive high levels of wildlife use or use by people-sensitive species.

Precautions. None.

Monitoring. Specific monitoring criteria for wildlife corridors could be developed based on the results of the wildlife corridor assessment. Monitoring could include data collection on potentially impacted corridors over a three-year period to determine the effects of projects on wildlife movement. The monitoring results would help to guide the preparation of protection and enhancement measures for wildlife corridors.