Edgewood Park & Natural Preserve Master Plan

Adopted May 1997

Environmental Services Agency
Parks and Recreation Division
San Mateo County ♦ California

EDGEWOOD PARK AND NATURAL PRESERVE MASTER PLAN

I. BACKGROUND

A. Purpose of the Edgewood Park and Natural Preserve Master Plan

The 1982 adopted Edgewood Park Master Plan called for the development of a golf course. Since then, there have been several physical, legislative, and institutional changes affecting Edgewood Park and Natural Preserve (hereinafter called "Edgewood" or "the site") which signaled the need for this update. Key among the changes was the designation of Edgewood as a "Natural Preserve."

The purpose of this Edgewood Master Plan is to guide the future use, preservation, and management of Edgewood. The Master Plan provides a management framework for preserving significant environmental resources while providing for appropriate recreational and aesthetic opportunities. Upon assessing Edgewood's specific natural character, resources, and historical setting (see Appendices A and B), the Plan culminates in a set of policies to protect and preserve Edgewood's special resources in order that they may be appreciated by present and future generations.

B. Master Plan Planning Process

The preparation of the Edgewood Master Plan began in June 1996. In August and September, two public workshops were conducted to afford the public the opportunity to express concerns, ask questions, generate new ideas, and provide additional information for inclusion into the Master Plan. In December 1996, March 1997, and April 1997, the Parks and Recreation Commission convened public hearings to consider the draft Plan. Extensive testimony was received from interested individuals and groups. Among the issues debated in this process (see Appendix C, Issues Analysis) was determining how much low-intensity recreational activity would be compatible with protecting the site's biotic resources.

This final Master Plan represents a concerted effort to mesh together divergent viewpoints within the limitations of earlier planning decisions. It draws on work by others conducted over the past 20 years, as well as correspondence, publications and discussions with interested parties, the scientific community, government agencies, and valuable testimony resulting from the public hearing process.

C. Summary Content of this Master Plan

The Master Plan is divided into the following major sections:

The Background section generally overviews Edgewood's setting by describing the site's relative location, and existing land uses and development. In addition, the section provides a chronology of site ownership and land uses, laws, and institutional agreements affecting Edgewood.

The Goals and Objectives section expresses the desired direction for Edgewood's future based on stated community values, and legal and institutional parameters, as well as public input and research. This section provides the foundation upon which this Master Plan is prepared.

The Policies section presents the guidelines that the County will follow to implement the Master Plan. The policies represent the Preferred Alternative (Appendix D) and are divided into the following categories: goals and objectives; definitions and designations; permitted uses; natural resource protection; operations and maintenance; access, parking, and associated amenities; interpretive activities; coordination activities; and plan monitoring and amendment.

The Site Resources section (Appendix A) overviews both natural resources and man-made resources. Natural resources consist of both physical resources (topography, geology, soils, climate, etc.), and biological resources (vegetation and animal communities, unique species, scenic and aesthetic resources). Additionally, the laws that protect Edgewood's rare, threatened, and endangered species are described. The man-made resources discussion primarily overviews Edgewood's existing land uses (circulation, access, parking, facilities improvements, operating and maintenance practices, etc.). In particular, relevant land use agreements are described.

The Historical Setting section (Appendix B) reviews Edgewood's history as it relates to geology, vegetation, ownership and land uses, and trails.

The Issues Analysis section (Appendix C) identifies and analyzes the important resource and planning issues arising during the planning process. Opportunities and constraints affecting resource protection and recreational development are evaluated. Significant planning issues include: appropriate uses; natural resources protection; site development/improvements; trails maintenance and improvement; and circulation, access, and parking.

The Preferred Alternative section (Appendix D) briefly describes the planning

process that culminated in the Parks and Recreation Commission and Board of Supervisors approving a balanced management plan in which the primary objective is to protect, preserve and restore Edgewood's natural resources, while allowing existing low-intensity recreation activities to continue. Incompatible land uses, disturbance of sensitive habitats, and unauthorized activities are prohibited.

D. Location and Description

Close to urban centers, Edgewood Park and Natural Preserve is located within the borders of both the unincorporated San Mateo County lands and the City of Redwood City (see Figures 1a, 1b and 1c). The site's 467 acres is situated southeast of the intersection of Interstate Highway 280 (Junipero Serra Freeway) and Edgewood Road. It is bordered to the east and south by the residential subdivisions of Emerald Lake Heights and Emerald Lakes, respectively; to the north by the Pulgas Ridge Open Space of the Mid-Peninsula Regional Open Space District; and to the west by the County of San Francisco's Crystal Springs Watershed lands. Pacific Gas and Electric Company ("PG&E") operates a substation adjoining the southwestern corner of the property and has both gas and electric transmission lines across the site (as discussed under 'Utility Easements').

Edgewood's varied topology and complex geologic composition, formation placement and soil distributions support grassland, chaparral, oak woodland, and wetland. The particularly diverse flora and fauna include sensitive habitats with many endemic species, some under Federal and State protection. Chief among the sensitive habitats is the serpentine grassland and chaparral; the grassland, in particular, draws many visitors in spring, when its native wildflowers are blooming. Recreational development consists of the Old Stage Day Camp (hereinafter also referred to as "Old Stage"), a trails system which traverses the site from its four corners, ranger residences, two benches, and a parking lot. With the exception of the ranger residences, the facilities provide opportunities for youth camping, hiking, jogging, horseback riding, picnicking, nature observation and docent-led tours.

E. Historical Review

Ownership of Edgewood has changed several times; thus, many physical changes have occurred. (See Appendix B for historical information on geology, vegetation, trails, ownership and land uses, and site degradation from overgrazing and motorcycle use.) Historical records are sketchy at best. In the 1890's, the eastern slope of Edgewood was owned by John Isaac, a member of the State Board of Horticulture. About 1907, Henry C. Finkler purchased the property, as well as

FIGURE 1a -- **LOCATION WITHIN COUNTY PARKS SYSTEM**

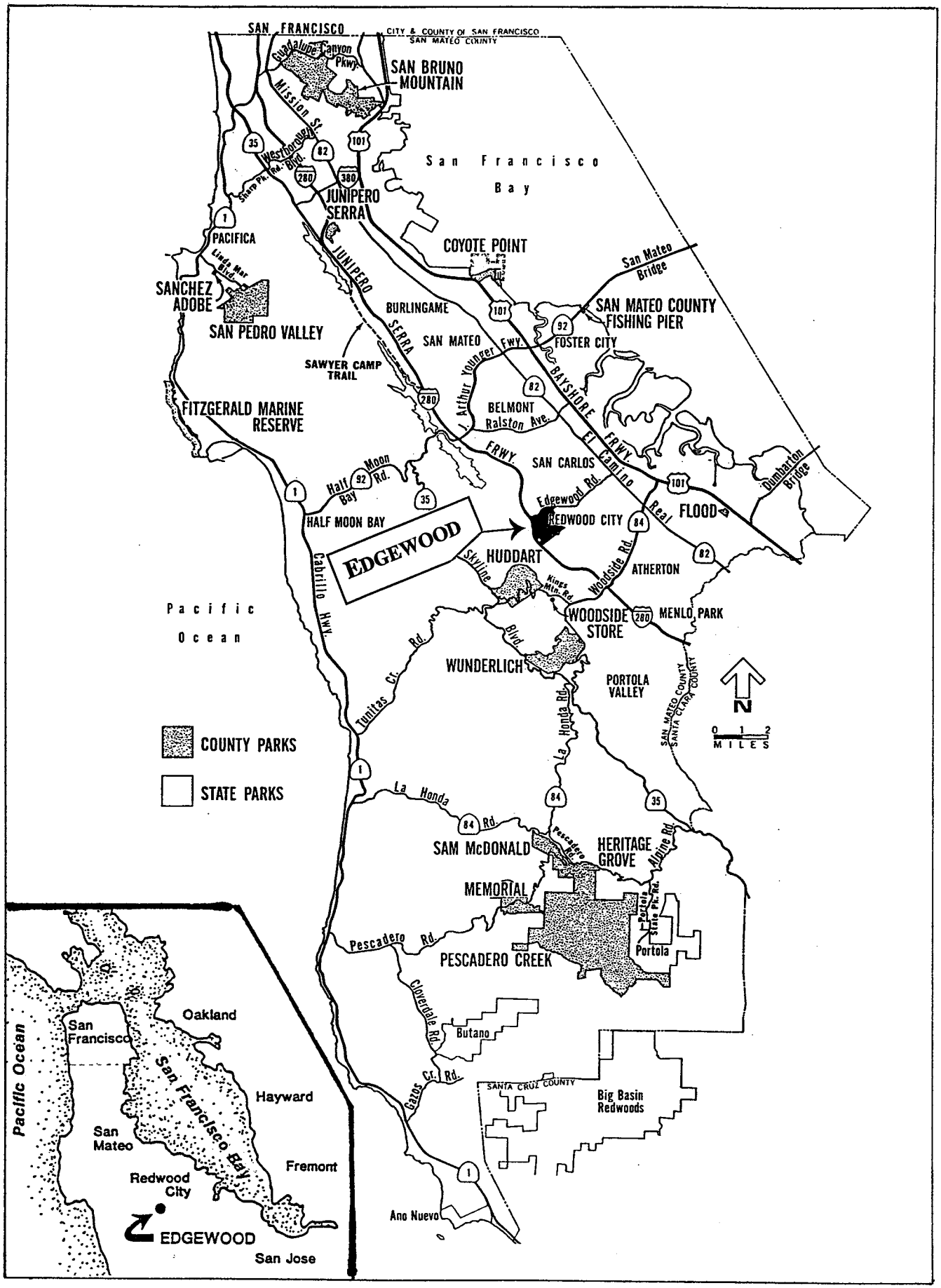


FIGURE 1b -- **EDGEWOOD LOCATION**

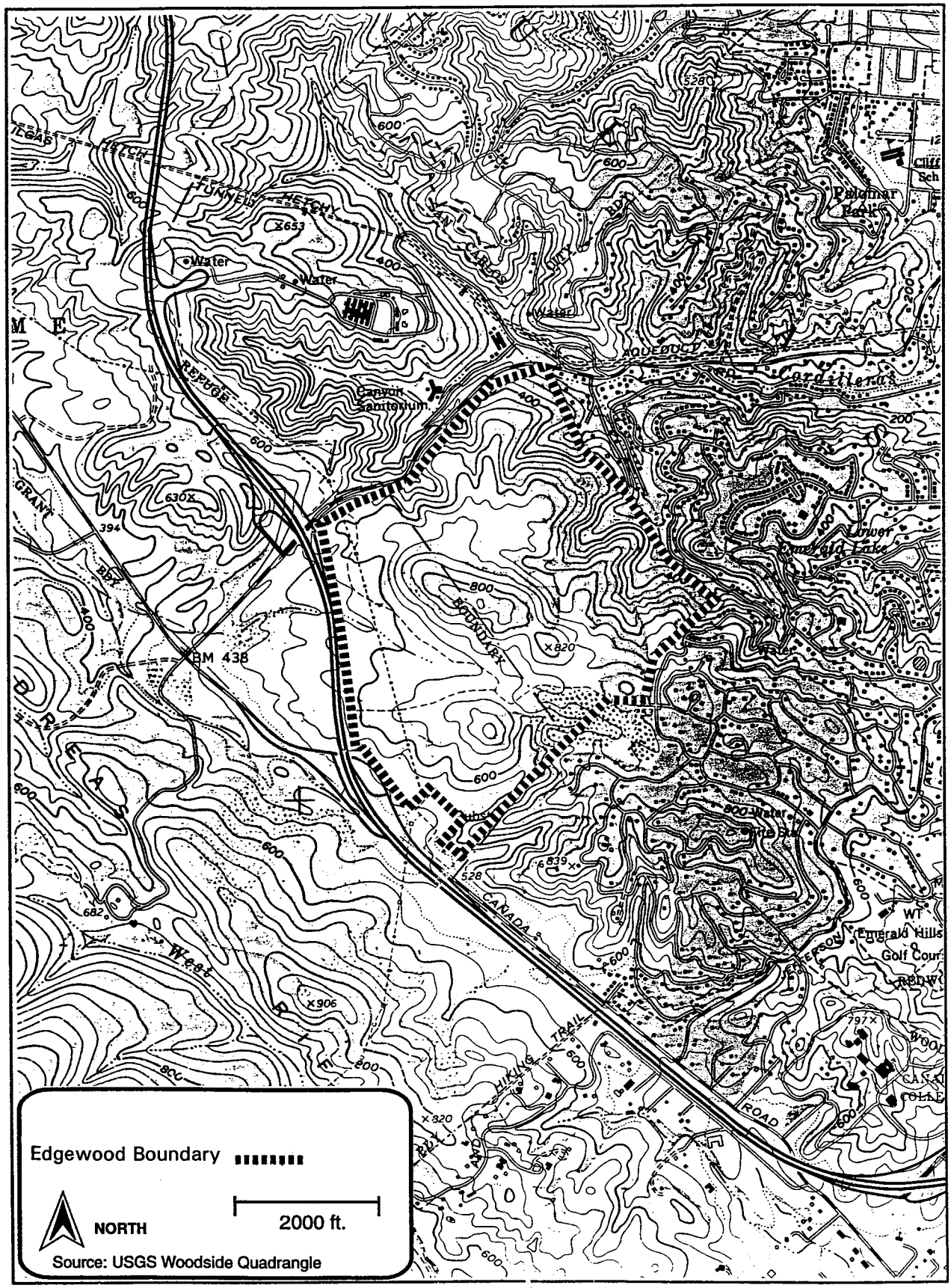
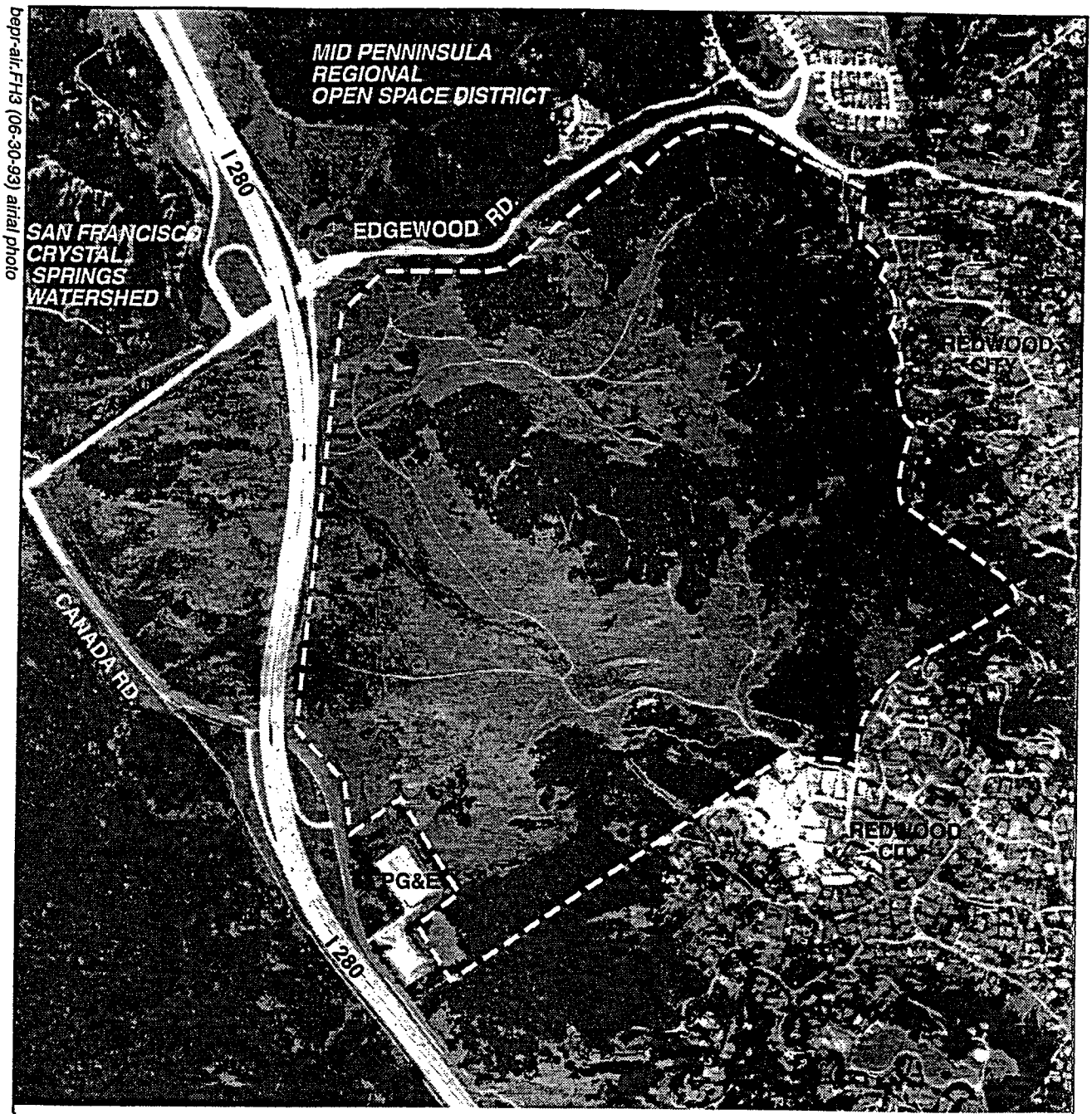


FIGURE 1c -- **AERIAL VIEW**



additional nearby lands. In 1967, the site was sold for development of a new California State College campus.

In 1972, plans for the new campus were postponed and discussions began on the possibility of building a golf course on the site. In 1979, the San Mateo County Board of Supervisors passed a resolution to raise funds to acquire the site from the State for use as a park. On October 10, 1980, the County acquired Edgewood from the State of California. The Federal Secretary of the Interior's contingency fund provided initial funding with a $965,200 grant toward the total price of $2,029,000. The Midpeninsula Regional Open Space District ("MROSD") and San Mateo County agreed to share the remaining costs in a joint acquisition. Final acquisition was 467 of the original 477 acres, with 10 acres awarded to the San Mateo Public Works Department for a future right-of-way to widen Edgewood Road.

In January 1981, the San Mateo County Parks and Recreation Commission held the first of a series of public hearings regarding future use and development of Edgewood. Controversy over the use often focussed on the rare plants and animals inhabiting the roughly 147 acres of serpentine grassland on the site. Of the 29 speakers attending the public hearing, 8 voiced the desirability of a golf course at the site while the others recommended open space recreational uses such as hiking and equestrian trails, camping and picnicking. Ideas for a dog training facility and hang-gliding facility were also brought forth.

Based on a 1977 Attitude Survey for County Recreation Needs, a 1978 Recreational Needs Assessment Process and various public meetings, it was indicated that there was "... substantial interest for a golf course ..., preservation of open space, horseback riding trails, hiking trails."

Two alternative site proposals were discussed. Plan A included hiking, jogging, birdwatching, horseback riding, nature study, picnicking, a day camp, parking, and an interpretive center. Plan B included similar activities, and an 18-hole golf course. These alternatives were revised to address public and legal concerns such as the impacts on the threatened Bay checkerspot butterfly, and rare plants associated with the serpentine grassland on the site.

Although there was strong support behind each revised alternative, in August 1981, the County Parks and Recreation Commission voted to recommend Plan B as the preferred alternative for the forthcoming Edgewood Park Master Plan. In October 1981, the San Mateo County Board of Supervisors concurred and approved Plan B as the basis of the Master Plan. In June 1982, the Master Plan and a series of documents addressing environmental impacts were prepared. The

Final Environmental Impact Report (FEIR), certified in December 1982, included a series of biological studies assessing golf course impacts on the Bay checkerspot butterfly, which at the time was a candidate for Federal listing as an endangered species, and several rare plants growing in the serpentine grassland. The FEIR "determined that the subject [golf course] project, in its approved form, will have significant effect on the environment." Based on the findings, the golf course portion of the Master Plan was revised several times in order to reduce environmental impacts.

Subsequently, the Stage II Final Supplement to the Environmental Impact Report for Edgewood County Park Master Plan was prepared to provide an update to the 1982 FEIR. The Stage II document was triggered by San Mateo County's request for a conditional lease of over 19 acres of adjacent property owned by the City and County of San Francisco's Public Utilities Commission for future development purposes. The Stage II environmental document was presented in a form of a supplement to the Stage I (1982) FEIR. The document presented new information, analyzed new environmental impacts, and offered additional mitigation measures. This document was certified in August 1984.

Since 1984, four plant species of concern have been found to occur at Edgewood, thus totaling ten rare plants documented at the site. At the time that the EIR was certified, San Mateo thornmint was the only plant protected under the State and Federal Endangered Species Acts. Since then, the site has also been found to contain two species of invertebrates which have been Federally-listed as Species of Concern: the blind harvestman, and the Edgewood microblind harvestman. More importantly, in 1987, the Bay checkerspot butterfly was listed as a Threatened species under the Federal Endangered Species Act which, as discussed below, was a key factor in preventing the development of a golf course.

On May 5, 1992, the Board of Supervisors designated Edgewood as a "Natural Preserve" (Resolution No.56062). On August 25, 1992, the Board commissioned a study on the feasibility of a golf course on approximately one-third of Edgewood. Future redesignation of this area would be considered based on the feasibility study.

In 1993, the County retained Thomas Reid Associates to study the environmental constraints to siting a golf course, as proposed by the 1982 Edgewood Park Master Plan. Reid's 1993 Edgewood County Park Golf Course Site Constraints Analysis document concluded that the proposed golf course was not feasible since the Bay checkerspot is legally protected under the Federal Endangered Species Act. Reid stated that "the County cannot do anything to the site which might result in the "take" of the listed butterfly, without a permit issued under Section 10(a) of the

Act. Development of a golf course resulting in disturbance to serpentine grassland would constitute such a "take."

Subsequent to Reid's findings, in July 1993, the Board of Supervisors closed the issue of developing a golf course at Edgewood by:

(1) Reaffirming that the entire 467 acres of Edgewood was designated as a "Natural Preserve," as defined in Resolution 56062.

(2) Amending the 1980 Joint Powers Agreement ("JPA") with MROSD to prohibit a golf course or other high-intensity recreational uses at Edgewood Park (Resolution No.57385, dated July 27, 1993).

(3) Modifying the existing Open Space Easement (called a "Modified Grant of Park, Recreation, Scenic and Open Space Easement" and referred to as "MROSD Easement") with the MROSD, pursuant to the JPA, to (1) eliminate high-intensity recreational uses as permissible uses in Edgewood, and (2) provide for a mechanism for future discussions with the Golden Gate National Recreation Area ("GGNRA") concerning future management of Edgewood (Resolution No.57386, dated July, 27, 1993).

Copies of these documents are included in Appendix A (Attachments No.1-3).

These changes, in effect, gave MROSD veto power over any future attempts to develop active recreational uses at Edgewood. In addition, the County committed itself to discuss with GGNRA, that agency's appropriate role in Edgewood's future.

Additionally, Friends of Edgewood Natural Preserve submitted a document called Edgewood County Park and Natural Preserve Master Plan, Final Draft January 1996 which emphasized the protection, preservation and restoration of Edgewood's special habitats and species. At the same time, it sought to promote enjoyment through low-intensity recreational use. The key to attaining these goals was controlled access, restriction of structures and improvements, public education on Edgewood's resources, and monitoring to ensure achievement of the goals.

The foregoing changes occurring since the 1982 Master Plan was written have resulted in the compelling need to rewrite the Edgewood Master Plan.

On May 20, 1997, the Board of Supervisors approved this Master Plan and in so doing, formally acknowledged that Edgewood is to be recognized as a "park and natural preserve".

II. GOALS AND OBJECTIVES OF THE EDGEWOOD MASTER PLAN

The goals and objectives guiding preparation of this Master Plan are derived from applicable legislation and institutional agreements, as well as public input, and research. The goals and objectives of the Edgewood Master Plan are to:

1. Protect, preserve, and restore Edgewood's natural resources. This is the primary objective.

2. Promote environmental awareness and educational opportunities to ensure responsible stewardship of Edgewood's rare, endangered, and fragile natural resources.

3. Ensure public enjoyment of Edgewood through low-intensity recreational uses that minimize the need for new construction.

4. Maintain and manage site improvements at Edgewood, thereby guaranteeing the continuance and maintenance of authorized trails.

5. Provide access to Edgewood that meets visitor and public service provider needs. Public service providers include emergency response, utility, and park maintenance personnel.

III. POLICIES

The County will:

A. GOALS AND OBJECTIVES

1. Protect Natural Resources

Protect, preserve, and restore Edgewood's natural resources. This is the primary objective.

2. Promote Environmental Awareness

Promote environmental awareness and educational opportunities to ensure responsible stewardship of Edgewood's rare, endangered, and fragile natural resources.

3. Ensure Public Enjoyment

Ensure public enjoyment of Edgewood through low-intensity recreational uses that minimize the need for new construction.

4. Maintain and Manage Site Improvements

Maintain and manage site improvements at Edgewood, thereby guaranteeing the continuance and maintenance of authorized trails.

5. Provide Adequate Access

Provide access to Edgewood that meets visitor and public service provider needs. Public service providers include emergency response, utility, and park maintenance personnel.

B. DEFINITIONS

6. Definition of Low-Intensity Recreation Uses

Define low-intensity recreation uses as passive recreation uses that will not create a direct or cumulative adverse environmental impact. Such uses include, but are not limited to, on-trail hiking, walking, jogging, horseback riding, nature observation, education, docent-led group tours, and picnicking and camping in the Old Stage Day Camp area.

7. Definition of High-Intensity Recreation Uses

Define high-intensity recreation uses as active recreation uses which may create a direct or cumulative adverse environmental impact. Such uses include, but are not limited to, golfing, bicycling, use of motorized vehicles, tennis, swimming, and special event community-sponsored runs or walks.

8. Definition of Sensitive Habitats

Define sensitive habitats as those areas which (1) include, or potentially could include, rare or unique species of animals or plants, or (2) have a unique or special biological value, and are easily subject to degradation or disturbance.

Sensitive habitats include, but are not limited to, habitats containing or having the potential to contain species legally protected and listed by U.S. Fish and Wildlife Service as endangered or threatened, and/or listed by California Department of Fish and Game as rare, threatened, endangered, or candidate for listing. At Edgewood, sensitive habitats consist of: areas of serpentine soils; riparian corridors; wetlands; bird nesting and feeding sites; and areas of special scientific study.

9. Definition of Authorized Trails

Define authorized trails as those trails designated and maintained by the County Parks and Recreation Division, for permitted low-intensity uses.

10. Definition of Viewpoint

Define viewpoint as a location along an authorized trail that affords distinctly scenic views of: (1) the site's natural landscape, or (2) the landscape of land beyond the site. Views may include hills and swales, wetlands, streams, serpentine grassland and associated wildflower field, San Francisco Bay, and San Francisco Watershed.

C. DESIGNATIONS

11. Designation of Sensitive Habitats

Designate those areas as sensitive habitats, as determined by Parks and Recreation Division, and shown on Figure 2.

12. **Designation of Authorized Trails**

Designate the following trails as authorized trails: Clarkia Trail, Edgewood Trail, Ridgeview Loop, Serpentine Loop Trail, Sylvan Trail, Inspiration Heights Trial, Franciscan Trail, and Trail 1B, as determined by Parks and Recreation Division, and shown on Figure 2.

13. **Designation of Viewpoints**

Designate the following locations as viewpoints: Points A, B, C and D, as determined by Parks and Recreation Division, and shown on Figure 3.

D. PERMITTED USES

14. **Permitted Uses**

Permit only the following uses and development at Edgewood when shown to pose no adverse impact on sensitive habitats and are compatible with the site's natural resources:

a. Low-intensity recreation uses as stated in Policy 6.

b. Low-intensity education, nature observation, research, and other interpretive activities.

c. Special event community-sponsored runs or walks, subject to permit approval by Parks and Recreation Division.

d. Restoration of damaged habitat, subject to permit approval by Parks and Recreation Division and consultation with appropriate Federal and State authorities.

e. Maintenance of existing authorized trails, buildings and structures.

f. Placement of signs, protective barriers, and other minimal service structures/facilities, as deemed appropriate or necessary by the Director of Parks and Recreation.

g. Construction of parking/staging areas, interpretive center, toilets, and benches, to the extent shown on Figure 3, and as authorized by these policies.

h. Other related uses or development, subject to approval by Parks and Recreation Commission, at a public hearing, finding that the proposed use, development, or facility conforms with goals and objectives of this Plan.

FIGURE 2 -- **SENSITIVE HABITATS AND AUTHORIZED TRAILS**

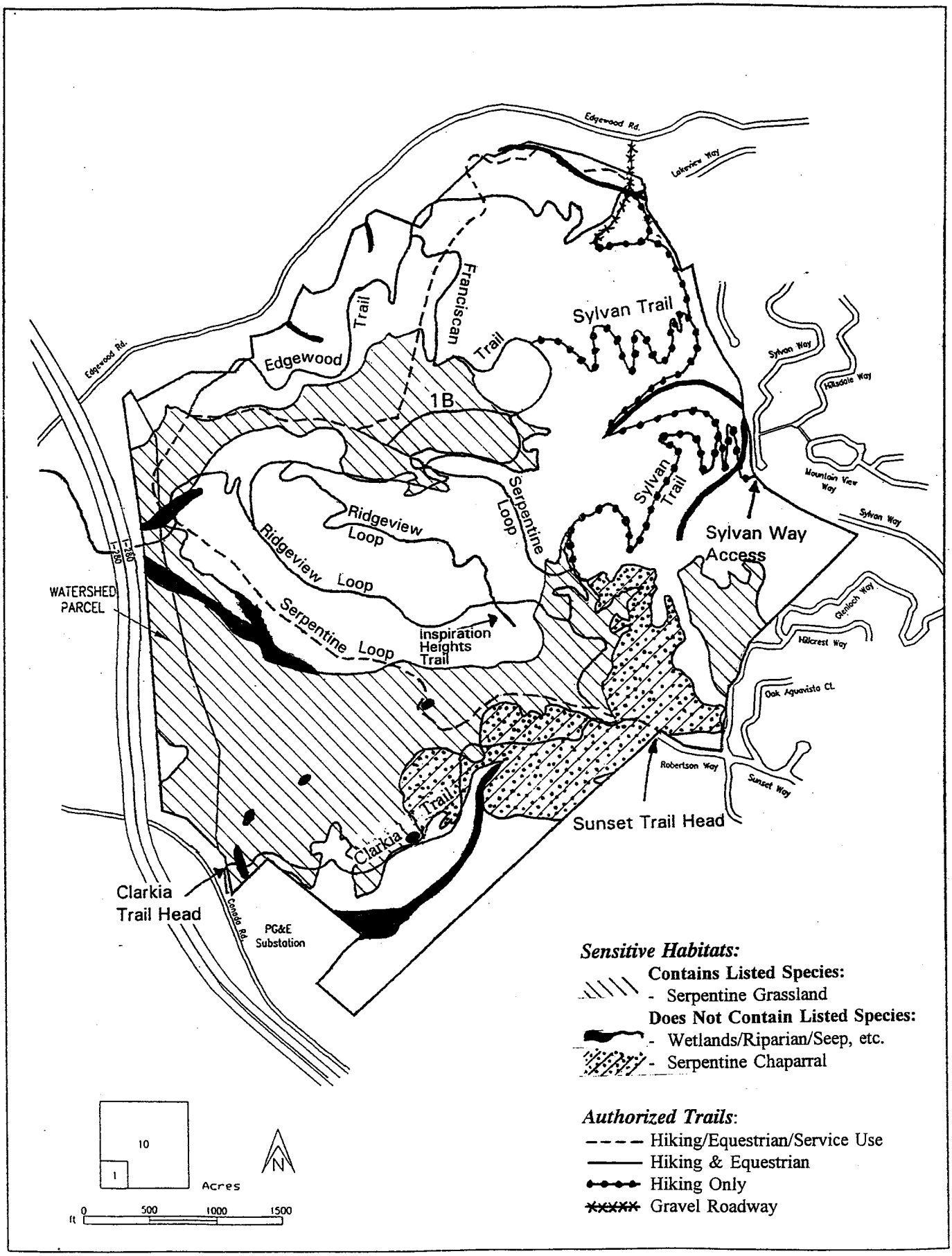
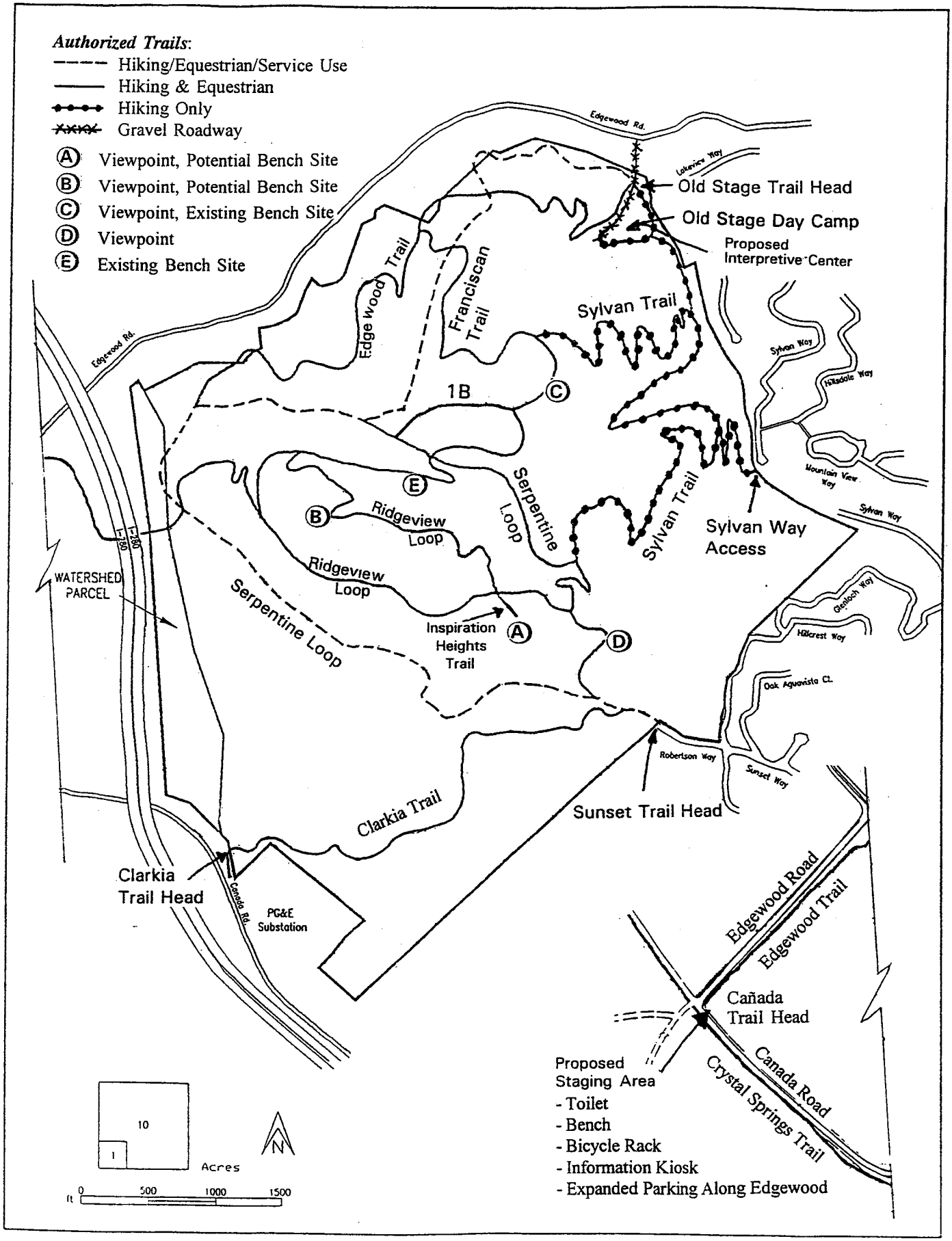


FIGURE 3 -- **VIEWPOINTS AND IMPROVEMENTS**



15. Restricted Bicycle Use

Continue to prohibit the use of bicycles in Edgewood, except to access a bicycle rack.

16. Expressly Prohibited Uses

Prohibit the following uses at Edgewood:

a. High-intensity recreation uses, except community-sponsored runs or walks, as permitted by Policy 14c
b. Livestock grazing
c. Dog-walking, except for guide dogs on leash
d. After-hours use.

E. NATURAL RESOURCE PROTECTION

17. Compile a Comprehensive Resource Inventory

Compile a comprehensive inventory of all natural resources at Edgewood, including soils, plants, and animal species. The inventory shall be prepared and updated on a regular basis with the coordinated efforts of the Trails, and Fish and Wildlife Advisory Committees, and other recognized stakeholder groups, for acceptance by the Parks and Recreation Commission.

18. Evaluate and Select A Preferred Resource Management Strategy

Evaluate all existing and potential natural resource management techniques for Edgewood, including methods to prevent unwanted visitor contact, protect and restore native species and their habitat, and control invasion of non-native species (e.g., hand-weeding, mechanical mowing, controlled burning, use of biodegradable herbicides, and protective barriers (to separate or buffer sensitive habitats from trail impacts)).

Select, implement and assess the effectiveness of the preferred strategy. The evaluation and strategy selection shall be conducted with the coordinated efforts of the Trails, and Fish and Wildlife Advisory Committees, and other recognized stakeholder groups, for consideration by the Parks and Recreation Commission.

19. Restrict Wildlife Release

Restrict wildlife release to species that are native to Edgewood, subject to permit approval.

20. Restrict Native Plant Collection

Restrict the collection of Edgewood native plants and seeds except for habitat recovery or re-introduction purposes. Collection shall be subject to permit approval by Parks and Recreation Division, and approval by State and Federal authorities if such collection involves species legally protected and listed by U.S. Fish and Wildlife Service as endangered, or threatened, and/or listed by California Department of Fish and Game as rare, threatened, endangered, or candidate for listing.

21. Enforce Federal, State, and Local Resource Protection Laws

To the extent authorized, enforce all applicable Federal, State, and local regulations governing resource protection and management at Edgewood.

22. Support Volunteer Resource Protection Programs

Support, encourage and recognize volunteer programs which reflect stakeholder diversity, help educate visitors, and protect and restore sensitive habitats at Edgewood.

23. Monitor and Verify Effectiveness of Resource Management Activities

Monitor and verify the effectiveness of activities directed at protecting, restoring, and preserving Edgewood's natural resources to ensure that the integrity of protected species and their habitat are not threatened.

F. OPERATIONS AND MAINTENANCE

24. Keep Authorized Trails Open Year-Round

Keep authorized trails open year-round for pedestrian and equestrian use, except when temporary trail closure is necessary for safety, maintenance, or resource management/protection reasons, as determined by the Parks and Recreation Director. Temporary trail closure shall not exceed 30 days. If trail closure exceeds 30 days, continued closure requires approval of the Board of Supervisors.

25. Repair and Maintain Authorized Trails

Repair and maintain authorized trail surfaces regularly and as necessary to: (1) control soil erosion, (2) conform with the original trail design, and (3) maintain year-round access. Where material found at trail site is inadequate, use only:

a. On-site native rock shown:

(1) not to exceed 5% asbestos content, and

(2) will not disrupt the site from which it is extracted; or

b. Where native rock cannot be used or where inadequate drainage conditions exist:

(1) Chemically inert rock that does not contain any biologic material, as follows:

(a) Quarried chert shall be used, unless deemed infeasible.

(b) If use of quarried chert is not feasible, quarried granite or basalt shall be used.

OR

(2) Raised walkways or "duck walks" constructed of redwood or pressure-treated fir.

26. Close and Restore Unauthorized Trails

Close and restore all unauthorized trails to their natural state. Unauthorized trails include all existing trails or routes that have not been designated as "authorized trails".

27. Rigorously Administer County Park Regulations

Continue to rigorously administer the provisions of the County Ordinance Code governing activities at County parks, particularly Chapter 3.2.40.

28. Maximize Resource Protection Operations

Maximize resource protection at Edgewood through operational efforts that include:

a) Aggressively enforcing Edgewood's visitor use regulations, particularly prohibition of (1) after-hours use, (2) use of unauthorized trails, and (3) bicycling and dogs.

b) Posting restrictive, directional, and interpretive signs at appropriate locations to reduce visitor incursion of sensitive habitats, including signs prohibiting use of unauthorized trails.

c) Erecting barriers around sensitive habitats where unlawful visitor access is likely.

29. **Reduce Maintenance and Construction Costs**

Unless specified otherwise, select maintenance and construction materials and processes that reduce costs while protecting environmental quality.

30. **Support Volunteer Maintenance Programs**

Support, encourage and recognize volunteer programs which reflect stakeholder diversity, and help maintain and operate Edgewood's trails and improvements.

31. **Monitor the Effectiveness of Operations and Maintenance Efforts**

On a regular basis, monitor and evaluate the effectiveness of operations and maintenance efforts performed by staff and volunteers. If shown to be ineffective, efforts will be changed in favor of others which may prove to be more effective in protecting and maintaining Edgewood.

G. ACCESS, PARKING, AND ASSOCIATED AMENITIES

32. **Promote Use of Off-site Parking Areas**

Promote the use of nearby off-site parking areas, particularly during peak periods when the on-site parking area is full.

33. **Provide Parking for Buses**

Continue using the County-owned gravel area adjacent to the Old Stage Day Camp parking lot to accommodate a mix of automobiles and buses.

34. **Keep Sylvan Way Access Open**

Strive to keep the Sylvan Way Access open.

35. **Provide Bicycle Racks**

Provide bicycle racks at or near each Edgewood entry point and suitable off-site parking areas.

36. **Provide Access and Amenities for Disabled Visitors**

Where feasible, provide access and amenities for disabled visitors that meet minimum Americans with Disabilities Act requirements. Improvements shall be focussed on the Old Stage Day Camp and parking lot, and amenities shall, at minimum, include accessible toilets, benches, and picnic tables.

37. Investigate Feasibility of New Staging Area

Investigate the feasibility of developing the Edgewood Road/Cañada Road off-shoulder parking area as a visitor staging area with development limited to a bicycle rack, bench, information kiosk, and low maintenance, ecological toilet. Consideration will also be given to meeting the minimum Americans with Disabilities Act requirements for disabled visitors.

38. Provide Trailside Benches

Provide a wooden bench at each of the following authorized trail locations when determined by the Parks and Recreation Commission, at a public hearing, that there is a compelling reason to place a bench at that location:

- Point A (potential new bench site at viewpoint on Inspiration Heights)
- Point B (potential new bench site at viewpoint along Ridgeview Loop Trail)
- Point C (existing bench at viewpoint along Sylvan Loop Trail)
- Point E (existing bench along Ridgeview Loop Trail).

If a new bench placement is implemented, it shall be subject to an initial 12-month review, at which time continuance will be determined by the Parks and Recreation Commission.

39. Designate Service Access Routes

Coordinate with Edgewood service providers, including fire, utility and emergency personnel, to formally designate service access routes and procedures. Designated access routes will, to the extent possible, make maximum use of existing authorized trails. Any designated route that involves unauthorized trail use or additional development shall require approval by the Parks and Recreation Commission at a public hearing.

H. INTERPRETIVE ACTIVITIES

40. Support Docent Programs

Support, encourage and recognize docent programs that help educate the public in understanding and appreciating Edgewood's natural resources and uniqueness.

41. Promote Interpretive Activities

Promote interpretive activities, including distribution of printed educational brochures, descriptive displays and signs, information kiosks, docent-led hikes, and birding activities.

42. Investigate Feasibility of Small-Scaled Interpretive Center

Investigate the feasibility of constructing a low-intensity, small-scaled interpretive center at the Old Stage Day Camp. Develop the interpretive center if shown to be feasible.

I. COORDINATION ACTIVITIES

43. Cooperate and Coordinate for Efficient Services

When implementing this Plan, cooperate and coordinate with surrounding park, open space, recreation, and service providers to provide efficient and effective services and to avoid duplication. Providers include, among others, Midpeninsula Regional Open Space District, Golden Gate National Recreation Area, San Francisco Water Department, PG&E, CDF Fire, Stanford University's Center for Conservation Biology, and the Filoli Center.

44. Support and Participate in Development of Regional Trail Links

Support, encourage and participate in the development of a system of trails that link Edgewood with surrounding park, open space, and recreation facilities, including Pulgas Ridge Open Space Preserve, Phleger Lands, Huddart County Park, and Wunderlich County Park. In developing regional trail links, special attention must be paid to the eventual impacts on Edgewood's natural environment.

J. PLAN MONITORING AND AMENDMENT

45. Evaluate Edgewood Master Plan

When necessary and feasible, review and evaluate the effectiveness of the Edgewood Park and Natural Preserve Master Plan in attaining the stated goals and objectives. Amend the Plan when the Parks and Recreation Commission determines it is necessary. The Plan amendment process shall require public hearings before the Parks and Recreation Commission and the Board of Supervisors.

APPENDIX A

SITE RESOURCES

Table of Contents

3. LIST OF FIGURES

4. LIST OF TABLES

5. ATTACHMENTS

SITE RESOURCES

1. NATURAL RESOURCES

A. Physical Resources

1. Topography

Much of Edgewood consists of rugged topography with pronounced hills, swales and steep ravines (see Figure A-1) ranging from 240 to 873 feet above mean sea level. The variable topography of the site is dominated by a northwest-southeast trending ridge with several prominent knolls or hills. To the south of this central ridge, the land consists of a dome-shaped hill, gentler slopes and some relatively flat ground. To the north of the central ridge is a flat-topped, steep-sided formation known as the North Hill.

2. Geology

Edgewood is situated on the northern half of a west-northwest trending ridge within the Coast Range Province of the San Francisco Peninsula. The Peninsula comprises of two major geological formations: the low, heavily eroded block of the Point Reyes-Montara Formation, which lies atop the granitic Sur Group, and the dirty sandstone San Francisco-Marin formation (referred to as the Franciscan formation). Much of the site is located within the northern portion of a large serpentinite intrusion which covers a surface area of approximately 6.5 square miles and is shaped like an irregular crescent. Information provided in this section is important for trail planning, use, and maintenance.

a. Composition and Importance of Franciscan Formation for Edgewood.

Although the Santa Cruz Mountain Range is comparatively young and consists of sedimentary and metamorphic rock, the Franciscan formation is the second oldest sedimentary series of rocks on the San Francisco peninsula. The Franciscan formation contains a potpourri of marine sandstone, dark gray sandstone (graywacke), and volcanics, with metamorphic rocks: serpentinite and serpentinized peridotite. Other typical materials associated with the Franciscan formation include black shale with pyrite, red radiolarian chert, greenstone (an altered volcanic), limited portions of grey limestone, blue schist, green chlorite, red garnet, and green jadeites.

FIGURE A-1 -- **TOPOGRAPHY**

Serpentinite and peridotite are considered to be ultramafic rocks because more than 70% of their composition consists of ferro-magnesium (iron-magnesium silicate). The resultant soils characteristically are highly variable, and highly alkaline as well. Serpentinite rock and its derived soils are significant features of western North American mountains because they exert an influence best described as "profound," affecting the patterns of vegetation, the species components of plant communities occurring on serpentinite, and the very physiognomy of the vascular flora.

California serpentinites are noted for their remarkable characteristic of supporting endemic species highly restricted in range. Many of Edgewood's rare and endangered species (which will be discussed in a later section) include some serpentinite endemic species with highly restricted range.

In general, the edaphic (soil-related) influence of serpentinite on plant growth and community development is complex. In addition to the inhibiting effects of the soil's alkalinity, the presence of magnesium inhibits plants from utilizing any calcium that may be present. This soil type gives rise to the "serpentine syndrome". The foliage can be tough, reduced in size, with differences in hair density and coloration; overall height of plants is reduced, root systems are increased. Size reduction can be caused by slower growth rates in habitats stressed by edaphic conditions.

At Edgewood, some of the serpentine soils differ from the foregoing general description:

- Levels of iron, nickel and chromium are higher and the calcium to magnesium ratio is low, due to low concentration of calcium and very high concentration of magnesium.

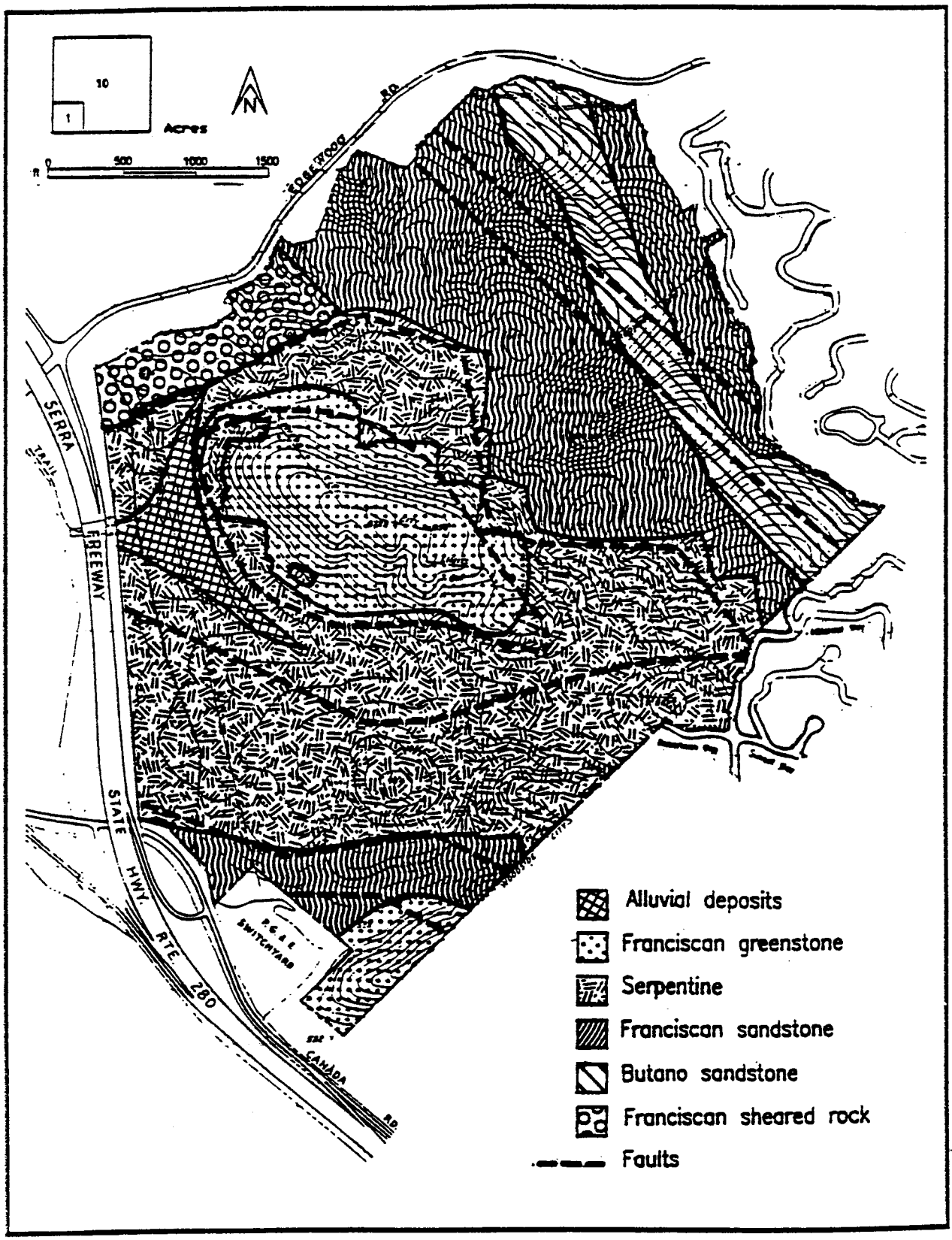
- Nickel and manganese are low in concentration, with a high concentration of chromium in claylike soils, where soil field capacity of water retention is high.

- In areas of depression or gouge, soils have a 50% greater water-holding capacity than other local serpentinites.

The serpentine clays at Edgewood form an A-horizon topsoil unique among serpentine soil types. The A-horizon is the surface horizon of a mineral soil having maximum biological activity or eluviation (removal of materials dissolved or suspended in water), or both.

b. ***Rock Composition.*** The following six rock types are mapped within Edgewood (see Figure A-2):

FIGURE A-2 -- **GEOLOGY AND SEISMICITY**



Reid, p. 25, amended by Sommers.

* Franciscan sandstone, mainly graywacke sandstone with imbedded shale and siltstone, is exposed both along Edgewood Road and the southwestern boundary. Along Edgewood Road 1:1 (horizontal to vertical) cuts in this sandstone appear stable. In general, cut slopes in this rock unit have a moderate, approaching high, stability except in areas of sheared shale.

  The grain of this dark grey-to-buff colored sandstone ranges from fine to coarse. In general, the fracture patterns have moderate to close spacing.

* Franciscan sheared rock is mainly graywacke, sheared and dark grey siltstone, and shale, sometimes highly sheared but also occurring in blocks. Some shallow landslides have occurred in the road cut slopes of this rock along Edgewood Road. Suggested stable cut slopes based on preliminary analysis are a maximum 2:1 (horizontal to vertical) and no greater than 30 feet high.

* Franciscan greenstone, a hard basaltic, igneous (i.e., volcanic) rock forms the resistant crest of the ridge in the center of the site, and is surrounded by the serpentinite unit. Cut slopes have a very high average stability greenstone. Fresh greenstone is grey and green colored and weathers red and brown. Landslides observed in this rock were confined to the soil layer.

* Franciscan serpentinite consists of somewhat rounded blocks up to 16.5 feet in diameter (5 meters) set in a soft, sheared, foliated matrix. The color ranges from greenish grey and blue-green to black when fresh, and dark grey when weathered or chemically altered. Serpentinites are characteristically highly fractured and somewhat slick, thus landslides can occur when hillsides underlain by this material are saturated. Cut slope stability for serpentinite is very low in soft material and higher in blocks.

* Butano sandstone is interbedded with mudstone, siltstone and shale. When fresh, it consists of varying shades of grey; when weathered, it changes to a buff color. Cut slopes have moderate to average stability in bedrock and good bearing capacity.

* Alluvial deposits are materials moved from other locations and deposited in drainages. A large deposit is found in two connected drainage areas on the western side of the site. Serpentinite and greenstone are the source materials for this deposition area. These areas of silts and clays would lose strength and bearing capacity when saturated (Reid, 1993:26).

3. Seismicity

The seismically active San Andreas fault zone lies less than 1,500 meters to the southwest of the site, demarcating the break between the Santa Cruz Mountains to the west and the hills and flats of the eastern San Francisco Peninsula. The San Francisco Peninsula segment of the San Andreas fault is approximately 3,000 to 4,000 feet southwest of the site.

The Hermit fault, also known as the Cañada fault, stems from the San Andreas fault zone, and parallels the main trace of the San Andreas fault in the site vicinity. The Hermit fault trends northwest along the southwestern boundary of Edgewood near the Cañada Road underpass of Highway 280. The extreme southern end of the site and the adjacent Watershed parcel are within the Alquist Priolo Special Studies Zone corridor that extends outward from the Hermit fault.

Though considered potentially active, displacement along this fault within the last 11,000 years has not been recorded and seismic information is insufficient to determine the recency of Hermit fault activity.

While all contacts between the serpentine rock unit and adjacent units appear to be faults, none are classified as "active" by the California Division of Mines and Geology. However, exposed contact points of the rock units show a slight over-steepening of the slope which could either indicate prehistoric movement or erosion of the contact area.

In 1986, the U.S. Geological Survey identified seven unnamed faults. They closely demark the diverse rock formations and associated soil types within the site. Of interest is the fault which lies at an oblique angle to the Cañada and San Andreas faults running northeast to the serpentinite. The drainage flowing into the Crystal Springs Reservoir along this fault forms one of the area's major riparian corridors and ephemeral lake, or so-called frog pond which is discussed later.

a. Ground Shaking and Surface Rupture. According to the 1990 Working Group on the California Earthquake Probabilities, there is a 23% chance of a magnitude 7.0 earthquake occurring during the next 30 years along this segment of the San Andreas fault. The north-facing slopes of the central ridge have a high potential for seismically induced landslides which could be exacerbated by grading into the slopes. The area of alluvial deposits at the western end of the central ridge could experience much stronger ground shaking than the remainder of the site.

Also, depressions in the grassland areas and portions of the alluvial area are

typically saturated during the rainy season. Fortunately, liquefaction potential in these areas is low owing to the minimal areas of sandy soils.

4. Soils

Site soils are formed primarily by weathering of underlying parent rock. Figure A-3 (Soil Types) shows that the locations of the rock formations closely correspond to the distribution patterns of the following three predominant soil types at Edgewood. Table A-1 details some of their traits.

Table A-1

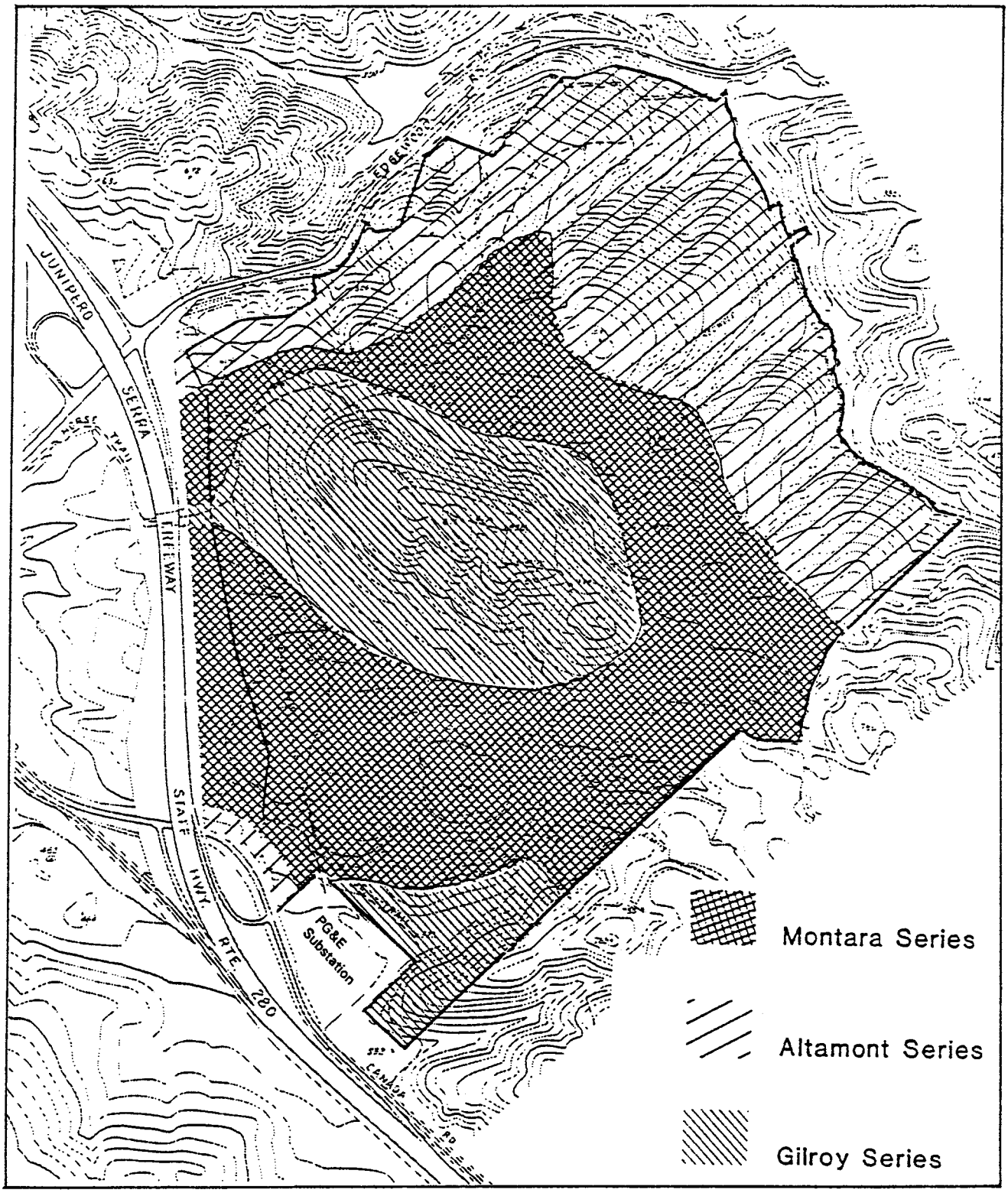
Selected Characteristics for Soil Series at Edgewood

SOIL CHARACTERISTICS	MONTARA	ALTAMONT	GILROY
Erosion hazard	Moderate to high	Moderate to high	Moderate to high
Surface texture	Gravelly	Clayey	Gravelly
Depth to bedrock	Shallow	Shallow to moderately deep	Moderate
Depth to seasonal water table	Slight	Slight	Slight
Subsoil permeability	Slow	Slow	Slow
Water holding capacity	Low	Slight	Slight

a. **Montara Series Soils.** These soils are derived primarily from weathering of the underlying serpentinite bedrock and almost entirely surrounds the Franciscan greenstone ridge. According to the 1986 General Plan, these serpentine-derived soils occur infrequently in San Mateo County, and undisturbed habitats as large as Edgewood's are quite rare. These soils are shallow and gravelly in texture, except in areas of depression or gouge, where clayey soils develop that are highly plastic and possibly expansive. Montara series soils are characteristically infertile, containing low amounts of soil enrichments such as calcium, phosphorus, potassium, and nitrogen, and high concentrations of heavy metals such as iron, nickel, chromium and magnesium, as well as a mineral, chrysotile asbestos. They are generally highly alkaline.

In California, serpentine soils can form a type of mineralized clay containing montmorillonite, a mineral not found in serpentinite rock material. This clay occurs as a result of the magnesium in soils leaching out in an aqueous carbon dioxide environment.

FIGURE A-3 -- **SOIL TYPES**



Thus, the permeability of Montara series soils is moderately slow, and the water-holding capacity is very low; thus, runoff is rapid to very rapid. Much of the Montara soils areas have a slope less than 20%, and the erosion hazard is moderate to high, depending on the steepness of the slopes and absence of vegetation.

b. ***Altamont Series Soils.*** These soils are formed from the underlying Franciscan and Butano sedimentary bedrock units and consist of well-drained clays and clay loams. They are located on the northern and eastern sections of the site, with steep slopes generally exceeding 20% grades. Soil Conservation Surveys of 1941, 1974, and 1977 characterize the Altamont series soils as having a moderate to high erosion hazard factor, high potential for shrink-swell fluctuation, slow permeability, and medium to rapid surface runoff. The heavy erosion gives rise to steep and narrow canyons and riparian corridors. The surface soils are dark brown to brown clay loam and are underlain by lighter colored subsoils that may include gravel and rock fragments. The depth of these surface soils varies from 3 to 60 inches above the underlying bedrock. On slopes exceeding 20%, root penetration is moderately shallow (Torrey, p.49). This soil series supports the mixed evergreen, foothill and valley woodlands and non-serpentine native grassland.

c. ***Gilroy Series Soils.*** These soils are formed from the underlying igneous Franciscan greenstone rock unit in the central and southwestern areas of the site, and mainly consist of slopes greater than 30%. The shallow to moderately deep surface soils are reddish-brown clay loam and the subsurface soil contains gravel or rock fragments. Permeability is moderately slow; roots penetrate to a depth of 20 to 40 inches; runoff is medium to rapid; and erosion hazard is moderate to high, especially in barren areas. Native California grasslands, chaparral, and woodland types vegetate the Gilroy series soils. Gilroy soils underlying the southwestern portion of the site contain wetland-type vegetation supported by a stream or creek.

5. Slope Stability and Erosion Hazard

Brabb and Pampayan mapped a possible landslide deposit, approximately 700 feet wide, on the northeast-facing slopes of the central ridge. Other mapped slope failures have occurred along perimeter road cuts. In general, most of the site is rated as having a low potential for landslides, with the north-facing slopes of the central ridge having a moderate landslide potential, and the north-facing serpentinite and sheared rock slopes of the central hill and the small southern hill having a high potential for seismically-induced landsliding.

Following the winter storms of 1982, very few debris flows were mapped on the site. These few debris flows occurred in the serpentinite units or on roadcut slopes

in the Franciscan sheared rock. Since 1982, County Parks and Recreation added a culvert to the west side of the Ridgeview Loop to collect and prevent further erosion. A Bay Area study of debris flow incidents found that most of the rock units occurring at the site have a low incidence of debris flows, while Franciscan sandstone has a moderate incidence. The very wet seasons of 1994 and 1995 have not yet been measured for debris flows.

As illustrated in Table A-1 (page A-7), all soils on the site have slow infiltration rates and slow subsoil permeability when wet. This can increase the potential runoff and erosion. Erosion hazard is generally moderate to high depending on the degree of slope and absence of vegetation.

6. Climate

The climate at Edgewood is typically described as "Mediterranean", i.e., hot, dry summers and cool, rainy winters. Summer temperatures can reach 100 degrees F, but are usually tempered by coastal advection fogs that are produced when moist air is cooled by contact with upwellings of cold ocean water and condenses to form fog banks. Offshore winds generated by the heatsink effect inland then pushes over the coast range. Since summer rainfall is minimal, fogdrips provide significant moisture to Edgewood plant communities, especially in the northeastern portions of the site. Fogdrips are formed when summer fog condenses onto the trees and drips down to other drops below, picking up momentum and dropping to the ground like a regular rainfall. The winters are generally cool, rainy, foggy, and, during "El Nino" years, extremely dark and very wet.

Although no weather records are available specifically for Edgewood, several nearby locations such as Skylonda Guard Station, Division Dam - CWS, and Crystal Springs Cottage, have monitored temperatures and precipitation. Summer high temperatures average 90 degrees F. and winter low temperatures average at near freezing. The Bay Area receives its highest precipitation between October and March, and at Edgewood, the average rainfall is about 30 inches (Torrey, 1982:30). Precipitation rates increase with altitude, and temperature extremes become increasingly distinct above fogbelts (Barbour & Major, 1977).

7. Air Flow, Current and Winds

The prevailing wind at Edgewood flows from the northwest through the Crystal Springs Gap, into the San Andreas Fault Rift Valley and eastward to the San Francisco Bay. These winds are strongest during the late spring and summer months (Torrey, 1982).

Temperature inversions often result during the summer as warmer air is displaced to higher elevations by the cooler sea breezes and fog at ground level. These breezes are quite strong on the grassland portions of Edgewood and along the ridgeline. Strong winds during the late spring and summer tend to dry exposed vegetative areas due to increased evapotranspiration (water loss). On exposed serpentinite outcrops, excessive winds tend to dry the soils quickly.

8. Air Quality

Due to lack of significant upwind pollution, the prevailing northwest winds bring relatively clean air to the site. As an indication of air purity, several species of lichens colonize at Edgewood. Lichens, especially those that grow on trees, are generally intolerant of atmospheric impurities (FoE, 1996:39). Some air pollution is generated by traffic along the I-280 freeway and may be held by the inversion layer during certain times of the year. Although the air east of the site is polluted by industrial and urban sources, the wind moving toward Edgewood tends to reduce the air pollution level.

9. Noise

The western portion of Edgewood receives a significant amount of noise from the I-280 freeway. Prevailing winds tend to pull the noise further into the site. Although the noise levels have not been monitored, it can be expected that the noise impact may be of concern in areas immediately adjacent to the freeway. The eastern portion of the site, however, is relatively quiet due to its topography, protective vegetation and distance from major roadways.

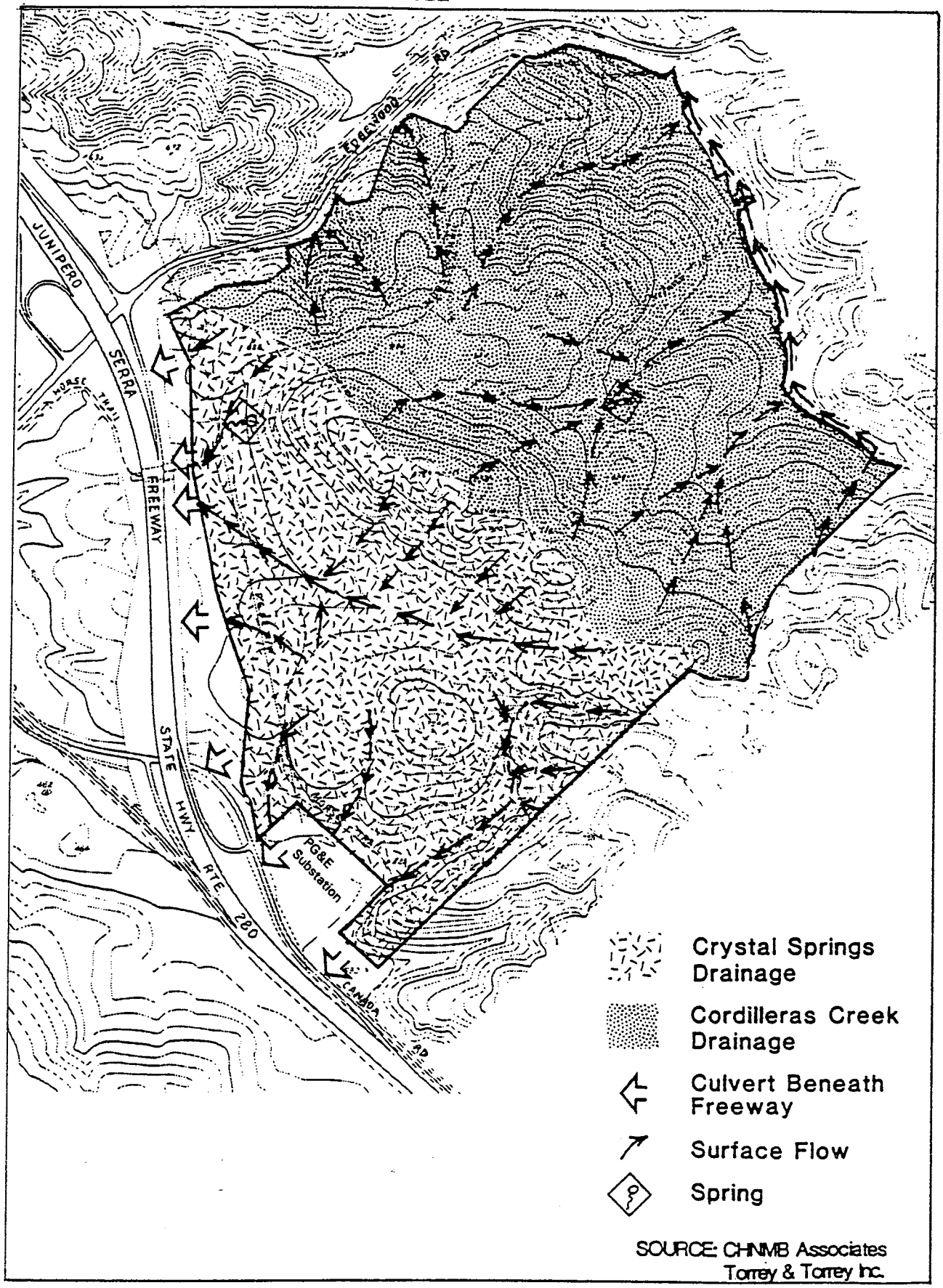
10. Hydrology

The site contains a freshwater marsh and several springs and seeps, all of which perennially support vegetation and wildlife.

Edgewood's 13 water courses drain either directly to the west into the Crystal Springs Reservoirs, or northeast into Cordilleras Creek which in turn drains into the estuaries of San Francisco Bay. Four of these creeks/streams are perennial while the balance is intermittent. In periods of drought, some surface drainage may become subterranean.

The largest creeks or streams flow west through the southern part of the site and through the earthquake fault that courses between the central ridge and the south hill. Directly along this corridor is a pond referred to as the 'frog pond' because it provides a significant breeding habitat for the Pacific tree frog (*Hyla regilla*). Two of

FIGURE A-4 -- **SURFACE DRAINAGE**



the 13 streams receive water flowing from perennial springs that drain through the Franciscan and Butano sandstone formations northeast of the central ridge to the Cordilleras Creek. Four minor riparian corridors flow northeast as well.

The ponds, seeps, springs, freshwater bog, and other riparian areas at Edgewood are fragile due to steep slopes, sedimentary soils, and the high-erosion potential of surface streams. Edgewood's hydrological network (Figure A-4, previous page) is complicated by the faults and fractured block formations in the serpentinite that create an intricate hydraulic capillary network.

B. Biological Resources[1]

Edgewood is best characterized as mostly undeveloped land which supports an abundance of flora and fauna, and because of this richness, the site has attracted many visitors and scientists just to study its diversity. It is this range of floristic and edaphic diversity and richness that provides a broad range of habitats for various resident, migratory, and visiting fauna. Further, the presence of serpentine soils at Edgewood provides an opportunity for unique and unusual plants to occur, one of which is San Mateo thornmint (*Acanthomintha duttonii*), a species found nowhere else in the world. Such unique plants are primarily confined to the serpentine grassland and are discussed later in this section. Plant and animal species protected by laws include: San Mateo thornmint, Marin western flax, white-rayed pentachaeta, and Bay checkerspot butterfly. Edgewood's vast array of natural amenities, including its diverse biotic habitats and visually interesting land forms, also provide an opportunity to experience views of a unique natural setting.

This section first discusses the chief Federal and State legal entities that affect special habitats and species at Edgewood. Following that is a detailed description of the prime natural resources of Edgewood.

---

[1]Scientific plant names are derived from The Jepson Manual - Higher Plants of California, ed. James C. Hickman. 1993, University of Calif. Press. The common names are derived from the same publication; however, lacking any common name, a common name is derived from Flora of the Santa Cruz Mountains of California, John H. Thomas, 1961, Stanford Univ. Press. It should be pointed out that plant common names vary for the same plant depending upon locality, local popularity, and usage; and unlike animal common names, there is no definitive authority governing such usage.

1. *Relevant Federal and State Laws Regarding Endangered Species and Sensitive Habitats*

Because of its unique qualities, Edgewood has been designated: (1) one of the top three of twelve Endemic Species Ensembles in California (CNPS, 1996), and (2) a Significant Natural Area by California Department of Fish and Game. The serpentine grassland habitat at Edgewood supports Federal and State listed plant and animal species. The following are laws which protect endangered species and sensitive habitats at Edgewood.

a. Federal Endangered Species Act ("ESA"). To harass, harm or kill, i.e. "take" a listed threatened or endangered species is prohibited under Section 9 and the implementing regulations of the Federal Endangered Species Act ("ESA") (16 USC 1531 et seq).

At Edgewood, U.S. Fish and Wildlife Service ("USFWS") expressed concern about possible effects of the Master Plan on Federally-listed endangered and threatened species, and the serpentine grassland (Attachment A-1, Nos.4 & 5). For example, regarding the threatened Bay checkerspot butterfly, removal of any serpentine grassland containing host plants of the butterfly, or activities which curtail butterfly movements through corridor areas, may be interpreted as a "take" (Reid, 1993:45).

In 1992, USFWS recommended "that destruction or damage to any areas containing serpentine habitat and potential movement corridors be avoided" (Attachment A-1, No.6). Without a permit or exemption (for incidental take) pursuant to Section 10(a)(1)(B) of the ESA, or authorization under Section 7 of the ESA, it is illegal for individuals, corporations, or governmental entities to take or authorize any activity resulting in the 'take' of even small amounts of a listed species. The Federal government can prosecute such entities for violation of the Endangered Species Act. Violations of the ESA could result in a $50,000 fine and imprisonment for one year.

The conservation planning process by which a local land use authority can legally allow projects potentially resulting in the take of such species, is set forth, as follows, in Section 10 of the ESA:

> The Secretary (of the Interior) may permit any act prohibited in Section 9 for scientific purposes. The Secretary may also permit any taking of fish and wildlife if such taking is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity.

According to the ESA, Section 10(a), or incidental take permit application, must be

supported by a habitat conservation plan ("HCP") that specifies:

1) impacts likely to result from the take;

2) measures to monitor, minimize, and mitigate such impacts;

3) funding to implement such measures;

4) alternative actions that would not result in taking;

5) reasons for not utilizing such alternatives;

6) responses to unforseen circumstances; and

7) any additional measures considered necessary or appropriate, such as an evaluation of the extent and potential, but currently unoccupied habitat, for listed and candidate species.

San Mateo County is familiar with the ESA Section 10(a) process because it received the first such permit issued. The 1982 permit was for the incidental take of the Endangered Mission blue butterfly on San Bruno Mountain. The permit allowed the County and Cities of Brisbane, Daly City and South San Francisco to approve permits which resulted in the construction of residential and commercial development on limited portions of the Mountain containing habitat of the endangered species. As mitigation for the take, private landowners had to dedicate land to the public and pay annual mitigation fees in perpetuity to cover costs of maintaining and monitoring the habitat.

ESA Section 7 is used instead of Section 10(a) if the site is within the jurisdiction of a federal agency and the agency requires a permit for project approval. In the case of Edgewood, U.S. Department of Defense, Army Corps of Engineers ("USACE") has jurisdiction over the wetlands and the National Park Service ("NPS") has jurisdiction over land adjacent to Edgewood, on the west side. Both agencies would require a Section 7 permit if the County were to develop this land. In either case, the Federal agency having jurisdiction must consult with USFWS and receive a biological opinion as to whether the proposed action would jeopardize the long-term existence of the protected species. USFWS must always evaluate "reasonable and prudent alternatives" to a project in order to eliminate a taking.

USFWS recommends that, as provided under Section 10(a)(1)(B) of the Act, a permit for incidental take be obtained for any project undertaken in areas containing Federally-listed endangered and threatened species (i.e., the serpentine grassland) (Attachment Nos.4 and 5). The Parks and Recreation Division would need to prepare a Habitat Conservation Plan (HCP) for Edgewood and apply for the incidental take permit, which has an application fee of $25.00. The HCP would be

similar to the Master Plan, but would focus on the selected alternative management plan and would provide a more detailed analysis of the Plan's likely impacts on special-status species. An HCP is prepared by the local agency (by contract, usually, with a competent consultant) in close working relationship with USFWS (Endangered Species Branch) as well as CDFG; ultimate approval and issuance of a Section 10(a) permit is by USFWS.

For resource management, and operation/maintenance activities occuring in the serpentine grassland at Edgewood, USFWS notes that it will be difficult to entirely eliminate the likelihood of small amounts of 'take' to the Bay checkerspot butterfly. "... a take would be difficult if not impossible to avoid completely, and would result from trampling, inadvertent uprooting or disturbance of host plants, and inadvertent harassment of butterflies." (Attachment A-1, No.4). In the case of incidental "takes", appropriate monitoring (every 5 years) and mitigation procedures would also have to be identified.

b. Federal Migratory Bird Protection Act (50 CFR 20, et seq)

Regulations on taking of migratory birds allow for only the taking of migratory game birds. Non-game migratory birds may not be taken, with very few exceptions. The complete list of migratory birds covered by the Migratory Bird Protection Act is found in 50 CFR 10.3.

c. California Department of Fish and Game ("CDFG") Statutes. Under the Native Plant Protection Act and the California Endangered Species Act, State-listed rare, threatened, endangered, or candidate for listing plant and animal species cannot be taken or possessed unless specifically authorized by CDFG. Authorization is obtained through a mitigation agreement.

Before applying for a Mitigation Agreement, an applicant must demonstrate to the Department that it is not feasible to avoid adverse impacts to the sensitive resources. The process would begin after project review under the California Environmental Quality Act ("CEQA"), and after the CEQA lead agency accepts another mitigation strategy. Mitigation activities must be designed to reduce adverse impacts to a level of insignificance.

In response to a previous feasibility study for a golf course at Edgewood, the Department stated that:

> "The Department views avoidance as the only appropriate mitigation for loss of species on serpentine habitat... Evaluation of the environmental constraints on the site would include consideration of not only the status of

the resources of the site, but law and Department policy in regard to appropriate mitigation of impacts to identified sensitive resources. Edgewood Park is considered by the Department as one of the most sensitive areas in the State, primarily due to the presence of the serpentine bunchgrass community and the unique suite of rare plants and animals that occur in conjunction with this community. In recognition of the unique qualities of the Edgewood Park area, the site is designated by the Department as a Significant Natural Area (SNA)." (Attachment A-1, No.7)

d. ***Protection of Migratory Birds.*** In addition to the two above-mentioned acts, the State of California, by agreement with USFWS, administers the limitations provided under the Federal Migratory Bird Treaty Act, discussed above.

California Fish and Game Code (Section 3513)

"§3513. Migratory nongame birds; protection.

It is unlawful to take or possess any migratory nongame bird as designated in the Migratory Bird Treaty Act or any part of such migratory nongame bird except as provided by rules and regulations adopted by the Secretary of the Interior under provisions of the Migratory Bird Treaty Act."

e. ***California Environmental Quality Act.*** The California Environmental Quality Act (CEQA) is not intended to be a "protective" mechanism, but it does provide special means by which local, State, and Federal agencies are notified when animals or plants of concern are affected by some kind of development. Thus, CEQA becomes a "full disclosure" document. Should any plant or animal, which is listed or even being considered for listing (usually including a plant listed in the Rare Plant Inventory of the California Native Plant Society[2]), be in some way identified as part of a development study, there is a requirement that the lead agency provide appropriate means for the protection (mitigation measures). Resource agencies, such as the Department of Fish and Game, usually provide input on mitigation for the protection of a plant or animal. In the case of Edgewood, the environmental document prepared for any future project would be distributed to all responsible agencies, including agencies of the Federal government. Thus, even though neither USFWS, Corps of Engineers, National Parks Service, nor the Environmental Protection Agency are specifically a part of the CEQA process, they do have the authority to review CEQA documents.

---

[2]The California Native Plant Society (CNPS) was instrumental in the late 1960's in preparing rare plant inventories. In 1973, the State Secretary for Resources provided a grant to the Society to complete such an inventory, and since its completion there have been four more editions. This list, "CNPS Inventory of Rare and Endangered Vascular Plants of California' has been recognized statewide as the authority regarding the rarity of native plants.

f. ***San Mateo County Ordinance Code.*** Sections 3.2.40.080 (a), (d) and (n) of San Mateo County's Ordinance Code deal with the appropriateness of taking any plants or animals in any of the County parklands, including "reserves" and "preserves". In accordance with Section 3.2.40.010, any violation of these sections is subject to a misdemeanor action.

g. ***Wetland Resources.*** Wetland resources are also protected under several Federal and State laws administered by various agencies. The Department of Fish and Game maintains a policy that no net loss of wetland shall occur. Any activities which may result in the alteration of a stream course would be subject to the requirements of the Department of Fish and Game under a Stream Alteration Agreement. Otherwise, the Department would exercise its jurisdiction over the project as a Responsible Agency during CEQA review to require mitigation measures that protect wetland resources. The following are some of the agencies protecting wetlands:

* U.S. Department of Defense, Corps of Engineers ("USACE"). Wetland resources are protected under the Federal Clean Water Act, as administered by USACE (Section 404). The agency maintains a policy of no net loss of wetlands. Filling or modifying a wetland may require a USACE permit under Section 404 of the Clean Water Act depending, in part, upon the extent of the wetland or wetlands in question.

  In certain circumstances, small wetlands may fall under the Nationwide Permit consideration of the Corps of Engineers rules; however, if USACE determines that the Edgewood wetlands are, in fact, "jurisdictional wetlands" (a predetermination made by the USACE, or by other appropriately USACE-certified "Wetlands Delineator"), a Section 7 (ESA) consultation with the US Fish and Wildlife Service would be required. At such time, the full range of listed and candidate species would be considered in the consultation. Streams are similarly protected by the USACE; however, in addition to Section 404 requirements, the USACE is also bound by the Rivers and Harbors Act of 1899, found to include "all waters of the United States".

* U.S. Department of Environmental Protection ("EPA"). EPA is an "overseer" of the Section 404 process as assigned to the USACE and could intercede as part of the process, if determined necessary.

* U.S. Department of the Interior, Fish & Wildlife Service ("USFWS"). Under Section 7 (Federal Endangered Species Act), any action by a federal agency which could affect a Federally-listed endangered or threatened species

requires that formal consultation take place. With certain rare exceptions, USFWS must issue a "No Jeopardy Opinion" for a project to proceed.

* California Department of Fish & Game ("CDFG"). The State Fish and Game Code is administered by CDFG. The State maintains a policy that no net loss of wetland shall occur. Any activities which may result in the alteration of a stream course would be subject to the requirements of the CDFG under a Stream Alteration Agreement. CDFG would also exercise its jurisdiction over a project as a Responsible Agency during CEQA review recommending mitigation measures that protect wetland resources.

* California Department of Water Resources ("DWR"). Under agreement with the USACE, California DWR must certify any mitigation program prior to the USACE issuance of a permit under Section 404, Clean Water Act.

2. Vegetation

Vegetation is dependent upon a great number of often unquantifiable environmental variables including climate, soils, slope, fire, water, etc. Although much has been studied about Edgewood, there has been very little put together which deals with the ecosystem as a whole. There has been some analysis regarding the serpentine grassland, and again, because of its uniqueness, the focus is on that specific vegetation type rather than the whole of the site.

The Edgewood vegetation has been studied by several botanists over the last decades; accordingly, checklists of about 460 plant species (representing 75 plant families) has been prepared and are found in Attachment A-2.

As indicated earlier, the vegetation in portions of Edgewood is influenced by the underlying serpentinite soils and rock formations as shown in Table A-2. The result is a higher diversity of plant communities than occurs in other nearby open space areas in San Mateo County. Susan Sommers, Diane Steek, Professor Bruce M. Pavlik (Mills College), and Niall F. McCarten have independently made studies on the nearly extinct San Mateo thornmint. In connection with the Bay checkerspot butterfly, staff at the Center for Conservation Biology at Stanford University has studied the support ecosystem for the butterfly within the serpentine grassland in and around Edgewood (as well as other areas where the butterfly is either extirpated or extant).

For the purpose of this document, the vegetation on Edgewood has been classified into four major vegetation types as illustrated in Figure A-5 (page 21). They

Table A-2

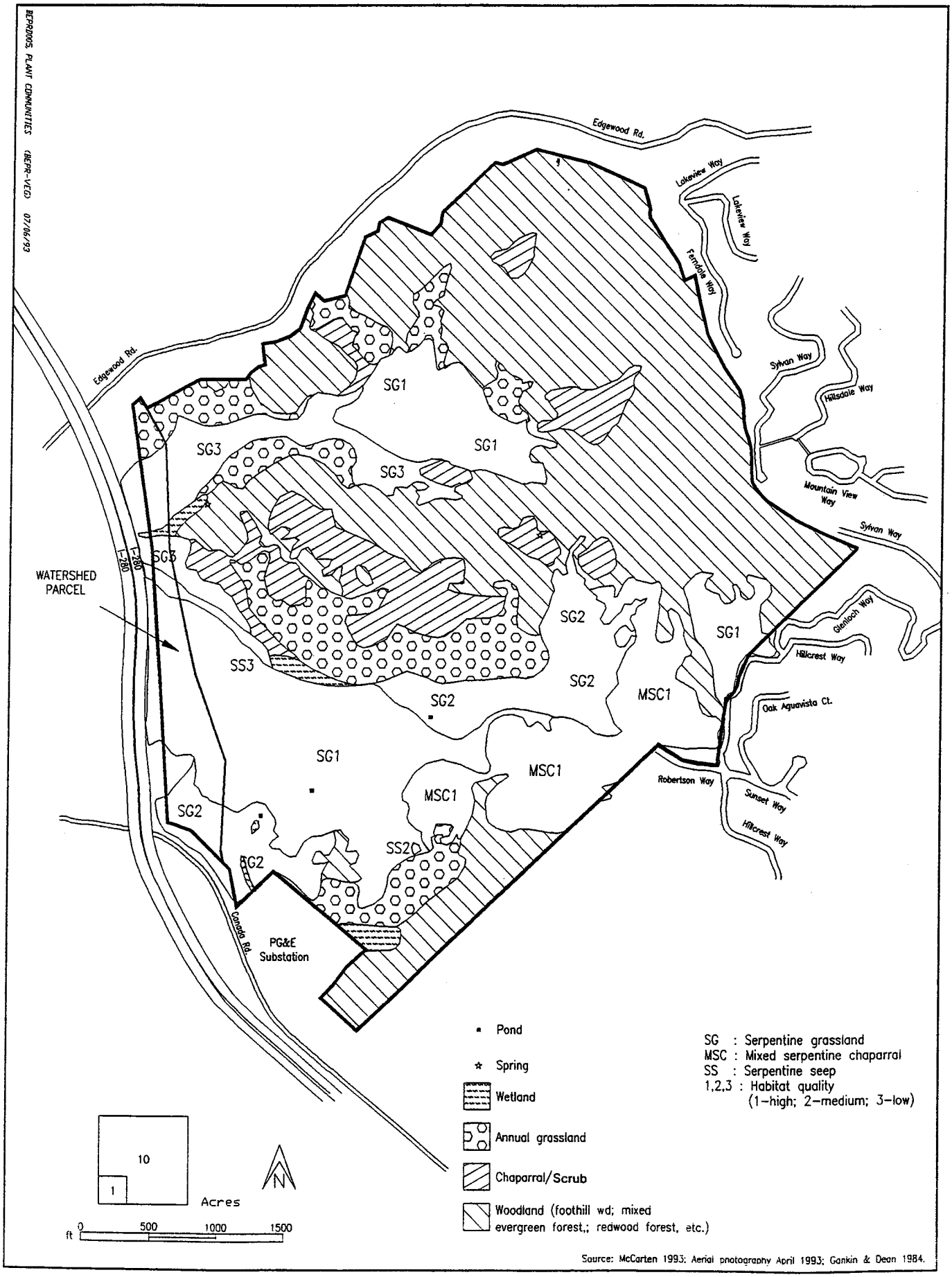
Rock Formations, Soil Series, Plant Communities

ROCK FORMATION	SOIL SERIES	PLANT COMMUNITY
Franciscan serpentine (serpentinite)	Montara	Serpentine bunchgrass grasslands, Mixed serpentine chaparral
Franciscan greenstone	Gilroy	Chamise chaparral, Mixed hardwood forest subgroup
Franciscan greenstone	Altamont	• Mixed hardwood forest subgroup • Foothill woodland subgroup • Non-native grassland dominant • Some native grass species present
Franciscan sheared rock	Altamont	• Mixed hardwood forest subgroup • Foothill woodland subgroup • Non-native grassland
Butano sandstone	Altamont	• Mixed hardwood forest subgroup • Foothill woodland subgroup • Non-native grassland dominant • Some native grass species present
Alluvial deposits from serpentine and greenstone debris flows	Altamont and Montara	Wetlands: freshwater marsh; willow thicket

include: grassland, shrub, woodland, and wetland. These types are further divided into distinct plant communities: non-native grassland, serpentine bunchgrass grassland, chaparral, mixed serpentine chaparral, chamise chaparral, mixed Northern California coastal scrub, oak foothill woodland, mixed hardwood subgroup of the mixed evergreen forest community, and wetlands. Because biologic communities are never static, no single community is absolutely pure and is, instead, a mosaic with patches of other communities intersticed, or can exhibit a combination of species representing several types of communities some of which may well have been infested by non-native plants. The following is a description of the various plant communities observed on Edgewood.

a. ***Grassland Vegetation.*** The grassland vegetation consists of native serpentine grassland and non-native grassland. The latter is the result of the invasion of the native grassland by non-native species. Some botanists now consider these non-native grasses to be established, inextricable components of the grassland community while others believe that with certain kinds of manipulation, it

FIGURE A-5 - **PLANT COMMUNITIES**



may be possible to return these to essentially native conditions.

* Serpentine Bunchgrass Grassland. This is an open grassland dominated by perennial bunchgrasses. Total cover is typically low. Edgewood has one of the largest of the few rare and undisturbed serpentine grasslands in the Bay Area. Edgewood's bunchgrass grassland is replete with diverse and abundant plant and animal species, including significant endemics. Table A-3 lists some rare and interesting plants found in this type at Edgewood.

  Non-native plant species are usually unable to survive in nutrient-poor serpentine soils. Nevertheless, highly invasive exotic species including annuals such as yellow star thistle (*Centaurea solstitialis*), and perennials such as perennial ryegrass (*Lolium perenne*) are adapted, although poorly, to these poor soil conditions.

  For the purpose of serving as a guideline for park maintenance, Edgewood's serpentine grassland communities have been further evaluated and categorized as having high, medium, and low floristic quality. The following are, however, qualitative and have little bearing upon the floristics or habitat value except as a guide for potential restorative activities:

  - *High*. The high quality plant areas contain, serpentine bunchgrass, serpentine endemic plants, a high proportion of native plants, and no invasive exotic species. These need protection.

  - *Medium*. The medium quality plant areas contain some serpentine bunchgrass, a fair proportion of native plants, and a higher percentage of non-native plant species. These could be identified as those areas which should receive immediate study for restoration.

  - *Low*. The low quality plant areas are found where the serpentine soils are mixed with other soils. There is a higher proportion of non-native plant species, serpentine endemics are not present, and serpentine bunchgrass is rare. Although not lost to the cause of restoration, these areas will require more in-depth analysis to determine the appropriate remedial measures. Of greater concern is that these areas are sources of infestation of non-native plants.

* Non-Native Grassland has almost completely replaced the native serpentine grassland in the valleys and foothills of California. Typically, non-native during the drought months of summer and fall; as the plants dry out, the soils desiccate along with them. Unlike perennial grasses, annual grasses do

Table A-3

Special, Showy, or Dominant Species of Edgewood's Serpentine Bunchgrass Grassland

COMMON NAME	SCIENTIFIC NAME	COMMENTS
ANNUALS		
San Mateo thornmint	*Acanthomintha duttonii*	Listed-endangered
Serpentine linanthus	*Linanthus ambiguus*	Uncommon; showy; CNPS-List 4
Marin western flax	*Hesperolinon congestum*	Listed-threatened
White-rayed pentachaeta	*Pentachaeta bellidiflora*	Listed-endangered
Woolly-headed lessingia	*Lessingia hololeuca*	Uncommon; not showy; CNPS-List 4
Owl's clover	*Castilleja densiflora*	Showy; obligate larval food plant for Bay checkerspot butterfly.
Purple owl's clover	*Castilleja exserta*	Formerly *Orthocarpus purpurascens*; showy
Tidy tips	*Layia platyglossa*	Common; showy wildflower
Goldfields	*Lasthenia californica*	Common; showy wildflower
California poppy	*Eschscholzia californica*	Common; showy wildflower. Can be a perennial plant; State flower
California plantain	*Plantago erecta*	Common; not showy; obligate larval food plant for Bay checkerspot butterfly
NATIVE PERENNIAL BUNCHGRASSES		
Purple needlegrass	*Nassella pulchra*	Proposed as the State grass
Foothill needlegrass	*Nassella lepida*	
Big squirreltail	*Elymus multisetus*	
California brome	*Bromus carinatus*	
Pine bluegrass	*Poa secunda*	
Junegrass	*Koeleria micrantha*	
NATIVE PERENNIAL FORBS		
Large-fruited lomatium	*Lomatium macrocarpum*	Flowers not conspicuous, but interesting in fruit
Fragrant fritillary	*Fritillaria liliacea*	Uncommon; showy, CNPS List 1B
Royal larkspur	*Delphinium variegatum*	Common; short stalks of dark royal blue flowers; showy
Yampah	*Perideridia kelloggii*	Not showy. Native American food source
Blue dicks	*Dichelostemma capitatum*	Showy, bulbous plant. Native American food source
Ithuriel's spear	*Triteleia laxa*	Showy, bulbous plant. Native American food source

not retain soil moisture, and persist as seeds and not as living plants.

Characteristic species are slender wild oat (*Avena barbata*), wild oat (*A. fatua*), soft chess (*Bromus mollis*), red brome (*B. rubens*), long-beaked filaree (*Erodium botrys*), ryegrass (*Lolium spp.*), and burr clover (*Medicago polymorpha*).

* Wildflower Field. Although this is not a static "plant community", it is a very important adjunct in the California flora. The colorful wildflower bloom attracts many visitors to Edgewood's serpentine grassland from March through June. The field not only forms a primary visual component for visitors, but it also serves as food for many diverse flying insects, especially solitary bees. Such a community is not stable and will fluctuate in size from year to year and from place to place depending upon the maturation ability of the plants. It is an herb-dominated community with conspicuous vernal displays of varying species of wildflowers. Characteristic species are California poppy (*Eschscholzia californica*), bird's eye gilia (*Gilia tricolor*), tidy tips (*Layia platyglossa*), Lindley's annual lupine (*Lupinus bicolor*), common owl's clover (*Castilleja exserta*), gold fields (*Lasthenia californica*), and *Phacelia* spp.

b. Shrub Vegetation. Shrub communities include: chaparral, mixed serpentine chaparral, chamise chaparral and Mixed Northern California coastal scrub. The canopies of shrub communities can be either irregular or uniform. Those with uniform canopies are sometimes referred to as scrub.

* Chaparral. Chaparral communities at Edgewood consist of approximately 32 acres of dense shrub, scrub, and brushlands. The chaparral habitat is primarily located on the hot, dry southern exposures of the hills and ridges, frequently growing next to oak woodland. Chaparral habitat is highly susceptible to fire, and its species are dependent on fire for regeneration. It appears from the density and general height of vegetation in some areas of Edgewood that a fire has not occurred for some time, thus increasing the risk of a wildfire that could severely impact other natural resources by diminishing species diversity, and reducing food and cover for wildlife; yet fire is this community's most important adjunct, and lacking fire it will ultimately senesce, lose viability and give way to other vegetation types such as oak woodland.

Dominant species include the shrubs buckbrush (*Ceanothus cuneatus*) and chaparral pea (*Pickeringia montana*), the subshrubs California sage (*Artemisia californica*), coyote brush (*Baccharis pilularis*), yerba santa (*Eriodictyon*

californicum), golden-yarrow (*Eriophyllum confertiflorum*), deerweed (*Lotus scoparius*), and bush lupine (*Lupinus albifrons*).

* Mixed Serpentine Chaparral. Mixed serpentine chaparral is found on approximately 41 acres of southeasterly facing serpentine terrain on Edgewood. This chaparral type is classified by the California Native Plant Society as threatened. The soils vary from well-drained rock to gravels and shallow soils. This community forms a continuous, fluctuating vegetation belt from the lee side of the south hills toward the northeast, covering most of the 805-foot hill by the Sunset Way entrance. The mixed serpentine chaparral plant communities are characteristically shrubby exhibiting reduced, curled, or thickened leaves. They often have little leaf litter and contain appreciable intershrub areas in which small grasses or annuals grow. The area is mostly dominated by a serpentine endemic oak, the leather oak (*Quercus durata*). Leather oaks can eventually become senescent without fire to regenerate this type of chaparral, although it is not fully understood what interval between fires is necessary for optimum survival of the species; however, specimens of leather oak have been seen to be over 3 meters tall which probably indicates the shrubs are well over 100 years old from acorn having withstood a multitude of fires.

* Chamise Chaparral. This plant community is dominated almost entirely by chamise (*Adenostoma fasciculatum*), a fire-dependant species found mostly on rocky, shallow, mostly sterile soils of the hot south- and west-facing slopes and ridges of the site. Other species may occur amongst it, but tend not to exceed 10% of the vegetation cover. Chamise chaparral forms dense, extensive stands up to 3 meters high, has scanty litter, and a lack of understory, due in part to the allelopathic compounds in the litter of chamise. It is a component species in the mixed serpentine chaparral vegetation east of the south hill on the site. It is also found predominantly on the upper slopes of the western portion of the central ridge. Chamise is considered the most dominant species in chaparral throughout much of California. Typically, the woody plants which occur in this community can withstand fire regenerating from an underground caudex or burl. Those which are killed outright by fire have seed triggered to germinate after having gone through a high heat such as a fire, and often that seed can lie dormant in the soil or duff for decades.

* Mixed Northern California Coastal Scrub. Sometimes referred to as soft chaparral, this plant community can be found on the north and northeast sides of the site on the steep terrain of the Franciscan and Butano sandstone, and to some extent, on Franciscan sheared rock formations. A

dense belt of coyote brush grows as a narrow belt along the riparian corridor -fault between the central ridge and the south hill. Indicator species are coyote brush (*Baccharis pilularis*), sticky monkey flower (*Mimulus aurantiacus*), coffeeberry (*Rhamnus californica)*, California sagebrush (*Artemesia californica*), and western poison oak (*Toxicodendron diversilobum*); blackberry (*Rubus spp.),* bedstraw (*Galium spp.*) and clematis (*Clematis spp.)* intertwine above California bee plant (*Scrophularia californica)* and yerba buena (*Satureja douglasii*).

c. ***Woodland Vegetation***. At Edgewood, woodland vegetation consists of oak woodland and foothill woodland subgroup, mixed evergreen forest and mixed hardwood forest subgroups, and willow thicket. The oak woodland community is estimated to cover between 102 acres to 165 acres of the site and is most prevalent in the north and northeast facing slopes of the mostly sheltered canyons.

* Oak Woodland (including Foothill Woodland Subgroup). This community occurs as transition zones to grassland and mixed evergreen type. The foothill woodlands are dense (with at least 30% tree canopy), or can be open savannas that consist of large areas of grasslands with wide spaces between oak trees. Indicator species are coast live oak (*Quercus agrifolia*), blue oak (*Quercus douglasii*) and western poison oak (*Toxicodendron diversilobum*). Perennial forbs include Indian warrior (*Pedicularis densiflora*); native perennial grasses include slender needlegrass (*Nassella lepida*). Annual forbs include miner's lettuce (*Claytonia perfoliata*), smooth mule's ears (*Wyethia glabra)*, and most of the grassland type species.

* Mixed Evergreen (including Mixed Hardwood Subgroup). This type is characteristic of California mountain communities and includes temperate evergreen conifers, evergreen sclerophyllous (tough-leaved) understories, sclerophyllous broad-leaved forests, and evergreen broad-leaved woodlands. The woodland type at Edgewood, however, contains no conifers even though gray pine (*Pinus sabiniana*) occurs in the nearby Emerald Lake Hills area, and there is some conjecture that redwoods might have naturally grown in the more mesic habitats along lowland tributaries of Cordilleras Creek; those which are found at Edgewood have been planted as part of landscaping. The mixed hardwood subgroup includes stands of coast live oak (*Quercus agrifolia*), valley oak (*Quercus lobata*), madrone (*Arbutus menziesii*), buckeye (*Aesculus californica*), and California bay (*Umbellularia californica*) which is dominant along the Sylvan Trail.

* Willow Thicket. Although willows are physiognomically trees or large shrubs, they are at the same time obligate wetland plants; this community is

discussed under "Wetlands", below.

d. ***Wetland Vegetation***. Edgewood's wetlands (also discussed under 'Hydrology') consist of freshwater marsh, ponds, seeps, springs, willow thickets, and riparian corridors. Wetlands are defined specifically by the Corps of Engineers to include aspects not only of the vegetation but also of the nature of the water table and soils (hydric). For purpose of early definition, wetlands are more easily determined on the basis of existing vegetation by indicator species that are termed 'obligate' wetland plants (i.e., those plants that must have wetland conditions in order to become established and survive in the long run).

Wetlands are generally considered to contain important wildlife resources and may often provide highly sensitive habitats for various fauna. Interruption of Edgewood's on-site, or nearby hydrological network, particularly upstream from it, could result in reduction or disruption of wetlands, the native vegetation, and the native wildlife that depend on them.

* Freshwater Marsh. A large freshwater marsh is located at the western base of the central ridge. It is a result of a perennial spring draining slowly through the level alluvial deposit which ultimately ends up in the Crystal Springs Reservoirs. Species include spike rush (*Eleocharis montevidensis)*, rush (*Juncus spp.)*, sedge (*Carex spp.)*, San Francisco willow herb (*Epilobium franciscanum)*, and northern willow herb (*E. adenocaulon* var. *occidentale)*.

* Ponds. There are three ponds located at Edgewood: 1) along the Serpentine Loop trail, 2) between the central ridge and the south hill (the frog pond), and 3) on the south hill. At the frog pond, the iris-leaved rush (*Juncus xyphioides*) forms a significant stand in the serpentine meadows, and the pond provides a significant breeding habitat for the Pacific tree frog. Plants found at other pond sites include rushes and sedges.

* Springs. In addition to the above-described spring located at the western base of the central ridge, others at Edgewood occur primarily in the redwood stand at the base of the western edge of the central ridge, and in the north-northeastern oak woodland and mixed hardwood forest. Diverse species occupy these perennial outflows of water due to diverse soils and differing forest type vegetation.

* Seeps. Seeps are a less prominent form of spring, usually vernal, and usually occurs on hillsides where water escapes (seeps) from the soil due often to a perched layer of impervious clay that causes the water to break to

the surface of the soil. Seeps are mostly vegetated by perennial herbs, especially rushes, sedges and grasses that form a complete but low vegetation cover. Seeps may also be attendant with willows. At Edgewood, seeps occur often in grassland type vegetation areas where the soils are kept permanently moist. Serpentine seeps are considered sensitive habitats for highly water-dependent species, and are found on the south hill at the 600-foot elevation level. The fountain thistle (*Circium fontinale* var. *fontinale*), now extirpated at Edgewood, requires such seeps and is found in similar habitats elsewhere in serpentine soils on San Francisco Watershed lands.

* Willow Thickets. Willow thickets are dependent upon the presence of water at either a spring, seep, or along a riparian corridor. Because these are comprised mostly of woody plants, however, it is often best to separate them out as a distinct wetland sub-type. Willow thickets can be found throughout California, especially notable where seeps occur, often to the near exclusion of most other wetland species. At Edgewood, this community features a shrubby overstory in the more open spaces around the spring and freshwater marsh of the western end of the central ridge. Indicator species include willow (*Salix spp.)* and rush (*Carex)*.

* Riparian Corridors. Riparian corridors are usually considered to be those lands immediately adjacent to streams and rivers and their associated vegetation. These corridors may be fragile when adjacent to soils that are subject to erosion. Steep slopes and high erosion potential can often be affected by higher than usual water runoff which not only can scar stream sides, but also can gouge into the stream bottom. Streams provide important moisture for wildlife, as well as typical riparian plants in order that they may survive. To date, the extent of Edgewood's riparian corridors and accompanying plant species have not been fully inventoried.

e. Invasive Plant Species. At Edgewood, several particularly invasive exotic species have either invaded or overtaken many native plant communities. The exotic pest plants seriously threaten native species and sensitive habitats. They include, but are not limited, to slender wild oat (*Avena barbata*), wild oat, acacia (*Acacia decurrens*), eucalyptus (*Eucalyptus globulus*), olive (*Olea europaea*), tree of heaven (*Ailanthus altissima*), German ivy (*Senecio mikanioides*), pampas grass (*Cortaderia spp.*), canary grass (*Phalaris spp.*), rye grass (*Lolium spp.*), purple and yellow star thistle (*Centaurea calcitrapa* and *Centaurea solstitialis*), teasel (*Dipsacus fullonum*), foxtail (*Hordeum murinum* subsp *leporinum*), Medusa head (*Taeniatherum caput-medusae*) and other annual barleys (*Hordeum spp.*), bellardia (*Bellardia trixago*), Italian thistle (*Carduus pycnocephalus*), and bristly oxtongue

(*Picris echioides*). Erradication efforts at Edgewood are discussed under 'Operating and Maintenance Practices at Edgewood'.

f. ***Wildlife***. The wildlife observed or reported on Edgewood (Attachment A-3, "Wildlife at Edgewood"[3]) depend extensively upon the oak woodland, grassland and scrub/chaparral plant communities at the site. Some of the animal species found at Edgewood are rare because they are limited to the habitat provided by the serpentine grassland. These species of concern are discussed in the next section. Although Edgewood is adjacent to the San Francisco State Fish and Game Refuge, the I-280 freeway, as well as Cañada Road, prevent significant wildlife migration between the two areas. Three freeway underpasses permit some migration of larger mammals, but major wildlife movements are unlikely.

* Mammals. The primary mammals reported or expected on Edgewood are black-tailed deer, coyote, fox, bobcat, grey skunk, ground squirrel, pocket gopher, California vole, jackrabbit, raccoon, deer mouse and grey squirrel. Many of these are predators and depend upon the existence of other animal species as a source of food while others depend upon the vegetative productivity of the site.

* Birds. Attachment A-4 contains the Sequoia Audubon Society's checklist of migrant and resident species of birds sighted at Edgewood. About 70 species have been found including vultures, quails, owls, hummingbirds, woodpeckers and flycatchers. The majority of species can be found in the oak woodland habitat. Some birds are specialized feeders and can only be found in certain areas, while others frequent different habitats in Edgewood. In general, the birds utilize Edgewood for feeding, nesting or protection. All raptors, such as owls, vultures, and hawks, as well as many other migratory birds are protected by international treaty under the strict regulation of USFWS and California Department of Fish and Game.

* Amphibians and Reptiles. Those observed or expected on Edgewood include: California slender salamander, Western toad, Pacific tree frog, northern alligator lizard, western fence lizard, ring-neck snake, gopher snake, western garter snake, western rattlesnake, western yellow-bellied racer, and California kingsnake. These species are all predatory, relying on insects or small rodents for food.

* Invertebrates. Those observed at Edgewood include wasps, bees, ants, butterflies, moths, beetles, spiders, and arachnids. The most significant

[3]The reader is also referred to Attachment A-3 for scientific names.

invertebrates observed at Edgewood include: the Federally-listed rare Bay checkerspot butterfly, the blind harvestman, and the Edgewood microblind harvestman. These species are discussed under 'Animal Species of Concern'.

g. Species of Concern at Edgewood.

Federal and State Protected Plant Species

As shown on Table A-4, three of the rare plants at Edgewood are listed by the State and Federal governments as 'threatened' or 'endangered'.

Table A-4

Federal and State Protected Species Found at Edgewood

COMMON NAME	SCIENTIFIC NAME	AGENCY AND LISTING	DISTRIBUTION	HABITAT AT EDGEWOOD
ANIMALS				
Bay checkerspot butterfly	Euphydryas editha bayensis	Fed: Threatened State: None[4]	San Mateo & Santa Clara Counties	Serpentine grassland
PLANTS				
San Mateo thornmint	Acanthomintha duttonii	Fed: Endangered State: Endangered	San Mateo County	Serpentine grassland
Marin western flax	Hesperolinon congestum	Fed: Threatened State: Threatened	Marin, San Francisco, San Mateo Counties	Serpentine grassland
White-rayed pentachaeta	Pentachaeta bellidiflora	Fed: Endangered State: Endangered	San Mateo County	Serpentine grassland

* San Mateo thornmint (*Acanthomintha duttonii*) is an annual plant found in three locations in San Mateo County, and which is currently found in one location at Edgewood.[5] Historically, this species occurred in a number of

[4]The California State Fish and Game Code does not recognize invertebrates, specifically insects or arachnids.

[5]There are two naturally occurring communities of the thornmint currently known. By seeding, an additional colony was attempted to be established in 1991 as part of a study conducted by Prof. Bruce Pavlik and a student, Mills College. Further enhancement by seeding in the same place occurred annually through 1993. The current status of this seeded attempt for reintroduction is not known, but it is presumed that it has not succeeded by virtue of previous years' experiences. There has been no further interest in attempting to reintroduce the thornmint until matters dealing with microhabitat are better understood.

populations from the Menlo Country Club in the south, northward to the San Francisco Watershed lands. The San Mateo thornmint is listed as Endangered by the Federal and State governments.

* White-rayed pentachaeta (*Pentachaeta bellidiflora*) is a small annual plant of the aster family. Historically, this species occurred in Marin, San Mateo, and Santa Cruz counties. The other populations have been destroyed by urbanization, off-road vehicles, or highway construction. The size of the population in Edgewood is small and fluctuates from year to year (Natural Diversity Database, 1996). The species is now known from only two natural occurrences, both in San Mateo County. It is listed as 'endangered' by the Federal and State governments.

* Marin western flax (*Hesperolinon congestum*) is an annual plant endemic to serpentine soils from Marin County south to San Mateo County, a range of about 50 miles. Six populations are known from Marin County, one from San Francisco County, and seven from San Mateo County. Edgewood contains three populations in the serpentine grassland. The size of the Edgewood populations has fluctuated between 1986 and 1992 (Natural Diversity Database, 1996). This species is listed as 'threatened' by the Federal and State governments.

h. Other Plant Species of Concern.[6] The following is a list of plants derived from materials and information provided by the California Native Plant Society (Santa Clara Valley Chapter). This list was excerpted from the Inventory of Rare and Endangered Vascular Plants of California, 5th ed. and has several categories[7], none of which has any operation of Federal or State law; however, this list can be referred to by State or Federal resource agencies when considering the listing of any species. Thus, even though CNPS might indicate a particular species is a sensitive species, until the plant has been listed there is no protection provided to it by those agencies. It should be noted, on the other hand, that California Department of Fish and Game strongly urges local agencies consider the information provided by the CNPS in its "Inventory" when providing CEQA

---

[6]Three plants occurring at Edgewood have been dropped from consideration as species of concern due to either a change in rare status or taxonomic clarification. These are valley oak (*Quercus lobata)* and, farewell-to-spring (*Clarkia rubicunda rubicunda*), both of which are no longer in the CNPS Inventory. The third plant, scrub oak (*Quercus dumosa*), has undergone taxonomic reclassification and according to the Jepson Manual, the scrub oak that occurs in Edgewood is scrub oak (*Quercus berberidifolia*) which has never had any protection.

[7]The categories of rarity which the CNPS has adopted were originally derived from recommendations by the staff of the Smithsonian Institution who were mandated by Congress to prepare a nationwide list of plants (Section 9, ESA).

documentation for any proposed development. The categories of rarity, as now used by the CNPS, are as follows:

1A Plant species presumed to be extinct.
1B Plants which CNPS considers rare, threatened or endangered in California and elsewhere.
2 Plants of significant rarity in California; but which could be more common elsewhere.
3 Plants about which more information is needed, but which have enough information to continue to be considered.
4 Plants which are of limited distribution - a "Watch List" to see if over time there could be some change in the level of rarity which would warrant either placement of the species at some higher level of rarity or removal from any further consideration.

Because members of the CNPS (Santa Clara Valley Chapter) have been and continue to be instrumental in studying the flora of Edgewood, the following Table A-5 is included. It shows those plants found at Edgewood and included in the 5th edition of the CNPS Rare Plant Inventory. These plants are in addition to those variously listed by resource agencies.

The fragrant fritillary (*Fritillaria liliacea*) is a perennial plant which grows from a bulb. It occurs in both serpentine and non-serpentine soils in Sacramento, Sonoma, Marin, San Mateo, and Santa Clara Counties. The three populations of fragrant fritillary found at Edgewood are located in serpentine grassland. This plant is recognized as a "Species of Concern" by the Federal government, i.e. under consideration for listing, and while being in such a category, it warrants no protection unless it is in the "proposed listing status", i.e., an official proposed listing has been published in the Federal Register.

The status of several other plant species known to occur at Edgewood is under investigation. These plants are currently listed on the CNPS List 1B, List 3 and List 4 and do not as yet have State or Federal status. They include: (1) three populations of serpentine linanthus (*Linanthus ambiguus*) that occurs in serpentine grassland, (2) one population of woolly-headed lessingia (*Lessingia hololeuca*) that occurs in serpentine grassland, (3) a population of San Francisco collinsia (*Collinsia multicolor*) that occurs in woodland, (4) western leatherwood (*Dirca occidentalis*) that also occurs in woodland at four locations, and (5) chaparral mallow (*Malacothamnus arcuatus*) that occurs in chaparral in one location.

A serpentine plant reported by the CNPS to occur at Edgewood is the fountain thistle (*Cirsium fontinale* var. *fontinale*), Federally-listed as 'endangered'. The

Table A-5

Plant Species of Concern Listed by the California Native Plant Society (in addition to those plants formally listed by resource agencies)

COMMON NAME	SCIENTIFIC NAME	CNPS LIST	OTHER AGENCY LISTING	HABITAT
Kings Mtn. manzanita	*Arctostaphylos regismontana*	4	None	Franciscan sandstone in coniferous and evergreen forests.[8] Its habitat at Edgewood is a disturbed site, formerly part of a ranch building site.
San Francisco collinsia	*Collinsia multicolor*	4	None	Moist shady evergreen woodland
Western leatherwood	*Dirca occidentalis*	1B	None	Moist shady evergreen woodland
Fragrant fritillary	*Fritillaria liliacea*	1B	Fed: Species of Concern	Moist areas in serpentine grassland
Woolly-headed lessingia	*Lessingia hololeuca*	3	None	Serpentine grassland
Serpentine linanthus	*Linanthus ambiguus*	4	None	Serpentine grassland
Arcuate bush mallow	*Malacothamnus arcuatus*	4	None	Chaparral

fountain thistle is a perennial plant restricted to perpetually moist clay openings in riparian or serpentine chaparral. According to the Federal Register (Feb. 1995), a single plant growing in a serpentine seep, adjacent to the Clarkia Trail, was sighted in 1987 and 1992. However, recent surveys in July and August 1996 (by T. Peterson, Thomas Reid & Associates, and Dr. W. Savage, San Jose State University, respectively) failed to show any evidence of the plant, or seedling material. Dr. Savage noted, however, that in the long term (greater than 5 years), the area presents a favorable habitat for the return of the fountain thistle[9].

The California Natural Diversity Database Rarefind records also indicate that a plant Species of Concern which may occur at Edgewood is the Crystal Springs lessingia

---

[8]The occurance of Kings Mtn. manzanita at Edgewood is very unusual in that it would appear there is no likely habitat there for its successful colonization. The species is best known at much higher elevations directly to the west in the Santa Cruz Mountains and has never been otherwise found at such a low elevation as at Edgewood.

[9]One reason which may explain the lack of this rare plant currently at Edgewood is that records show there to have been only a single plant known in the past. Because many members - over 80% - of the sunflower family are self-incompatible, i.e. they cannot self-pollinate in order to set seed (Don Kyhos and John Strothers, pers. comm.) and pollen from another plant close by is then needed to produce seed to perpetuate it.

(*Lessingia arachnoidea*). Thus far, there has been no record of this species at Edgewood, but it should looked for, nonetheless.

The following list of plants were believed at one time to have occurred at Edgewood, but because there are no verified vouchers and because no one has seen them in recent years, they have been dropped from the list of plants found at Edgewood (see Attachment A-5 for CNPS explanation). This, however, does not mean that such plants are not to be found, and they need to be looked for more thoroughly. Until such time that they have been located, they are not included in any listing:

San Francisco campion	(*Silene verecunda verecunda*)
Dudley's lousewort	(*Pedicularis dudleyi*)

The Tiburon buckwheat's (*Eriogonum luteolum* var. *caninum*) presence at Edgewood has not been confirmed, and currently it is thought that the species may not extend south of Marin County. A specimen of an unknown buckwheat collected at Edgewood is at the UC Herbarium at Berkeley with Barbara Ertter, Curator and is undergoing taxonomic investigation to determine if Edgewood has a population of the Tiburon buckwheat.

Federally Protected Animal Species at Edgewood

Bay Checkerspot Butterfly. The Bay checkerspot butterfly *(Euphydryas editha bayensis)* occurs in the serpentine grassland at Edgewood. Because of its limited distribution and existing threats to its survival, in 1987, USFWS listed the Bay checkerspot butterfly as a 'threatened' species. Until recently, it was also known to exist at Jasper Ridge[10] (Stanford University lands) in San Mateo County and at locations north of Morgan Hill in Santa Clara County. Accordingly, Edgewood is considered to be "vital to the survival of this butterfly species" (D.Wright).

The Bay checkerspot colonies at Edgewood were first studied in depth by Stanford University graduate student Michael Singer in the late 1960's. The Stanford studies have identified 6 subareas containing Bay checkerspot butterfly colonies within Edgewood. A status report on the butterfly at Edgewood between 1979 and 1993 has been prepared by the Center for Conservation Biology at Stanford University and is included as Attachment A-6.

---

[10]Recent field information has shown that very likely the Bay checkerspot butterfly no longer occurs on Jasper Ridge; however several more seasons will be needed to verify the absence of it from that population.

The following is excerpted from the status report:

> "The Bay checkerspot butterfly is restricted to patches of native California grassland containing a mixture of larval host plants ... and adult nectar sources ... . the only areas that presently support this mixture of grassland forbs are found on the patchily distributed serpentine-derived soils ... . As a result, the Bay checkerspot butterfly is currently restricted to remnant patches of native grasslands that are limited in area and isolated from one another."
>
> "Variations in the timing of the adult flight period and hostplant senescence makes the Bay checkerspot butterfly highly prone to weather-induced population fluctuations. ... The topographic configuration of species patches of serpentine soil-based grasslands plays a critical role in determining the ability of an individual habitat patch to support Bay checkerspot butterfly populations through extreme weather years. Variations in aspect, slope and elevation across hillslopes create distinct solar exposure regimes, which result in distinct microclimates ... This microclimatic variation affects the timing of both butterfly and hostplant development.... The spatial pattern of prediapause survival, and hence, distribution of postdiapause larvae, across the microclimatic gradient changes from year to year... The ever-shifting patterns of larval survival emphasize the importance of topographic diversity in maintaining populations of the Bay checkerspot butterfly. A variety of microclimates across a habitat patch apparently acts to buffer the population from weather fluctuations, and greatly increases the chances of long-term persistence."
>
> "... the Bay Checkerspot butterfly survives as a single metapopulation ... The extinction of local demographic units within this metapopulation and the subsequent recolonization of temporarily unoccupied habitat batches seems to be a common occurrence. ... records, ...indicate that during periods with average or slightly greater than average seasonal rainfall, the size of individual populations and the total number of populations tend to increase and the geographic range of the butterfly tends to expand ..."
>
> "At the present time, only two populations of the butterfly are known o exist on the San Francisco Peninsula (Jasper Ridge Area H and Edgewood County Park). ... Until the late 1980's the butterfly was found on at least four other Peninsula serpentine soil-based grasslands, including those located at San Bruno Mountain [ed. note: soils not formed on serpentinite, although having similar properties], northeast of the Highway 280 and 92 interchange, south and west of Farm Hill Boulevard, and Jasper Ridge Area C. While poorly documented, it is generally assumed that several other populations of the Bay checkerspot butterfly existed on the Peninsula until the 1960's."

Observations made since 1979 indicate that all serpentine grassland in Edgewood

have been used at one time or another by Bay checkerspot butterflies. Studies have shown that there is some movement of butterflies between subareas at Edgewood. The rate of interchange, although low, is sufficient to tie the subpopulations together genetically providing for adequate heterogeneity to keep them viable, but low enough that the subpopulations, during most years, are probably independent demographic units.

The status report provides the following conclusion regarding the Bay checkerspot population at Edgewood:

> "Individually, each of the subareas at Edgewood County Park is of limited topographic diversity, hence, each subarea by itself probably does not provide enough environmental buffering necessary for the long-term persistence of a butterfly population. However, when all the subareas are viewed as supporting components of a single, albeit somewhat diffuse, population, then there is considerable topographic diversity present and a large buffering capacity. Non-native grasslands located between the serpentine soil-based grasslands probably act to facilitate Bay checkerspot butterfly dispersal between subareas ... the subpopulations at Edgewood ... should be considered components of a single population. Each of these components and dispersal routes between the subareas are probably necessary for the long-term persistence of the butterfly at Edgewood County Park. In addition, the Bay checkerspot butterfly populations at Edgewood County Park are undoubtedly key to the long term persistence of the San Francisco Peninsula metapopulation as the only other known population, at Jasper Ridge Area H, declined to approximately 30 individuals in 1993. Population reaching this low level are highly susceptible to extinction."

Other Animal Species of Concern

Invertebrates. Edgewood supports two other species of invertebrates which are under consideration for listing by USFWS as 'threatened'. They are: blind harvestman (*Calicina minor*); and Edgewood microblind harvestman (*Microcina edgewoodensis*). Both are in the same animal order as daddy-longlegs spiders (Phalangidae). These species are Federally-listed as 'Species of Concern'. Some species of harvestman are usually found clinging to the underside of rocks near permanent springs, in the moist, open serpentine grassland, on slopes of 0 to 20 degrees.

Amphibians and Reptiles. The California Department of Fish and Game expressed that certain Edgewood areas were potential habitats for the (Federal and State listed) 'endangered' San Francisco garter snake (*Thamnophis sirtalis tetrataenia*). It was considered also possible that this snake utilized and depended on the small wetland and spring area immediately east of the freeway underpass. Thus, wetland

areas such as the frog pond, had been classified as primary and secondary habitats for the snake. However, when these areas were surveyed by Dr. Sam McGinnis between Fall 1983 and Summer 1984, he found no San Francisco garter snakes at Edgewood. Dr. McGinnis concluded that the site's wetland areas do not provide suitable habitat for this snake. Nevertheless, because the last survey was conducted over 10 years, USFWS recommends that Edgewood be resurveyed for sensitive amphibian and reptile species.

In November 1992, USFWS raised concern that Edgewood may support western spadefoot toad (*Scaphiopus hammondi* - Species of Concern status), California tiger salamander (*Ambystoma tigrinum californiense* - Category 1 candidate to become a 'proposed' species), and the 'threatened' California red-legged frog (*Rana aurora draytoni*). The wetland areas at the site may provide breeding habitat for these amphibian species of concern; however, a survey would be necessary to verify their existence. With respect to the red-legged frog, a preferred prey species of the San Francisco garter snake, it was not found at the site during the garter snake survey nor was it likely due to the lack of perennial standing water.

Birds. In November 1992, USFWS stated that Edgewood may support the California horned lark (*Eremophila alpestris actia*; Candidate 2), and the Loggerhead shrike (*Lanius ludovicianus*; Candidate 2). The presence of these two birds has not been identified thus far by members of the Sequoia Audobon Society. These birds, while no longer being considered by USFWS, however, must be given some consideration as 'Species of Concern'.

> **The Horned Lark** is a ground nester, and prefers barren, open habitat with low, sparse, or overgrazed vegetation. The grassland at Edgewood may have too high a cover to be suitable for horned lark.
>
> **The Loggerhead Shrike** prefers open habitat with scattered shrubs, trees, posts, fences, utility lines, or other perches. Such suitable habitat for the loggerhead shrike occurs at Edgewood. The bird nests in trees or shrubs. Further surveys would be required in the future should any suitable potential habitats be jeopardized by planned development.

3. Other Natural Resources

Scenic and Aesthetic Resources. Edgewood offers users an opportunity to experience a variety of visual resources in a setting which is comparatively close to urban centers. Views into the site, as well as from the site, are possible from various locations. The site has a vast array of natural amenities: diverse habitats,

visually interesting land forms, and colorful array of native wildflowers (from March to June).

The land is in a relatively natural state although serious degradation has taken place in the past when off-road vehicles and motorcycles eroded hillside slopes. To date, some areas have been successfully restored to their natural state; in other areas, however, regrowth efforts have been limited.

High power lines and towers on the western portion of Edgewood and the adjacent utility substation and gas lines are all highly visible and slightly detract from the overall natural appearance.

The most striking views into the site are from the freeway, Cañada Road and from a scenic overlook to the north. Southbound traffic on the freeway has direct views of the serpentine grassland and the western exposure. Northbound vehicles have views which are somewhat blocked by the PG&E substation, a steep bank and a grove of eucalyptus trees adjacent to the roadway. Views from Cañada Road at the southwest boundary of the site are limited by slope embankments and the substation. A scenic overlook off I-280 has views into the northern exposure of the Edgewood. The rolling grassland and the central ridgeline are also prominent features.

Viewpoints within Edgewood are identified by Points A to K on Figure A-6. The views are described in detail on the accompanying page (Table A-6), and are primarily to the west, north and east. Although several of the viewpoints are accessible by authorized trails, there are others which visitors access through presently unauthorized trails, some of which cross sensitive habitats. The broadest panoramas are from the ridgeline, and knolls and hills. Views atop areas in the central ridge, such as Inspiration Heights (see Viewpoint A), are popular. North and west views through the San Francisco Watershed (Crystal Springs Lake) are dominated by natural landscapes, while east views from knolls and hills on the site are characterized by developed suburban and urban environments and San Francisco Bay in the distance.

FIGURE A-6 -- **DIRECTION OF VIEWS FROM EDGEWOOD**

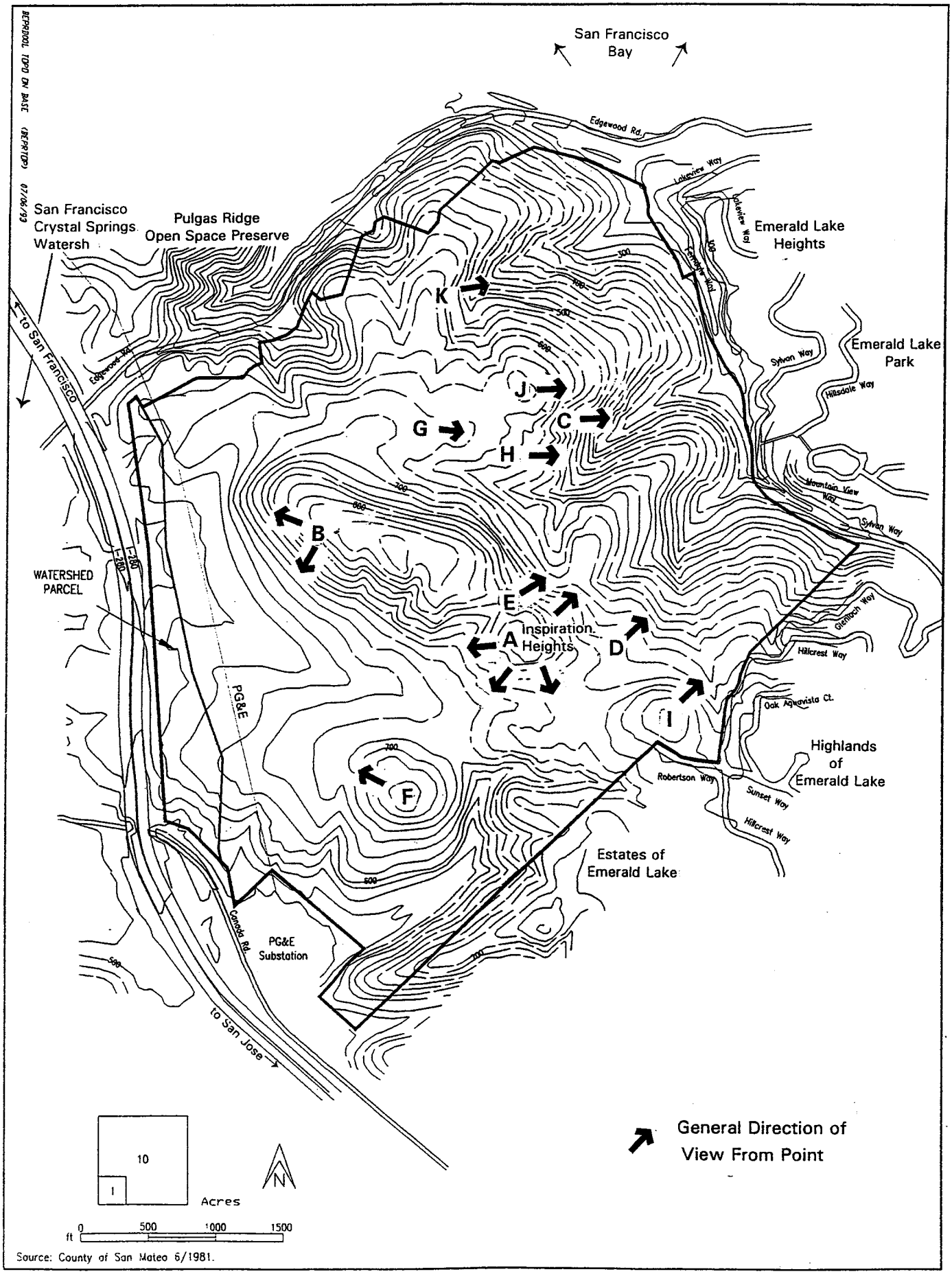


Table A-6

Description of Views from Edgewood

Viewpoint	
A	Inspiration Heights offers best views from three directions; to the east toward the Bay and East Bay hills, to the west out to Crystal Springs Reservoir, and south toward the South Bay. Viewpoint is accessible off Ridgeview Trail by Inspiration Heights Trail. **Access is authorized.**
B	On the north end of the central ridge along the RidgeviewTrail is a spectacular view of the reservoirs and S.F.Watershed. **Access is authorized.**
C	This is one of two existing bench sites and is located along the Sylvan/Franciscan Trail. It also has an outstanding view to the east of the Bay Area. **Access is authorized.**
D	Situated along the Serpentine Trail in the serpentine grassland, this viewpoint offers the second best view of the Bay and the East Bay hills. Popular viewing spot for July 4th fire works. Previously, a proposed bench site (the Harry Dean Memorial bench). **Access is authorized.**
E	Situated on the southeast side of the Ridgeview Trail in the grasslands. It looks northeast out at the Bay and the Greater Bay Area. **Access is authorized.**
F	Grassland and serpentine shrub knoll on the south side of Edgewood. The view is north across grasslands, looking into the Crystal Springs Reservoirs. **Access is unauthorized.**
G	Located in the grassland section of the Service Road, views of the Greater Bay Area, the East Bay and Handley Rock are possible. **Access is authorized.**
H	"Coyote Rock" is east of Viewpoint G and located in grassland. It is a poplar because it is isolated. **Access is unauthorized.**
I	"Sunset Hill" just east of Sunset entrance from Emerald Hills neighborhood. There is a northeast facing view of the Bay. This knoll is a serpentine chaparral shrub area surrounded by fragile serpentine habitat and is railed off. . **Access is unauthorized.**
J	On a knoll shaded by oak trees, this location offers a view of the greater Bay Area. **Access is unauthorized** and is through butterfly habitat.
K	This is along the Franciscan trail, looking east over the Bay Area. **Access is authorized.**

2. MAN-MADE RESOURCES

A. Cultural Resources

A site and literature survey of Edgewood by Basin Research Associates in 1981 found no evidence of any archeological or historical resources at the site. However, two Native American sites exist within a two-mile radius of the Edgewood boundary: (1) a large midden/mound located southwest of the intersection of Edgewood and Cañada Roads and (2) a shell midden northwest of the first site.

B. Land Uses

The current land uses at Edgewood are recreational open space and preservation of the natural environment. The County has begun implementing approved portions of the 1982 Master Plan by installing hiking trails, a day camp, picnic and passive recreation areas, and a parking area. Plans for an interpretive center, to date, have not materialized. The primary recreational activities include day and overnight camping, hiking, jogging, horseback riding, picnicking, nature observation and docent-led tours. Although not accurately monitored, visitor use at Edgewood appears to be heaviest during the spring months.

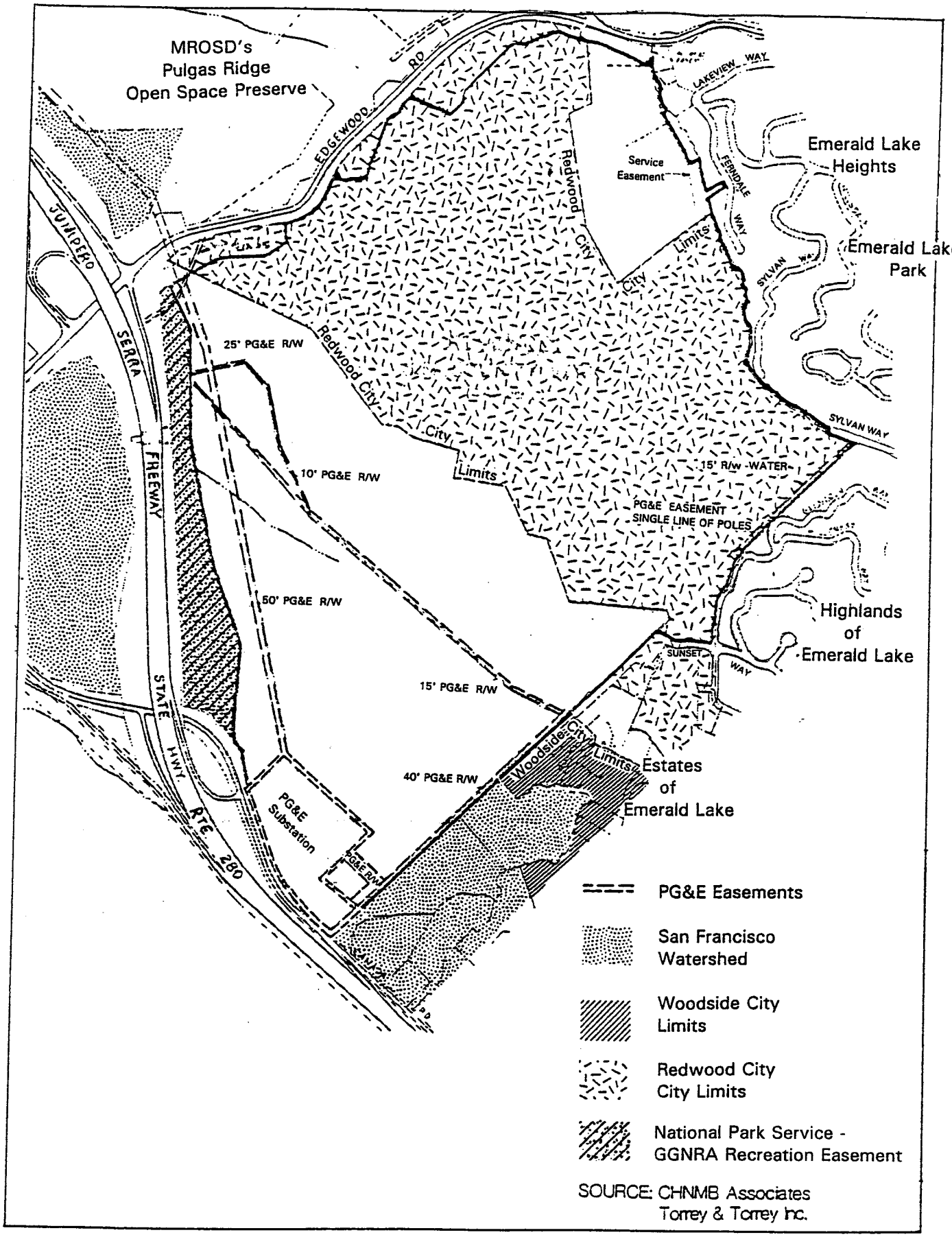
Between 1993 and 1995, the yearly attendance at Edgewood ranged from 60,000 to 96,000 persons, with hikers followed by joggers and picnickers, accounting for the majority of visitors. In addition, Edgewood attracts numerous visitors each year who come to see the serpentine wildflower displays between mid-March and mid-June. The California Native Plant Society conducts wildflower tours of the site on weekends during the spring months. To a lesser extent, field trips are also conducted by Sierra Club, Audubon Society, MROSD, as well as museums, academic institutions, and garden clubs.

1. Relevant Legal and Institutional Land Use Agreements

Since Edgewood lies within two municipal jurisdictions (see Figure A-7), it is subject to the provisions of the San Mateo County General Plan and the City of Redwood City Strategic General Plan. It is also subject to the provisions of the 1993 Modified Grant of Park, Recreation, Scenic and Open Space Easement between the County, MROSD, and the GGNRA.

a. ***City of Redwood City Strategic General Plan.*** The portion of the site within the City of Redwood City is designated as Publicly-owned Park in the City's

FIGURE A-7 -- **JURISDICTIONS & EASEMENTS**



Strategic General Plan. The Plan states that this open space area should be preserved for its natural resources. It should be noted, however, that Redwood City does not contribute to the maintenance of Edgewood.

b. San Mateo County General Plan. The 1986 San Mateo County General Plan: (1) designates the unincorporated portion of the site as Public Recreation, (2) identifies parks and natural preserves as appropriate land uses for land designated Public Recreation, and (3) indicates that a natural preserve "may be contained within a County park".

A park is defined as:

> A spacious area of outstanding scenic and natural character where outdoor recreation opportunities and facilities may be provided for public convenience and enjoyment, and within which special natural areas ... can be set aside. (Attachment A-1, No.8)

A natural preserve is defined as:

> A scenic and natural area where outstanding features as well as significant wildlife habitats are preserved in their present state for the enjoyment, education and well-being of the public. (Attachment A-1, No.9)

This unincorporated portion of Edgewood is zoned Resource Management (RM). RM is the implementing zoning district for land designated as Public Recreation. The RM district allows public and commercial recreation land uses, subject to a use permit approval. These uses may include but are not limited to stables, campgrounds, dude ranches, and motorcycle riding.

c. Resolution Designating Edgewood County Park as a Natural Preserve under the Terms of the County General Plan. Resolution No.56062, passed by San Mateo County Board of Supervisors on May 5, 1992, designated the Edgewood site as a Natural Preserve, pursuant to the definitions, standards and planning and management guidelines set out under the "natural preserve" classification of the County General Plan, as described previously and as outlined in Attachment A-1, No.1. On May 20, 1997, the Board officially recognized Edgewood as a "park and natural preserve".

d. Modified Grant of Park, Recreation, Scenic and Open Space Easement. As previously discussed, in 1993 the amended 1980 Joint Powers Agreement ("JPA") and the Grant of Park, Recreation, Scenic and Open Space Easement with the MROSD were amended (and is on file at Parks and Recreation Division). According to the amendments, permitted uses within Edgewood are restricted to low-intensity

recreational uses. (It should also be noted that at Edgewood, as well as at all County open spaces, hunting, fishing and dogs are prohibited.). Moreover, any future developments in Edgewood must be discussed with both the MROSD and GGNRA.

According to the Easement, the "County shall manage and maintain Edgewood and provide rules and regulations for its uses, in accordance with acceptable practices of parks and recreation departments and agencies of the State of California." (p.2)

With respect to restrictions imposed on uses at Edgewood, the following are highlights of the Easement:

- new structures or improvements (without prior MROSD review), advertising signs, the planting of vegetation (without permission), specified resource management techniques, and excavation or other topographic changes are prohibited;

- public uses other than parks, recreation, scenic or open space uses are prohibited;

- motor bikes, bicycles, trail bikes, go carts and other motor-powered vehicles (except by County staff for daily operation purposes) are prohibited;

- every effort must be made to prevent damage, destruction or infringement upon areas currently occupied by rare and/or endangered plant species, except as part of an approved and recreation development plan which specifically address the ecologic importance of such colonies);

- development shall not include any high-intensity uses (such as: amusement or theme park, golf course, driving range, tennis court, swimming pool), residential, commercial or industrial structures (except for use in connection with County maintenance and patrol);

- County can maintain, use, construct, install, restore and make improvements necessary for public enjoyment of parks, recreation ... preservation, scenic, scientific or educational purposes;

- Improvements may include (but not limited to): parks, picnic areas, bridle paths, scenic lookouts, areas reserved for preservation, exhibits, roads, utilities, fences, shelters, on-site use only of sewage and disposal facilities, etc.;

- any improvement or development is subject to design review by

MROSD. This review does not pertain to the maintenance or improvement of presently existing structures;

- review and comment privileges granted to the MROSD are advisory only; thus the County shall consider, but shall be free to accept, reject or modify the recommendations of the MROSD.

The foregoing Resolution and Easement supersede any conflicting uses that were outlined in any of the preceding documents; if deemed to be incompatible, such uses are prohibited. The County is therefore obligated (and cannot violate) any of these agreements.

e. Utility Easements. The Pacific Gas and Electric Company ("PG&E") holds easements which grant PG&E the right to construct, operate and maintain their facilities at Edgewood. The easements allow for aerial power lines and towers, and underground natural gas lines to traverse the lower portion of the site. These lines connect with a PG&E substation just beyond Edgewood's southern boundary (see Figure A-7).

2. The Circulation System

This section describes Edgewood's existing network of roads and trails, as well as connecting points to bordering areas.

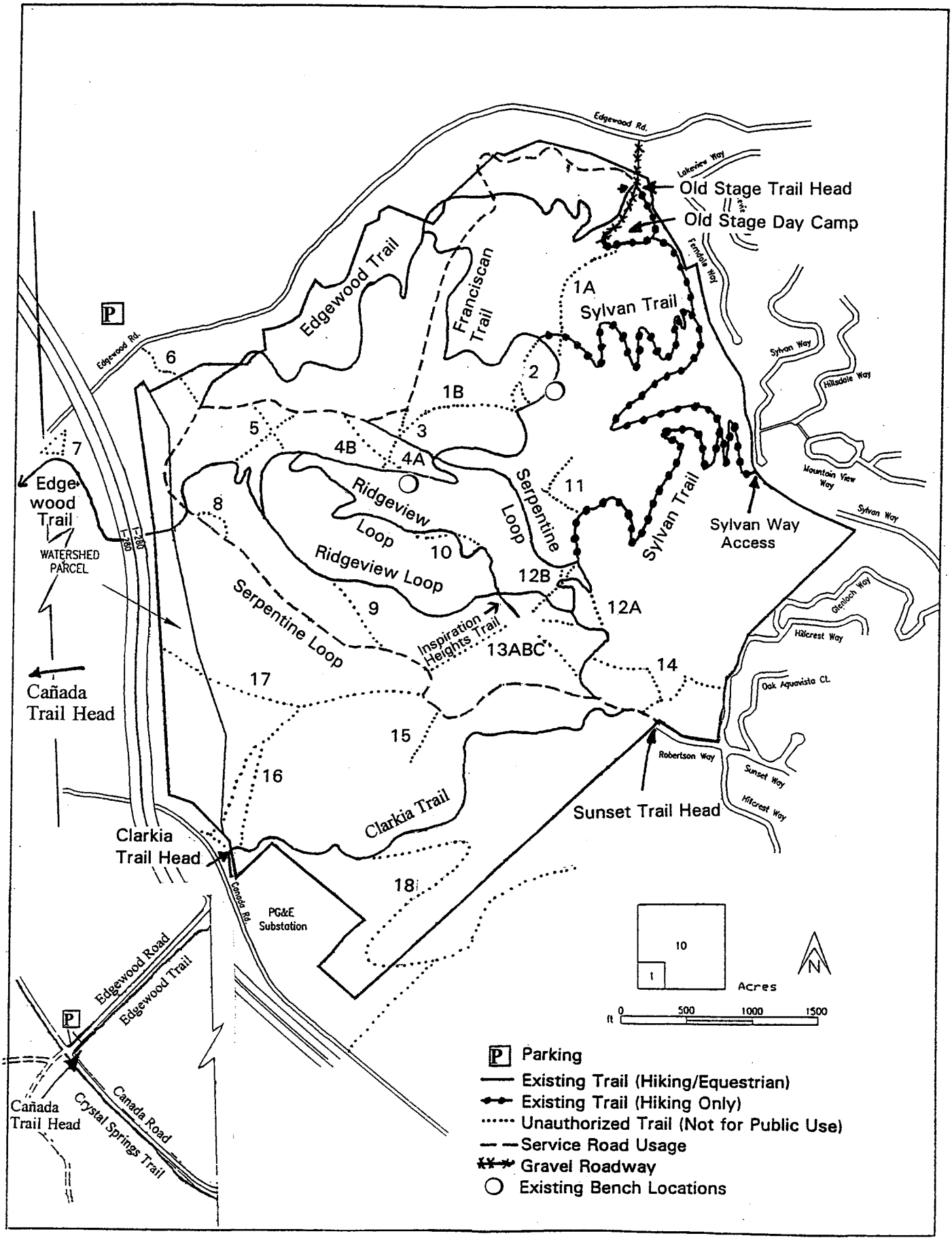
a. External Access. As shown on Figure A-8, the primary vehicular transportation routes providing access to the site are Edgewood Road, Cañada Road and the I-280 Freeway. Secondary access to the site is through the residential streets of the Emerald Hills subdivisions to the south and east. Cañada Road is designated as a bike route, and is extensively used by bicyclists.

Direct access to Edgewood was planned via an underpass when I-280 was constructed. The underpass was built, but is now only used by equestrians and hikers. It is unpaved and no roads connect the underpass with existing roadways.

b. Entry Points and Parking Facilities. Figure A-8 also shows four official entry points into Edgewood which are referred to as "trail heads", and are described as follows:

* Old Stage Trail Head is situated on the northeast point of the site, near the Old Stage Day Camp, and provides access to the Edgewood and Sylvan Loop trails. Interpretive information (maps, trail information, etc.) is also available from this entrance. The adjoining on-site paved parking lot

FIGURE A-8 -- **CIRCULATION, ACCESS, AND PARKING**



contains a bicycle rack, and parking spaces for 14 cars, including one handicapped space. No parking spaces for buses are provided. Adjacent to the driveway, between the creek and Edgewood Road is an off-site unpaved (gravel) overflow area which can accommodate buses, or about 25 cars.

* Sunset Trail Head is located at the southeast point of Edgewood, at the intersection of Sunset Way and Hillcrest Way. It provides access to the Serpentine and Clarkia Trails. Interpretive information is available at this entrance which is popular among residents of Emerald Lake Hills entering the site on foot or horseback. Parking is limited to streetside parking along residential streets.

* Clarkia Trail Head is situated west of the PG&E substation property, just off Cañada Road, at the western endpoint of the Clarkia Trail. There is unpaved street parking along Cañada Road accommodating 10 to 20 cars.

* Cañada Trail Head marks the point where the Edgewood Trail crosses into the site from along the south side of Edgewood Road, adjacent to the San Francisco Watershed lands. Parking at this entrance is available along the unpaved shoulders of Edgewood Road, at the intersection of Cañada Road. This parking area is shared by people using Cañada Road for bicycling, especially when Cañada Road is closed to automobile traffic on the first, third and fourth Sundays from March to October.

*c. **Hiking and Equestrian Trail System.*** Edgewood's trails are currently used extensively for hiking, jogging, and equestrian activities. They were originally constructed to the four-foot wide, 10 percent grade national standards for mixed-use trails. The layout of the trail system, which started around the turn of the century, had provided critical safety and transit corridors for surrounding residents. Although the exact lengths of the trails are not known, the trail system takes full advantage of the site's topography and allows maximum enjoyment of views of the surrounding region as well as the site's unique plant and wildlife habitats.

A key feature of the site's trail network is linkage to existing off-site community and county trail systems. The numerous hiking and equestrian trails serve as vital connecting links to the Fish and Game Refuge and Huddart Park trails. The trails enter the site from its four corners and utilize the freeway underpass to exit the site and gain access to other trail systems. As illustrated in Figure A-8, there are five named trails in Edgewood, which are believed to total over 8 miles. Including the only service road, the entire interior access system consists of approximately 10 miles.

* Serpentine Loop is approximately two miles long. It circumnavigates the central ridge at an elevation of about 600 feet and passes predominantly through serpentine grassland. It is a loop trail, with an extension to the Sunset Trail Head. This trail is fairly wide and flat, admitting service vehicles over much of its length.

* Clarkia Trail is about 3/4 mile long. Though regularly used by hikers and runners, it is favored by equestrians as the most direct route to the Town of Woodside. It extends from Cañada Road, traveling through serpentine chaparral and serpentine grassland, to the Serpentine Trail near the Sunset Trail Head. The trail is narrow and fairly winding, and intersects a natural seep.

* Edgewood Trail runs from the Old Stage Day Camp along the northern boundary of Edgewood for about two miles, intersecting the Serpentine Trail at the northwest corner of the site. Much of this narrow and winding trail runs through oak woodland, grassland, and along the service road.

* Sylvan Loop Trail runs for roughly 2.5 miles through oak woodlands and is designated as an exercise trail for hikers and runners only. This moderately steep trail winds its way up and then down a 300-foot slope, crossing a small creek with a three-foot waterfall. A portion of this Loop overlaps the Serpentine and Franciscan Trails which are used as equestrian routes.

* Ridgeview Loop is just under 1.5 miles long and loops around the central ridge beside the highest point in Edgewood (872 feet). This winding trail passes through chaparral, serpentine chaparral, and oak woodland.

* Service Road. Edgewood has one service road. It runs from the Old Stage Day Camp, past the on-site ranger residences, then through grasslands, following the west side of the Serpentine Trail, eventually exiting as the Sunset Trailhead in Emerald Hills.

* Unnamed Trails. The following two unsigned trails are authorized:

    1. Between the Service Road and the Sylvan Trail is an unmarked but authorized trail, as shown on Figure A-8. This trail is currently being referred to as Franciscan Trail. There is a sign at the beginning of this trail which indicates that it leads to Edgewood Trail. Thus, some visitors following this trail tend to think that they are already on the Edgewood Trail.

2. Off Ridgeview Loop, this short trail is unmarked and is currently being referred to as the Inspiration Heights Trail as it leads to Inspiration Heights, a location which offers scenic views of the site.

d. ***Regional Trail Connections.*** The Edgewood and the Clarkia Trails link to regional trails within San Mateo County (see Figure A-9). Both trails link with the Crystal Springs Trail along portions of Cañada Road, and I-280, at the western and southern boundaries of the site, respectively. The Crystal Springs Trail continues west uphill from here to Huddart County Park, where it connects to the Skyline Trail that terminates at Wunderlich County Park. The Crystal Springs Trail also connects to Sheep Camp and Ralston Trails, north of Edgewood.

The Clarkia Trail also connects to the Cañada Trail, at the northwestern edge of the PG&E substation. Following the Cañada Trail in a southeasterly direction leads to the Town of Woodside. This trail is available for use by equestrians, hikers, pedestrians and cyclists.

e. ***Unauthorized Points of Access and Routes.*** Figure A-8 and the following Table A-7 also identifies and describes all routes within, and points of access to Edgewood which are unauthorized by the County. These unauthorized routes were primarily created by trail users who took shortcuts to visit new areas on the site, or who were simply unaware of restrictions and consequently trespassed to complete their desired trek. Some of these routes are located in highly sensitive areas; all, however, promote soil erosion to existing surfaces. Those warranting further discussion are as follows:

1. The Sylvan Way Access is situated in the east point of the site, south of the Old Stage Trail Head. It is a spur trail providing access to the Sylvan Loop from Sylvan Way. Although no parking facilities exist at this entry point, it is often used by nearby residents of the Emerald Hills subdivisions. The first 50 feet of this entry crosses private property, and is therefore not officially recognized. Thus, there is no information sign placed at this entry point. In addition to legal reasons, the Sylvan Way Access is not officially recognized because it was not built by the County and does not meet recognized trail standards; it is considered hazardous. At present, the County is in the process of attempting to secure an easement for this property. In the meantime, however, with the permission of the owner, access through this point will continue since the County plans to maintain the trail head and hold the property owner harmless from any liabilities which may occur on the property.

2. Trail 1B was previously part of an old ranch road and park service road. This

FIGURE A-9 -- **REGIONAL TRAIL LINKAGES**

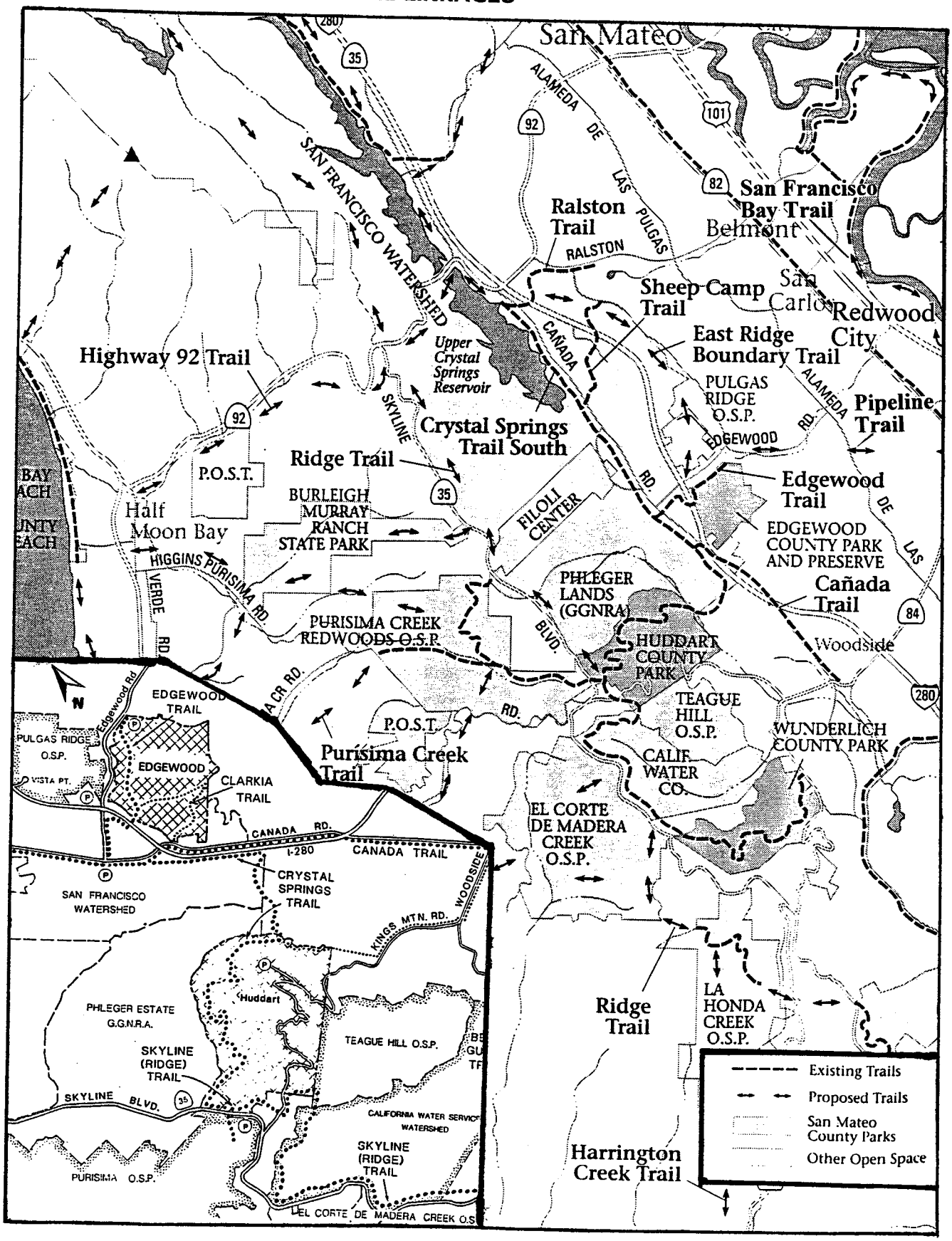


Table A-7
Description of Unauthorized Trails Shown on Figure A-8

Trail

1A. An old ranch road and abandoned park service road from Old Stage Day Camp to top of Sylvan Trail at the Franciscan Trail. Equestrians currently use the Edgewood Trail to access the Old Stage area.

1B. An old ranch road and abandoned park service road from Franciscan Trail to current service road. This unauthorized trail is in the open grassland and in butterfly habitat. It is heavily used by hikers as a shortcut across the meadow and leads to a desirable view spot.

2. Three unauthorized routes lead to a view site, and are located north of the grassland in the Oak woodland buffer. It provides a shady spot to stop and view the grasslands and the S.F. Watershed.

3. An unauthorized short cut spur trail. A short cut from Trail 1B to the Serpentine Trail.

4A. A series of unauthorized shortcut trails through grasslands on the north side of the Ridgeview that connects to the Serpentine Trail. Signs indicate that this area is closed to the public.

4B. Unauthorized shortcut trail through grassland from the north side of the Ridgeview Trial to the Serpentine Trail. It is unsigned.

5. Shortcut through sensitive grassland from the Serpentine on north side of Ridgeview to the Serpentine Loop on the west side.

6. Located off Edgewood Rd. across from Park & Ride Lot. This unauthorized and hazardous trail is on a steep, rocky hillside on Road Dept. property connecting to an unused Road Department service road, off the current service road. (For further description, see #3, next page.)

7. Trail passes through disturbed grasslands off Edgewood Road to the Edgewood Trail on west side of Highway I-280. This unauthorized route is used by hikers who park under the freeway or in the Park & Ride lot. Note: this is not in Edgewood but leads to County easement through SFWD property.

8. Unauthorized trails into the olive grove off the Serpentine Trail.

9. A less used unauthorized shortcut trail through annual grasslands from the west side of the Ridgeview Trail to the Serpentine Trail below it.

10. Unauthorized trail (intersecting Ridgeview Trail) on the top of the ridge crosses an old ranch road in several places.

11. Unauthorized trail drops off the Sylvan Trail in the oak woodlands and goes down to an open meadow then into an isolated ravine.

12A. Unauthorized trail located on an old off-road-vehicle road through serpentine area. It shortcuts the Serpentine Trail from a viewpoint to a section that can be seen below.

12B. A series of unauthorized shortcut trails on the Serpentine Trail through native grassland.

13 A,B,C. Unauthorized shortcut trails through fragile serpentine grassland. There is heavy foot and illegal bike use to get to and from the most popular view on the site.

14. Unauthorized trails lead to popular, illegal after-hour activity area adjacent to Emerald Hills neighborhood.

(continued)

Table A-7
Description of Unauthorized Trails Shown on Figure A-8
(continued)

Trail	
15.	Unauthorized trail through fragile serpentine grassland from Serpentine Trail to another view of native grassland and the Crystal Springs Reservoir.
16.	Unauthorized trail leads off the bottom of the Clarkia Trail, through fragile butterfly habitat, and connects to the Serpentine Trail. This trail was used before the Clarkia was built and was the originally proposed trail. The current alignment of the Clarkia trail was established around the originally planned golf course. This trail is still heavily used by hikers.
17.	Unauthorized trail is a spur off Trail #16 and leads to a northern access toward Cañada Road.
18.	Unauthorized trail passes through grassland and used by a few equestrians. It is a shortcut from Rocky Way in Woodside to the Clarkia Trail. It bypasses going out to Cañada Road.

trail stretches from the service road then curves eastward to touch the Serpentine Loop, and eventually leads to Viewpoint J. A large portion of Trail 1B is situated in the serpentine grassland, in a butterfly habitat. It is heavily used by visitors as a shortcut across the meadow because it leads to a desirable viewpoint on the knoll. Presently, there are neither signs, including restriction signs, nor fencing in this area.

3. Edgewood/I-280 Entry Point and Trail. This unauthorized entry point (Trail #6, Figure A-8) is at the Edgewood Road off-ramp of northbound Highway I-280 and is heavily used by pedestrians. Visitors park in the 30-car capacity Park and Ride lot located off-site, at I-280. This lot serves as a meeting place and starting point for many guided hikes and walks in Edgewood. This location is popular because it offers convenient parking and accessibility to the grassland and seasonal wildflower displays. Additional street side parking is sometimes available along Edgewood Road, near I-280. Entering Edgewood across from the Park and Ride lot is unauthorized and can be hazardous, as visitors cross traffic and walk on steep terrain.

4. Other Unauthorized Routes. In addition to the authorized Inspiration Heights Trail, there are many unauthorized pathways leading to Inspiration Heights (Figure A-8, #13); the path on the southwestern side of the Inspiration Heights is in native grassland and crosses a sensitive butterfly habitat area.

Other unauthorized routes link to the Serpentine Loop, and the Clarkia Trail,

and also cross the western edge of the PG&E substation to exit along the southern portion of the site. In the northeastern to central portions of the site, old service roads (identified as 1A and 1B) are also used as trails by pedestrians.

f. ***Utilities Maintenance Access.*** PG&E is allowed to access its facilities located on the site. PG&E performs routine inspections, maintenance and repairs of its facilities to ensure reliable operations and the health and safety of the general public. Routine inspections include physically inspecting all tower structures along the transmission line and the gas line at least twice a year. Unforeseen maintenance and emergency actions could also be required. Consequently, clear and unrestricted access to PG&E's facilities is critical during any of these activities. At present, access to service lines is via two routes at Edgewood's southwestern boundary, near the PG&E substation (identified as Trail 16, Figure A-8). This route cuts directly across the serpentine grassland into a habitat for the endangered Bay checkerspot butterfly.

PG&E instructs its crews about the need to perform their work in accordance with PG&E's environmental commitment and policy. This includes reinforcement of the need to utilize existing disturbed access roads where feasible, and to minimize disruption to the surrounding environment during the performance of their activities.

g. ***Access for the Physically Challenged.*** There is no wheelchair access from the Old Stage parking lot to Edgewood's trails or the picnic area. The picnic area is in a relatively gently sloping area of the site, whilst most of the trails at Edgewood are on steep topography. One disabled access restroom stall and one handicapped parking space are located at the Old Stage area, but there are no other facilities accessible to the physically challenged.

3. Old Stage Day Camp

The Old Stage Day Camp is the only area of Edgewood with structural development (i.e, buildings). The Camp is located in the northeast corner of Edgewood, in an oak woodland region that historically was disturbed by homes, and is distant from sensitive habitats. See Figure A-10.

The Old Stage facility was built to meet a growing demand for youth facilities in the south County. The camp can accommodate 100 to 150 day campers for nature and related activities (such as picnicking and craft projects) on a reservation basis. There were approximately 4 reservations for overnight use by small parties of youth groups in 1996.

FIGURE A-10 -- **OLD STAGE DAY CAMP**

Both on-site and off-site parking is available at the Old Stage Day Camp entry point, as previously discussed.

Although a path connecting to the Edgewood Trail and the service road lead into Old Stage, cyclists and equestrians are not officially permitted to bring their bicycles or horses to the area containing the Old Stage facilities.

There are five picnic areas at Old Stage. Three of the areas are available on a reservation basis and each can accommodate a maximum of 50 people; the other two picnic areas are available on a drop-in basis and can each accommodate a maximum of 35 people. Every picnic area is equipped with concrete tables, a water faucet, and a barbecue pit. Refuse containers are located nearby.

The Camp includes one 5-stall restroom which is designed as a unisex facility, with one stall accessible to the disabled. There is no electricity available for public use. Outdoor washbasins, a drinking fountain and a pay phone are situated near the restroom.

An amphitheatre is located adjacent to a picnic area, in the northwestern section of the Camp. The amphitheatre can seat between 75 and 100 patrons. A campfire ring, six feet in diameter, is located immediately in front of the amphitheatre. This area is currently underused for its intended youth group purposes and has become a nuisance due to abuse (drinking and vandalism) by people who illegally enter Edgewood after hours of operation, i.e., after-hours crowd.

A ranger office and storage area is also connected to the restroom facilities. This area is somewhat limited for its working and storage uses. Oftentimes, some of the maintenance equipment is borrowed from other County park locations. However, needed equipment may not always be available at the time, especially when it is needed simultaneously at other parks, for example, during seasonal trail maintenance.

4. Ranger Residences

There are two houses which have been converted to ranger residences. They are located on the northeast corner of Edgewood in the Old Stage Day Camp. The residences are rented to San Mateo County park rangers, subject to outlined conditions.

5. Benches

There are two benches at Edgewood which were donated and installed in 1993

and 1995. The benches are located along the Sylvan Loop Trail and Ridgeview Loop, in the north-central area of Edgewood (see Figure A-8), and have been subjected to vandalism.

6. Signs

Signs are valuable to users for indicating where activities are located, distance, names of trails, restrictions, etc. Within the site, the following three types of signs are found:

1. Interpretive Signs. Wooden and metal entrance signs are located at the Edgewood Road, Cañada Road, Sunset, and Old Stage Day Camp entrances. These signs are large enough to be clearly visible, and most contain the following characteristics: the Edgewood Park and Natural Preserve name; hours of operation; pockets for Edgewood maps and brochures; and symbols and language about basic site prohibitions including dogs and bicycles.

2. Directional Signs. Directional signs clearly label or point the way to a trail, area, or other park facility.

3. Regulatory Signs. Regulatory signs inform visitors of the pertinent rules and restrictions at particular locations. Included are the posting of boundaries, no parking and restricted access signs.

Many of the signs at Edgewood have been, and continue to be vandalized.

C. Operating and Maintenance Practices at Edgewood

1. Resource Management

The natural resources at Edgewood are constantly threatened, and therefore require management techniques or practices that protect, maintain and restore the resources and related natural processes. Techniques may be either active or passive. Active management techniques involve the physical manipulation of a particular area. Passive techniques, on the other hand, do not alter an area, but protect it from further detrimental impacts so that normal restoration processes may occur.

The techniques currently employed at Edgewood are predominantly passive and include: (1) regulating land use for habitat protection, (2) classifying sensitive habitats, (3) fencing to create buffers adjacent to sensitive habitats, (4) educating

visitors to some extent, and (5) enforcement. Fencing has resulted in the revegetation of some areas at the southern end of the site.

Current active management methods performed at Edgewood are: hand weeding, some mowing and cutting, removal of large specimens by hand, and restoration through the planting of native grasses. Hand weeding has resulted in the successful removal of exotic and invasive plant species in some areas of Edgewood.

In order to control the number of undesirable species that threaten the native plant communities and butterfly habitats at Edgewood, volunteers have spent countless numbers of hours removing invasive or exotic species by hand weeding. To date, efforts have concentrated on the eradication of the following invasives: Yellow star thistle, Italian thistle, Bull thistle, Milk thistle, Bristly oxtongue, French broom, fennel, teasel, and bellardia. As shown on Figure A-11, hand weeding efforts are undertaken throughout Edgewood, in both serpentine and non-serpentine areas. The volunteers have been issued the required permit from the County for hand weeding and are either specifically trained, or led by qualified biologists. County rangers transport the bagged weeds out of Edgewood for disposal. On a weekly or bi-weekly basis, the volunteers work in groups of no more than 5, and have been successful in eradicating teasel and fennel from entire areas of Edgewood. In another instance, weeding and planting efforts have resulted in the restoration of purple needlegrass colonies.

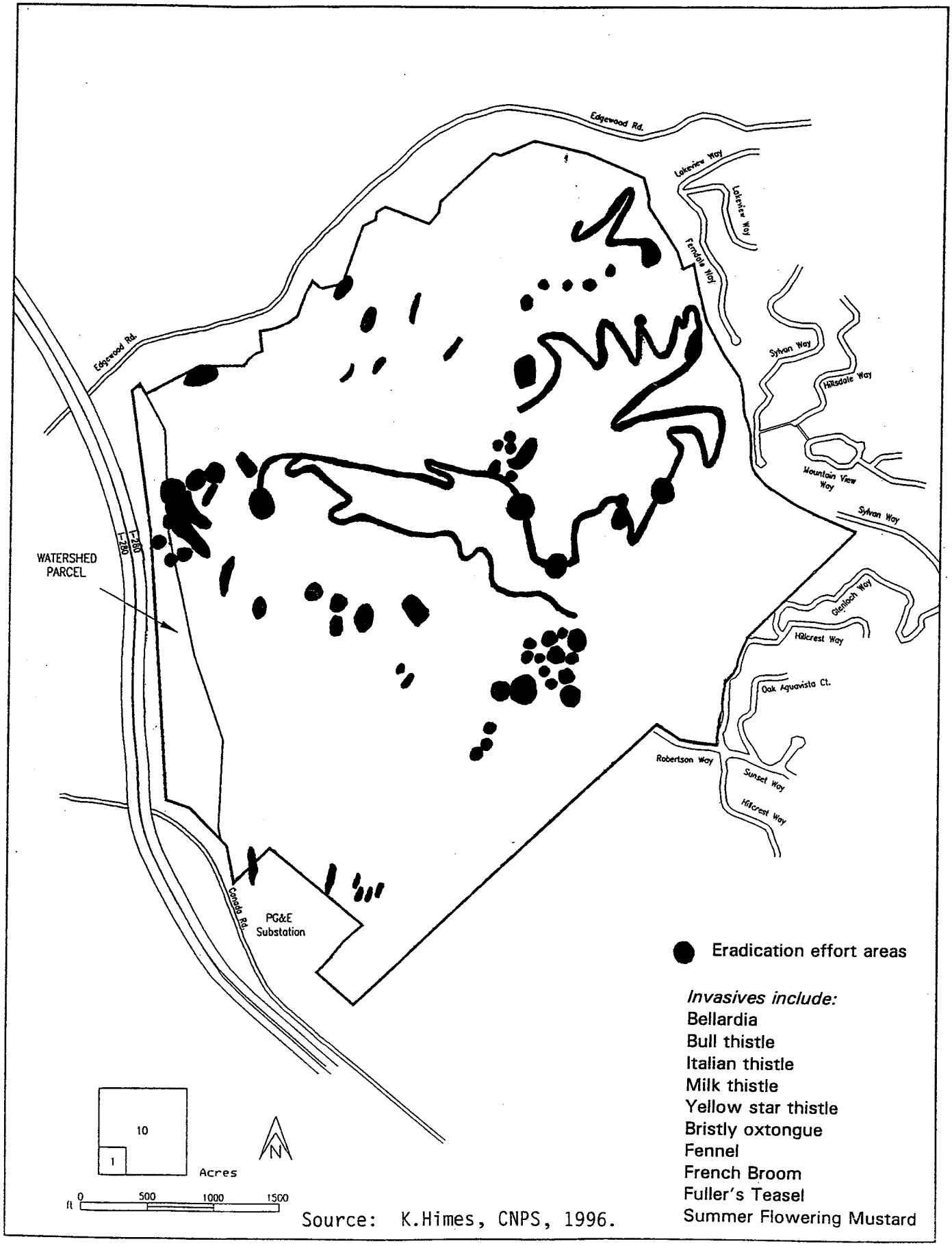
2. Facilities Maintenance

In addition to assisting and educating visitors, two County Park Rangers and two seasonal Park Aides perform routine maintenance activities at Edgewood. Their duties include: landscape maintenance, facility repair and cleaning in the Old Stage area; trail repair and maintenance; fence, gate and sign installation and repair; facility painting; general area cleanup throughout the site; and administrative oversight of maintenance and operation activities.

3. Trails and Service Road (or "Route") Maintenance

Route maintenance requires the brushing (or cutting away) of about one foot of vegetation on either side of a trail to keep from protruding too far onto the trail. Maintenance also requires repairing trail treads. Surfacing trails with road rock, i.e., "rocking", is also a common trail maintenance practice at Edgewood. Rocking seasonally wet areas provides a more stable surface and prevents the creation of muddy bogs and slippery areas, as well as maintain the integrity of the trail. Although it is County's policy to maintain County trails and service roads to higher

FIGURE A-11 -- **INVASIVE PLANT SPECIES ERADICATION EFFORTS**



Source: K.Himes, CNPS, 1996.

than the nationally-acceptable standards, trails and service road (also referred to as "routes") surface repairs at Edgewood, including rocking, have not been carried out for several years. The proposed 1996 rocking of wet areas was postponed pending further study regarding the use of imported or non-native soil, rocks and other materials to repair trail surfaces in sensitive areas. There is a perception that these materials might have a detrimental effect on sensitive areas and species since they could carry ingrained exotic seeds, or contain compounds which may change the composition of the existing soil, making it more habitable for invasive weeds.

As a result of a lack of repairs, bogs or muddy areas have developed on several areas of the routes. These wet soils are slippery and unsafe. Moreover, some trail treads have not been maintained at the original four-foot wide standard that could accommodate two users simultaneously. The result of the foregoing is narrowed, boggy and/or slippery areas along routes. Hikers, in particular, thus tend to walk off-trail, around the outer edge of trails. Consequently, there is further soil erosion, ad hoc and inappropriate trail widening, and imminent damaged habitats.

4. Fire Management

Fires are the result of both natural causes and human activities. Natural causes such as lightning, while not frequent, are a threat on the site due to the limited annual rainfall and the biotic community (such as the scrub, chaparral and grasslands) that builds up dry fuel. Human-related causes include: (1) accidental fires from illegal campfires and cigarettes, and (2) intentional fires from arson and vandalism.

In the late-1980's to early-1990's, fires were reported in the grassland areas, on the northeastern side of Edgewood. Another recently occurred in the northwest area of chaparral from Edgewood Road. Although controlled, it was suspected to be caused by an arsonist. Illegal campfire activity is also occasionally reported. With respect to PG&E facilities, their operational requirements have ensured that areas of about 20 feet around each electric tower structure remain clear of vegetation.

Responsibility for firefighting in Edgewood rests with the California Department of Forestry (under contract with San Mateo County and Redwood City). These agencies have a mutual response agreement, and usually, the closest fire fighting units are dispatched. Firefighting units are self contained with fire suppression equipment and supplies. Historically, CDF has been the main service provider.

Within the Old Stage area, fire extinguishers are located near the restroom unit and

in County Park vehicles, and are readily available for staff use. During fire season, County Park vehicles are also equipped with 5-gallon water pumps.

The current road system within Edgewood provides limited or minimal access for fire fighters and emergency vehicles.

5. Security

The County Parks and Recreation Division assumed security and patrol responsibility during negotiations for the final purchase of Edgewood in 1981. Trained volunteers often assist in patrol duties. The on-site County staff observe park visitor activities while on foot or in a vehicle, and usually in conjunction with performing other duties. Volunteers also assist County staff with foot and horse patrols. The volunteers observe and report trail use, problems and violations; they educate and assist trail users; and some enforce park regulations such as the prohibition of dogs, bikes, and off-trail use. The volunteers also assist staff in dealing with unauthorized after-hour use at Edgewood. Staff and volunteer efforts have been effective in reducing site abuse, vandalism, and adverse environmental impacts.

RELEVANT LEGAL AND INSTITUTIONAL DOCUMENTATION

1. Resolution 56062, dated May 5, 1992 -- Resolution Designating Edgewood County Park as a Natural Preserve Under Terms of the County General Plan.

2. Resolution 57385, dated July 27, 1993 -- Resolution Authorizing and Directing the Execution of an Amendment to the Joint Powers Agreement with the Midpeninsula Regional Open Space District Entered into on September 16, 1980.

3. Resolution 57386, dated July 27, 1993 -- Resolution Authorizing and Directing the Execution of a Modification to a Park, Recreation, Scenic, and Open Space Easement Granted to the Midpeninsula Regional Open Space District on September 16, 1980.

4. Correspondence from United States Department of the Interior, Fish and Wildlife Service dated October 17, 1996.

5. United States Department of Fish and Wildlife Service. Correspondence re Edgewood dated May 23, 1997 from White, W.S., Field Supervisor.

6. Correspondence from United States Department of the Interior, Fish and Wildlife Service dated November 3, 1992.

7. Correspondence from California Department of Fish and Game dated November 3, 1992.

8. San Mateo County General Plan's Park and Recreation Facility Classification Definition, Development Standards and Planning and Management Guidelines for "Park".

9. San Mateo County General Plan's Park and Recreation Facility Classification Definition, Development Standards and Planning and Management Guidelines for "Natural Preserve".

RESOLUTION NO. 56062

BOARD OF SUPERVISORS, COUNTY OF SAN MATEO, STATE OF CALIFORNIA

****

RESOLUTION DESIGNATING EDGEWOOD COUNTY PARK AS A NATURAL PRESERVE UNDER THE TERMS OF THE COUNTY GENERAL PLAN

RESOLVED, by the Board of Supervisors of the County of San Mateo, State of California, that

WHEREAS, Edgewood County Park is recognized statewide for its biological diversity and tremendous beauty; and

WHEREAS, Edgewood County Park contains serpentine soil which supports many native plants and wildflowers such as Lupine, Owl's Clover, Cream Cups, Gold Fields and Tidy Tips including several rare and endangered species some found only at Edgewood County Park; and

WHEREAS, Edgewood County Park is highly valued for its research and educational uses as well as for its accessibility to our community; and

WHEREAS, the Board of Supervisors unamiously agreed earlier this year to suspend plans for a golf course at Edgewood County Park and appoint a committee of golfers, environmentalists and county officials to search for alternative sites; and

WHEREAS, the San Mateo County Board of Supervisors' Task Force Chaired by Supervisors Huening and Schumacher consisting of citizen golfers and environmentalists from our community have worked diligently to locate a site better suited to a county golf course and are recommending six alternative sites; and

WHEREAS, a Natural Preserve is defined by the County General Plan as, "a scenic and natural area where outstanding features as well as significant wildlife habitants are preserved in their present state for the enjoyment, education and well-being for the public," and as such adheres to the following standards: A County Natural Preserve should be of outstanding scenic and natural character; Primary resources typically should consist of woodlands, meadows, hillsides, canyons, creeks, lakes, ridgelines, shorelines, visually sensitive or prominent landscape features and rare, endangered or unusual natural resources; Public facilities should be limited to those necessary for public health, safety and education; and

WHEREAS, a Natural Preserve defined by the County General Plan holds to the following planning and management guidelines: The prime resource of the area should be determined. Preservation and enhancement of the prime resource should be the most important objective. Interpretation and enjoyment should be secondary management objectives; Development should be limited to foot trails, protective barriers, regeneration of indigenous vegetation, overlooks, signs, sanitary facilities, parking areas, interpretive centers and other minimal service facilities as may be required; Emphasis should be placed on locating natural preserves within 15 minutes of urban areas; Emphasis should be placed on the protection of rare, endangered, unusual or educationally important natural resources; Access should be controlled to provide adequate resource protection and sufficient buffers from adjacent environment should be provided within its boundaries; A natural preserve may be a separate unit of the county park system or be contained within a county park; and

NOW, THEREFORE, BE IT RESOLVED, that the Board of Supervisors of San Mateo County respectfully recommends to the San Mateo County Parks and Recreation Commission the designation pursuant to the County General Plan to include all 467 acres of Edgewood County Park as a Natural Preserve and thereby exclude all uses not consistent with the above definition of a natural preserve; and be it

FURTHER RESOLVED, that the Board of Supervisors respectfully requests the San Mateo County Parks and Recreation Commission to consider reviewing other County maintained parks currently not designated for inclusion as natural preserves.

DATED: MAY 5, 1992

Regularly passed and adopted this 5th day of May, 1992.

AYES and in favor of said resolution:

Supervisors: MARY GRIFFIN

TOM HUENING

ANNA G. ESHOO

TOM NOLAN

NOES and against said resolution:

Supervisors: WILLIAM J. SCHUMACHER

Absent Supervisors: NONE

President, Board of Supervisors
County of San Mateo
State of California

Certificate of Delivery
(Government Code section 25103)

I certify that a copy of the original resolution filed in the Office of the Clerk of the Board of Supervisors of San Mateo County has been delivered to the President of the Board of Supervisors.

RICHARD L. SILVER,
Clerk of the Board of Supervisors

RESOLUTION NO. 57385

BOARD OF SUPERVISORS, COUNTY OF SAN MATEO, STATE OF CALIFORNIA

* * * * * * * *

RESOLUTION AUTHORIZING AND DIRECTING THE EXECUTION OF AN AMENDMENT TO THE JOINT POWERS AGREEMENT WITH THE MIDPENINSULA REGIONAL OPEN SPACE DISTRICT ENTERED INTO ON SEPTEMBER 16, 1980

RESOLVED, by the Board of Supervisors of the County of San Mateo, State of California, that

WHEREAS, on September 16, 1980, the County of San Mateo ("COUNTY") and the Midpeninsula Regional Open Space District ("DISTRICT") entered into a Joint Powers Agreement, pursuant to the provisions of California Government Code section 6500 et seq., to provide for funding to purchase certain real property formerly known as the Edgewood State College Site (hereinafter "Edgewood Site") for open space and recreation purposes by DISTRICT and COUNTY, to establish the final vesting of title to the Edgewood Site, and to designate the responsibility for the management and maintenance of the portion of said property devoted to park, recreation, and open space use; and

WHEREAS, pursuant to the Joint Powers Agreement, on September 16, 1980, COUNTY granted to DISTRICT a Park, Recreation, Scenic and Open Space Easement, which easement is recorded as Document No. 96615AP (beginning at Reel 7995, Image 1503) in the Official Records of the County Recorder of the County of San Mateo; and

WHEREAS, COUNTY and DISTRICT desire to amend the Joint Powers Agreement to (1) provide for a modification of the terms and conditions of the Park, Recreation, Scenic and Open Space

Easement to eliminate high intensity recreational uses as permissible uses on Edgewood Park, and (2) provide for a mechanism for future discussions with the Golden Gate National Recreation Area (hereinafter "GGNRA") concerning future management of Edgewood Park; and

WHEREAS, a form of such amendment to Joint Powers Agreement has been presented to this Board for its review and approval;

NOW, THEREFORE, IT IS HEREBY RESOLVED AND ORDERED that the President of the Board of Supervisors shall execute that certain Amendment to Joint Powers Agreement, amending certain terms of the Joint Powers Agreement previously entered into with the Midpeninsula Regional Open Space District on September 16, 1980, and the Clerk of the Board shall attest to her signature thereto.

* * * * * * * *

/30[resjpa.edg]
CoC:MPM:jmm
07/19/93

Regularly passed and adopted this 27th day of July, 1993.

AYES and in favor of said resolution:

Supervisors: MARY GRIFFIN

TOM HUENING

TED LEMPERT

RUBEN BARRALES

MICHAEL D'NEVIN

NOES and against said resolution:

Supervisors: NONE

Absent Supervisors: NONE

Mary Griffin

President, Board of Supervisors
County of San Mateo
State of California

Certificate of Delivery
(Government Code section 25103)

I certify that a copy of the original resolution filed in the Office of the Clerk of the Board of Supervisors of San Mateo County has been delivered to the President of the Board of Supervisors.

RICHARD L. SILVER,
Clerk of the Board of Supervisors

RESOLUTION NO. 57386

BOARD OF SUPERVISORS, COUNTY OF SAN MATEO, STATE OF CALIFORNIA

* * * * * * * * *

RESOLUTION AUTHORIZING AND DIRECTING THE EXECUTION OF A MODIFICATION TO A PARK, RECREATION, SCENIC, AND OPEN SPACE EASEMENT GRANTED TO THE MIDPENINSULA REGIONAL OPEN SPACE DISTRICT ON SEPTEMBER 16, 1980

RESOLVED, by the Board of Supervisors of the County of San Mateo, State of California, that

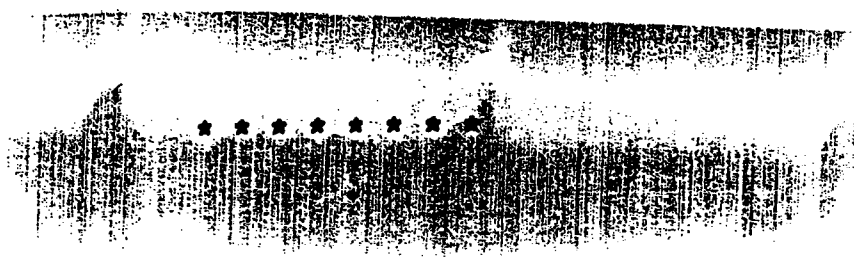
WHEREAS, on September 16, 1980, the County of San Mateo ("COUNTY") and the Midpeninsula Regional Open Space District ("DISTRICT") accepted, a Park, Recreation, Scenic and Open Space Easement over a portion of Edgewood Park (the "Subject Property") for the benefit of DISTRICT, its successors and assigns pursuant to a certain Joint Powers Agreement of the same date;

WHEREAS, DISTRICT and COUNTY have determined to amend the Joint Powers Agreement to allow for modification of the previously granted Park, Recreation, Scenic, and Open Space Easement to eliminate higher intensity recreational uses as allowed uses on the Subject Property; and

WHEREAS, DISTRICT and COUNTY now desire to modify the terms of the easement in accordance with the proposed amendment to the Joint Powers Agreement by conveying a modified Park, Recreation, Scenic and Open Space Easement which will supersede the Park, Recreation, Scenic and Open Space Easement granted on September 16, 1980; and

WHEREAS, a form of such modified easement has been presented to the Board for its review and approval;

NOW, THEREFORE, IT IS HEREBY RESOLVED AND ORDERED that the President of the Board of Supervisors shall execute that certain Modified Grant of Park, Recreation, Scenic and Open Space Easement modifying certain terms of the easement previously granted to the Midpeninsula Regional Open Space District on September 16, 1980, and the Clerk of the Board shall attest to her signature thereto.



/30[resjpa.mid]
CoC:MPH:jmm
07/19/93

Regularly passed and adopted this 27th day of July, 1993.

AYES and in favor of said resolution:

Supervisors: MARY GRIFFIN

TOM HUENING

TED LEMPERT

RUBEN BARRALES

MICHAEL D. NEVIN

NOES and against said resolution:

Supervisors: NONE

Absent Supervisors: NONE

President, Board of Supervisors
County of San Mateo
State of California

Certificate of Delivery
(Government Code section 25103)

I certify that a copy of the original resolution filed in the Office of the Clerk of the Board of Supervisors of San Mateo County has been delivered to the President of the Board of Supervisors.

RICHARD L. SILVER,
Clerk of the Board of Supervisors

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ecological Services
Sacramento Field Office
3310 El Camino Ave., Suite 130
Sacramento, California 95821-6340

IN REPLY REFER TO:

In Reply Refer To:
1-1-97-TA-48

October 17, 1996

Bernadine Alling
San Mateo County
Parks and Recreation Division
590 Hamilton Street, 4th Floor
Redwood City, California 94063

Subject: Edgewood Park and Natural Preserve Draft Master Plan, San Mateo County, California

Dear Ms. Alling:

This letter responds to your request for comments on the August, 1996 draft Edgewood County Park and Natural Preserve Master Plan (Plan) which was received in our office on August 22, 1996. The Plan will guide the future use and management of Edgewood and is intended to provide a framework for management of natural resources while providing recreational opportunities for the public. The U.S. Fish and Wildlife Service (Service) appreciates the obvious effort the San Mateo County Parks and Recreation Division (Division) has made to accommodate disparate interests while maintaining a conservation ethic with respect to native plants, animals and natural features of the park. The County is to be commended for its efforts on behalf of endangered species and for its proposed efforts involving community outreach and education. Our comments address only endangered species issues.

The Service is concerned about the possible effects of the Plan on federally listed endangered and threatened plant and animals species and serpentine grasslands. As discussed further under "Incidental take" below, Section 9 and the implementing regulations of the Endangered Species Act (Act) prohibit even small amounts of "take" of listed animal species, regardless of the ultimate impact of the project without a permit or exemption. Therefore, the Service recommends that the Division obtain a permit for incidental take as provided for under Section 10 (a)(1)(B) of the Act. The Division would need to prepare a Habitat Conservation Plan (HCP) for the Park and apply for the incidental take permit, which has an application fee of $25.00. The HCP would be similar to the Master Plan, but would focus on the selected alternative management plan and would provide a more detailed analysis of the Plan's likely impacts on special-status species. Forms and guidance for these procedures are available from this office; we will be happy to work with you in developing an appropriate application.

Our general and specific comments follow. Some of these issues could be addressed in detail in an HCP, should the Division decide to prepare one.

General comments:

1. Incidental take: A properly designed and maintained trail system should not threaten the federally endangered Bay checkerspot butterfly (*Euphydryas editha bayensis*) population at the site. To approach this ideal, unofficial trails would have to be closed and their formation discouraged, and some official trails might best be re-routed.

Although impacts from a well designed trail system would be expected to be small, the likelihood of small amounts of "take" of the threatened butterfly due to operation and maintenance of the trail system will be difficult to eliminate entirely; people and horses may stray from trails, trampling vegetation and possibly butterfly larvae, pupae or eggs. Unofficial trails or extreme conditions may create erosion hazards. Hikers may pick trailside vegetation or carelessly start fires, inexperienced trail workers may inadvertently damage sensitive plants, and so on.

It also appears that, despite the likely benefit to the butterfly of the habitat enhancement efforts contemplated in the Plan, these efforts would be likely to result in small amounts of take. Such take would be difficult if not impossible to avoid completely, and would result from trampling, inadvertent uprooting or disturbance of host plants, and inadvertent harassment of butterflies.

2. Discussion of impacts: The draft Plan contained no detailed discussion of the expected effects of each alternative on plant and animal species of concern and their occupied or potential habitat. Consideration of the specific effects of the preferred alternative in future drafts or an HCP would help the Service accurately evaluate potential impacts.

   In addition, the draft Plan did not discuss expected impacts of specific proposed management strategies or how the Division would choose among various strategies in particular situations. In what situation would the preferred technique be mechanical mowing versus use of chemicals versus prescribed burning? How will these decisions be made?

3. Monitoring: The Service recommends that the Division consider a detailed monitoring program to track federally listed plant and animal species as well as other species of concern in Edgewood Park, including federally proposed and candidate species and federal species of concern. Monitoring should also address the quality and quantity of occupied and potential habitat for the species.

   Along with this monitoring, the management plan should be adaptive and dynamic. It should require management strategies to be evaluated periodically. If populations of plant and animal species of concern are not responding as expected, the Plan ought to be flexible enough to allow changes in management to compensate for any unexpected population trends.

4. Wetlands: Based upon our review of the draft Plan, we note that the County may be required to obtain permits to fill or modify wetlands as required by the Clean Water Act, section 404. During the Army Corps of Engineers review of permit applications the Service is consulted concerning impacts to fish and wildlife resources including wetland habitats and species. In order to assist you with completing the Plan and any subsequent documents such as Environmental Impact Reports, we are providing Enclosure B. This document provides general guidelines which will assist you and the Service in conserving, protecting, and enhancing fish and wildlife and their habitats.

Specific comments:

1. The Plan should include comprehensive plant and animal species lists from recent surveys of the park as well as details of how surveys were conducted to substantiate the lists. The California Natural Diversity Data Base Rarefind records indicate that some plant species of concern occur in Edgewood Park which are not addressed in the Plan (e.g. *Lessingia arachnoidea*). A list of plant and animal species which should be considered for inclusion is enclosed.

The Service also recommends that the Division evaluate the presence and extent of potential, but currently unoccupied, habitat for federally listed species, federally proposed and candidate species, and federal species of concern. Avoidance of suitable occupied and unoccupied habitat should be specifically addressed. These sites may play an important role in recovery of listed species.

2. It should be noted that the Service has proposed to discontinue the designation of Category 2 species (Federal Register 61 (40): pp. 7549-7613). Former Category 2 species are currently being referred to as Species of Concern.

3. The Service recommends that publicly available Plan documents should discuss and map locations of listed and proposed species only in a general way. Including exact locations of populations may increase the species' vulnerability to collecting and other human-related impacts.

4. The Plan should have a specified term, such as 5 or 10 years, after which it is reevaluated and is renewed or revised.

Thank you for providing the Service the opportunity to comment on the draft Edgewood Park and Natural Preserve Master Plan. Please contact David Wright at 916/979-2725, Jan Knight or Diane Elam at 916/979-2120 of my staff if you have any questions about this letter, if you wish to consider developing a habitat conservation plan, or if you require other assistance in developing the final plan.

Sincerely,

for Joel A. Medlin
Field Supervisor

Enclosure

cc: CDFG, Carl Wilcox
CNPS, David Tibor
CNPS, Carolyn Curtis
Friends of Edgewood, Bill Korbholz
San Mateo County Trail Users Group,
Adda Quinn

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
Sacramento Field Office
3310 El Camino Ave., Suite 130
Sacramento, California 95821-6340

IN REPLY REFER TO:

1-1-97-TA-1325

May 23, 1997

Bernadine Alling
San Mateo County
Parks and Recreation Division
590 Hamilton Street, 4th Floor
Redwood City, California 94063

Subject: Edgewood Natural Preserve Master Plan, San Mateo County, California

Dear Ms. Alling:

This letter responds to your request for comments on the May, 1997 Edgewood Natural Preserve Master Plan (Plan). The U.S. Fish and Wildlife Service (Service) recognizes the efforts of San Mateo County Parks and Recreation Division (Division) to reconcile differences among various stakeholders in the process of developing the Plan. The County is to be commended for its commitment to maintenance of the area as a natural preserve and for its conservation ethic with respect to native plants, animals and natural features of the preserve.

General comments:

1. As mentioned in our letter of October 17, 1996, the Service recommends that, as the Plan is implemented, the Division prepare a Habitat Conservation Plan (HCP) and obtain a permit for incidental take as provided for under Section 10(a)(1)(B) of the Endangered Species Act (ESA). Preparation of an HCP is consistent with the goals of protection, preservation, restoration and responsible stewardship of Edgewood Natural Preserve; a 10(a)(1)(B) permit would be necessary should restoration and other activities result in take of federally listed species. An HCP would also be valuable for the Division and the Service as a guide to how restoration, maintenance, and management activities might be designed to minimize their impacts to sensitive species and habitats.

2. The Service recommends that the Division consult with the California Department of Fish and Game (CDFG) regarding California Endangered Species Act (CESA) and California Environmental Quality Act (CEQA) issues, including exemption from CEQA.

Specific comments:

1. Definitions, #8: The Service recognizes that in the Plan, sensitive habitats are defined based on the presence of legally protected species. We recommend that the definition be reworded to state specifically that the species considered (i.e., federally listed species and State-listed and candidate species) are those with legal protection.

2. Permitted Uses, #14: Restoration of damaged habitat may require permitting by several agencies. We recommend that the phrase "subject to permit issuance" be clarified so that it makes explicit which agencies may need to be contacted for permitting. When restoration

involves or impacts species with Federal status, permits from the Service may be required. Similarly, restoration involving or impacting species with State status would require permits from the CDFG. Permits from the Service and CDFG would be required in addition to any permits issued by the County.

3. Natural Resource Protection, #18: Before any resource management technique or strategy is to be undertaken at Edgewood Preserve, the Service recommends that the Service be consulted. Coordination on the planning and implementation of management techniques would best be conducted through preparation of an HCP which would address various management techniques and their impacts on sensitive plant and animal species and their habitats.

4. Natural Resource Protection, #20: We recommend the following wording be used to describe allowable native plant collection: "Prohibit the collection of California native plants and seeds at Edgewood Preserve for purposes other than restoration of damaged habitat or other recovery activities approved by the California Department of Fish and Game (CDFG) for species with State status, the U.S. Fish and Wildlife Service (USFWS) for species with Federal status, and the San Mateo County Parks and Recreation Division for other native plant species. Appropriate permit approval is required for plant or seed collection at Edgewood Preserve. Permits for work with State-listed species are issued by CDFG Plant Conservation Program, for federally-listed species, by USFWS, and for other native species at Edgewood Preserve by San Mateo County."

5. Natural Resource Protection, #23: The Service commends the Division for requiring periodic evaluation of management activities. We recommend that a specific time period for evaluations be specified, perhaps every five years. The evaluation should include an analysis of the status of sensitive plants, animals and habitats at Edgewood Preserve (see below). We suggest adding a sentence to specify that management activities will be modified if populations of plant and animal species of concern are not responding as expected.

   As mentioned in our previous correspondence, the Service recommends that the Division design and implement a detailed monitoring program to track federally listed plant and animal species, other species of concern in Edgewood Natural Preserve, and the quality and quantity of occupied and potential habitat for these species. The Service is aware of the work of the California Native Plant Society in this respect and suggests that a formal monitoring plan for plants could be developed and implemented with their help. In general, we suggest that populations of annual plant species be monitored at least every two years and populations of perennials at least every five years. We also recommend that surveys be conducted for federally-listed Bay checkerspot butterfly (*Euphydryas editha bayensis*), San Francisco garter snake (*Thamnophis sirtalis tetrataenia*) and red-legged frog (*Rana aurora draytoni*). With respect to the San Francisco garter snake and the red-legged frog, we note that the last surveys for these species at Edgewood were conducted thirteen years ago.

6. Operations and Maintenance, #31: The Service recommends that the evaluation period be specified, perhaps every five years.

7. Access, Parking and Associated Amenities, #38: The Service is concerned that fire management and suppression activities have the potential to seriously damage sensitive species and their habitats (in particular, the *Acanthomintha duttonii* habitat). We recommend that the Division work with the Service and other appropriate agencies in developing a fire management strategy that would take these concerns into account. Coordination with the Service would best be conducted through preparation of an HCP.

8. Plan Monitoring and Amendment, #44: As mentioned in previous correspondence, the Service recommends that the Plan have a specified term, such as 5 or 10 years, after which it is reevaluated and renewed or revised.

9. Page A-19, third full paragraph under Vegetation: Diane Steeck has also conducted research on the San Mateo thornmint (*Acanthomintha duttonii*).

10. Page A-32, last line: The Plan should note that *Cirsium fontinale* var. *fontinale* is federally listed as endangered.

11. Page A-33, footnote 8: Check with Susan Sommers about whether there was more than one individual of *Cirsium fontinale* var. *fontinale* at the Edgewood location in the past. Also, it is difficult to predict a species' mating system; it is preferable to base conclusions on experimental analysis of the mating system.

12. Page A-36, last paragraph and page A-37: As noted above, the Service recommends that Edgewood Preserve be resurveyed for sensitive amphibian and reptile species.

13. Page A-37, first paragraph about Birds: Does the Plan mean to state that California horned lark (*Eremophila alpestris actia*) and loggerhead shrike (*Lanius ludovicianus*) are no longer considered candidates for Federal listing? No longer species of concern? The statement needs to be clarified.

14. Page A-59, Fire Management: As noted in 7 above, the Service is concerned that fire management activities may adversely impact sensitive plant and animal species and/or their habitats. This issue could be addressed in an HCP.

15. Page C-4, third full paragraph: Certain management activities may require permits from the CDFG as well as the Service. This should be stated in the Plan.

Thank you for providing the Service the opportunity to comment on the Edgewood Natural Preserve Master Plan. Please contact David Wright at 916/979-2725, Jan Knight or Diane Elam at 916/979-2120 of my staff if you have any questions about this letter, if you wish to consider developing a habitat conservation plan, or if you require other assistance.

Sincerely,

Dale A. Pierce

for Wayne S. White
Field Supervisor

cc: CDFG, Carl Wilcox
CDFG, Deborah Hillyard
CDFG, Sandra Morey
CNPS, David Tibor
CNPS, Carolyn Curtis
Friends of Edgewood, Bill Korbholz

United States Department of the Interior

TAKE PRIDE IN AMERICA

FISH AND WILDLIFE SERVICE
Fish and Wildlife Enhancement
Sacramento Field Office
2800 Cottage Way, Room E-1823
Sacramento, California 95825-1846

In Reply Refer To:
1-1-93-TA-098

November 3, 1992

Mr. Paul Koenig
Environmental Services Agency
County of San Mateo
County Government Center
Redwood City, California 94063

Subject: Proposed Golf Course at Edgewood County Park, San Mateo County, California

Dear Mr. Koenig:

This responds to your October 8, 1992, request for information to prepare a scope of work for the proposed golf course at Edgewood County Park in San Mateo County, California. The U.S. Fish and Wildlife Service (Service) is concerned about the possible effects of the proposed project on federally listed, proposed and candidate species, and wetland resources. The comments and recommendations in this letter are based on the material supplied by your office that was received by the Service on October 22, 1992.

Regarding fish and wildlife resources, the environmental document should assess fully the impacts of the proposal and its alternatives on species populations and their habitats, with emphasis on wetlands and endangered, threatened, or candidate species. The document should state clearly the purposes of, and document the needs for the proposed project so that the capabilities of the various alternatives to meet those purposes and needs can be determined readily. The document should include a thorough description of all the facilities to be constructed as part of the proposal. Figures accurately depicting proposed project features in relation to natural features in the project areas also should be included.

The threatened bay checkerspot butterfly (*Euphydryas editha bayensis*) has been documented to inhabit serpentine grasslands at the project site. This animal is fully protected under the Endangered Species Act of 1973, as amended (Act). Activities that may adversely impact this animal could violate section 9 of the Act, which prohibits the "take" of any federally listed endangered or threatened species by any person subject to the jurisdiction of the United States. Take of the bay checkerspot butterfly could result from actions that destroy or damage its habitat.

Take incidental to an otherwise lawful activity may be authorized by one of two procedures. If a Federal agency is involved with the permitting, funding, or carrying out of the project, then initiation of formal consultation between that agency and the Service pursuant to section 7 of the Act is required if it is determined that the proposed project may affect a federally listed species. Such consultation would result in a biological opinion that addresses the anticipated effects of the project to the listed species and may authorize a limited level of incidental take. If a Federal agency is not involved with the project, and federally listed species may be taken as part of the project, then an incidental take permit pursuant to section 10(a) of the Act would need to be obtained. The Service may issue such a permit upon completion of a satisfactory conservation plan for the listed species that would be affected by the project.

The environmental document should discuss take and potential adverse impacts to the bay checkerspot butterfly resulting from the proiposed golf course. To address this issue, the Service recommends that any serpentine grassland habitat be mapped accurately, along with the locations and approximate numbers of the foodplants of the larvae and adult nectar sources. In addition, a qualified entomologist should conduct an adequate survey for the butterfly during its activity period. The Service recommends that destruction or damage to any areas containing serpentine habitat and potential movement corridors be avoided. If the project is not designed to avoid adverse impacts to the bay checkerspot butterfly and any other endangered or threatened species that may be present at the project site, authorization to take listed species must be obtained under section 7 or 10(a) of the Act.

The County of San Mateo should provide information on any listed, proposed, or candidate species that may be found at the project site. The following candidate species should be addressed (numbers in parentheses indicate candidate status): San Francisco garter snake (*Thamnophis sirtalis tetrataenia*) (Endangered), loggerhead shrike (*Lanius ludovicianus*) (2), California horned lark (*Eremophila alpestris actia*) (2), western spadefoot toad (*Scaphiopus hammondi hammondi*) (2R), California tiger salamander (*Ambystoma californiense*) (2), California red-legged frog (*Rana aurora draytonii*) (1), Opler's longhorn moth (*Adela oplerella*) (2), Edgewood micro-blind harvestman (*Microcina edgewoodensis*) (2), Edgewood Park blind harvestman (*Calicina minor*) (2), *Acanthomintha duttoni* (San Mateo thornmint) (Endangered), *Hesperolinon congestum* (Marin dwarf flax) (1), *Pentachaeta bellidiflora* (2), *Silene verecunda* ssp. *verecunda* (Mission Delores campion) (2), *Fritillaria liliacea* (fragrant fritillary) (2), and *Cirsium fontinale* var. *fontinale* (fountain thistle) (2). Although candidate species are not protected under Federal law, the 1988 amendments to the Act require the Service to monitor their status. If any of these candidates decline precipitously, they could be listed under an emergency basis. The Service recommends that adequate surveys be conducted during the proper flowering or activity periods by qualified biologists. The findings of the surveys and measures that will be taken to avoid/mitigate any adverse impacts to these species should be included in the environmental document. In addition, as part of a settlement agreement for a lawsuit brought by an environmental group, the Service will be issuing proposed rules in the near future to list a number of category-1 candidate plant species in California, including some or all of those in the project area.

Please contact Chris Nagano of my staff at the letterhead address or at 916/978-4866 if you have any questions. Thank you for your interest in endangered species and California's remaining wildlife habitats.

Sincerely,

Wayne S. White
Field Supervisor

STATE OF CALIFORNIA—THE RESOURCES AGENCY PETE WILSON, Governor

DEPARTMENT OF FISH AND GAME
POST OFFICE BOX 47
YOUNTVILLE, CALIFORNIA 94599
(707) 944-5500

November 3, 1992

Mr. Paul Koenig
County of San Mateo
County Government Center
Redwood City, California 94063

Dear Mr. Koenig:

Department of Fish and Game personnel have reviewed your notice of intent to prepare an environmental constraints analysis for construction of a golf course on a portion of Edgewood County Park. The area under consideration contains a number of State and Federally-listed plant and animal species, which are associated with serpentine grassland on the project site.

Edgewood Park is within the range of three rare insects, one of which, the Bay checkerspot butterfly, *Euphydryas editha* ssp. *bayensis*, is listed by the U. S. Fish and Wildlife Service (USFWS) as threatened. The other two species, the Edgewood blind harvestman, *Calicina minor*, and the Edgewood micro-blind harvestman, *Microcina edgewoodensis*, are both endemic to the serpentine in Edgewood Park and are candidates for Federal listing.

Information about the Bay checkerspot indicates that this butterfly was historically distributed across virtually all serpentine soil-based grasslands from San Mateo to Santa Clara counties. Bay checkerspot has a population structure that considers the entire range as a metapopulation, characterized by periodic increases and decreases in population numbers. The extinction of local populations and subsequent recolonizations are part of this regional population structure of the Bay checkerspot butterfly. This information indicates that virtually all of the serpentine grassland areas within Edgewood County Park could be considered suitable habitat for the Bay checkerspot. In view of the above, the county should request an opinion from USFWS regarding the potential effects of this project on the Bay

checkerspot. Should the USFWS determine that "take" of a listed species would occur as a result of the proposed golf course, the county will be required to prepare a Habitat Conservation Plan in order to receive a permit for take under Section 10(a) of the Federal Endangered Species Act.

Edgewood County Park contains habitat for four listed plant species: San Mateo thornmint, *Acanthomintha obovata ssp. duttonii*, California and Federally endangered; fountain thistle, *Cirsium fontinale* var. *fontinale*, California endangered and Federal candidate; dwarf flax, *Hesperolinon congestum*, California threatened and Federal candidate; and white-rayed pentachaeta, *Pentachaeta bellidiflora*, California endangered and Federal candidate. A proposed rule on the three federal candidate species is expected early in 1993. In addition, there are several other rare plant species that occur in Edgewood County Park: San Francisco collinsia, *Collinsia franciscana*, western leatherwood, *Dirca occidentalis*, northern malacothamnus, *Malacothamnus arcuatus*, and valley oak, *Quercus lobata*. Fragrant fritillary, *Fritillaria liliacea*, is considered rare and endangered.

The Department's Natural Diversity Data Base considers two communities that occur on serpentine to be of significance: mixed serpentine chaparral, considered to be of limited distribution and very threatened; and serpentine bunchgrass, of limited distribution and threatened. Because these two plant communities are considered to be significant resources, the constraints analysis needs to identify the extent of their presence on site. This is particularly important, as the serpentine grassland community provides the matrix within which are found the four listed plant species as well as the three rare insect species.

Transplantation and propagation have not been shown to be effective measures to mitigate the loss of rare species; success rates are typically very low. While relocation of rare species has met with limited success in some species, it is generally successful only in those areas where suitable habitat exists that for whatever reason is not currently occupied by the species of concern. Rare plants and animals are generally rare not just because there is a lack of individuals, but because of the lack of suitable habitat and an increase in numbers of individuals is not usually effective in increasing or maintaining the overall population (or replacing lost individuals) unless there is a concomitant increase in the available habitat. In serpentine communities, this is further complicated by the fact that there can be great differences in soil chemistry within a local area.

This will influence survival of individuals on a very site specific basis, and soil that has been disturbed can further complicate relocation efforts.

The Department views avoidance as the only appropriate mitigation for loss of species on serpentine habitat. After avoidance, the second preferred alternative is off-site habitat purchase and preservation combined with experimental translocation onto existing nonoccupied habitat or created habitat. Creation of habitat is the least preferred alternative, and no mitigation plan would be acceptable unless the county is able to demonstrate conclusively that the proposed mitigation measures would ensure a successful recreation of the populations and habitat area to be impacted prior to disturbance of existing habitat. Mitigation will be based on no net loss of acres of habitat and numbers of individuals. This may be particularly difficult at Edgewood County Park as there simply is no other place on earth that contains these unique characteristics and thus would provide a suitable site for off-site habitat purchase and/or creation of habitat. In addition, the county will be required to enter into a Mitigation Agreement with the Department regarding any activities that affect the State-listed species.

Fountain thistle, *Cirsium fontinale* var. *fontinale*, is typically found in seeps and springs of serpentine areas. Presence of this habitat type would indicate the need for consultation with the U. S. Army Corps of Engineers regarding a permit under section 404 of the Clean Water Act. Should a Federal permit be required, or Federal funds be used in the project, consultation with USFWS will be required regarding the Federally-listed species.

Evaluation of the environmental constraints on the site would include consideration of not only the status of the resources of the site, but law and Department policy in regard to appropriate mitigation of impacts to identified sensitive resources. Edgewood Park is considered by the Department as one of the most sensitive areas in the State, primarily due to the presence of the serpentine bunchgrass community and the unique suite of rare plants and animals that occur in conjunction with this community. In recognition of the unique qualities of the Edgewood Park area, the site is designated by the Department as a Significant Natural Area (SNA). Realistic constraints analysis will need to identify the total area within which both construction of the golf course and long-term protection of the sensitive resources on site can take place, since there is simply not another area with values equivalent to Edgewood Park that could serve as the site of any potential off-site mitigation.

Thank you for the opportunity to provide information regarding the proposed constraints analysis for Edgewood County Park. Should you have questions regarding our comments, please contact Ms. Deborah Hillyard, Plant Ecologist, at (408) 726-3847 or at the letterhead address.

Sincerely,

Brian Hunter
Regional Manager
Region 3

cc: Ms. Jan Knight,
U. S. Fish and Wildlife Service
Sacramento

Mr. Chris Nagano
U. S. Fish and Wildlife Service
Sacramento

PARK

DEFINITION

A spacious area of outstanding scenic and natural character where outdoor recreation opportunities and facilities may be provided for public convenience and enjoyment and within which special natural areas, geologic exhibits or historic places can be set aside.

STANDARDS

1. The major portion of a park should include (or potentially include) an area of outstanding scenic and natural character. This area should be designated as a Natural Area for planning and management purposes.

2. A smaller portion(s) of a park should be suitable for accommodating a variety of recreation activities. The area(s) should be designated as a Facilities Cluster(s) for planning and management purposes.

PLANNING AND MANAGEMENT GUIDELINES

1. Emphasis should be placed on locating County parks within 15 minutes of urban areas.

Natural Areas

2. The purpose of Natural Areas is to assure the protection of the natural environment within a significant portion of a County park.

3. The most important management objective is to determine the prime resource of the park and to protect and enhance it.

4. Only those recreation activities compatible with this primary management objective should be allowed.

5. Development of recreation facilities should be limited to those which make the unit available for public enjoyment and convenience in a manner which is consistent with the protection and enhancement of the prime resource. Development may include facilities for nature interpretation, hiking and horseback riding trails. Access should be controlled.

6. Resource management techniques such as tree cutting, controlled burning, reforestation and planting may be used to preserve, maintain or recreate the desired environmental setting. Preference should be given to planting native species.

Facilities Cluster

7. Facilities Clusters should contain substantially all of the recreation development that is provided within a County park.

8. Development in a facilities cluster should be limited to those facilities which are consistent with the protection and enhancement of the primary resource. Development may include campgrounds, youth group camps, picnic areas, commercial concessions, nature interpretive facilities, nature, hiking and horseback riding trails and equestrian facilities. Access should be controlled.

9. All developed facilities should be designed, landscaped and managed to harmonize visually with the surrounding natural environment.

NATURAL PRESERVE

DEFINITION

A scenic and natural area where outstanding features as well as significant wildlife habitats are preserved in their present state for the enjoyment, education and well-being of the public.

STANDARDS

1. A County Natural Preserve should be of outstanding scenic and natural character.

2. Primary resources typically should consist of woodlands, meadows, hillsides, canyons, creeks, lakes, ridgelines, shorelines, visually sensitive or prominent landscape features and rare, endangered or unusual natural resources.

3. Public facilities should be limited to those necessary for public health, safety and education.

PLANNING AND MANAGEMENT GUIDELINES

1. The prime resource of the area should be determined. Preservation and enhancement of the prime resource should be the most important management objective. Interpretation and enjoyment should be secondary management objectives.

2. Development should be limited to foot trails, protective barriers, regeneration of indigenous vegetation, overlooks, signs, sanitary facilities, parking areas, interpretative center and other minimal service facilities as may be required.

3. Emphasis should be placed on the protection of rare, endangered, unusual or educationally important natural resources.

4. Emphasis should be placed on locating natural preserves within 15 minutes of urban areas.

5. Access should be controlled to provide adequate resource protection, and sufficient buffers from adjacent environment should be provided within its boundaries.

6. A natural preserve may be a separate unit of the County park system or be contained within a County park.

ATTACHMENT A-2

PLANT SPECIES AT EDGEWOOD

1. The Flora of Edgewood County Park, California Native Plant Society, 1996.

2. Checklist of Plants at Edgewood Alphabetically by Common Name, Toni Corelli.

3. Bryophytes at Edgewood, 1994-1995.

THE FLORA OF EDGEWOOD COUNTY PARK

compiled by

Toni Corelli, Botanist

for the Santa Clara Valley Chapter

of the California Native Plant Society

REVISED APRIL 1993, JUNE 1994, AUGUST 1996

Introduction

Edgewood County Park is comprised of 467 acres located at the intersection of Interstate 280 and Edgewood Road in Redwood City and Woodside. The Park is known for the biological diversity of plants and animals represented in a single area. Contained within this flora are 470 vascular plant species representing 76 plant families and 9 plant communities.

Edgewood Park is especially well known for its serpentine grasslands, which become spectacular carpets of wildflowers in spring. To date, the rare, threatened, and endangered species discovered in Edgewood Park include 11 plants, 2 plant communities, the bay checkerspot butterfly (*Euphydryas editha ssp. bayensis*), and two arachnids. There is much ongoing research conducted at the park because of the biological diversity.

Acknowledgments

This flora was partially compiled from the many years of work by Susan C. Sommers contained in her work, Partial Flora of Edgewood County Park, 1987. Many others contributed to this booklet as well including: John Allen, Brenda Butner, Sally Casey, Carolyn Curtis, Ken Himes, Midpeninsula Regional Open Space District, Bart O'Brien, Mary Simpson and Jean Sorensen.

This publication was made possible by the Santa Clara Valley Chapter of the California Native Plant Society.

Illustrations by John Allen and Jean Sorensen.

FAMILY/GENUS SPECIES	COMMON NAME	PAGE # (Thomas)	PLANT COM.
Aceraceae Maple Family			
Acer macrophyllum	bigleaf maple	232	FW,MEF
Aizoaceae Carpet Weed Family			
Dorotheanthus bellidiformis	**Livingston daisy**		
Anacardiaceae Sumac Family			
Toxicodendron (Rhus) diversilobum	poison oak	230	C,FW,MEF
Apiaceae Carrot Family			
Angelica tomentosa	wood angelica	262	FW,R
Anthriscus caucalis (scandicina)	**bur-chervil**	257	FW
Bowlesia incana	bowlesia	258	FW
Conium maculatum	**poison hemlock**	260	D,G
Daucus pusillus	rattlesnake weed	257	G,SG
Eryngium aristulatum	coyote thistle	255	SG
Foeniculum vulgare	**fennel**	258	D,G
Lomatium californicum	California lomatium	261	FW
Lomatium caruifolium	caraway-leaved lomatium	261	SC,SG
Lomatium dasycarpum	woolly-fruited lomatium	261	SC,SG
Lomatium macrocarpum	large-fruited lomatium	261	SC,SG
Lomatium utriculatum	bladder parsnip	261	SC,SG
Osmorhiza chilensis	sweet cicely	255	FW,MEF
Perideridia kelloggii	yampah	258	G
Sanicula bipinnata	poison sanicle	257	G,FW
Sanicula bipinnatifida	purple sanicle	257	SG
Sanicula crassicaulis	pacific sanicle	256	FW,MEF
Sanicula laciniata	coast sanicle	256	C,FW
Sanicula tuberosa	turkey pea	257	SC,SG
Scandix pecten-veneris	**venus' needle**	255	D
Tauschia kelloggii	Kellogg's tauschia	259	C,FW,G
Torilis arvensis	**hedge parsley**	256	D
Torilis nodosa	**knotted hedge parsley**	255	FW
Yabea (Caucalis) microcarpa	California hedge parsley	257	C,FW
Apocynaceae Dogbane Family			
Vinca major	**periwinkle**	273	D
Araceae Calla or Arum Family			
Zantedeschia aethiopica	**calla lily**	111	D
Arecaceae (Palmae) Palm Family			
Erythea edulis	**Guadalupe Island palm**	111	D
Asclepiadaceae Milkweed Family			
Asclepias fascicularis	narrow-leaved milkweed	274	C,G
Asteraceae Sunflower Family			
Achillea millefolium	yarrow	370	SG
Achyrachaena mollis	blow wives	359	G,SG
Adenocaulon bicolor	trail plant	354	RF
Agoseris heterophylla	mountain dandelion	342	G,FW,SG
Artemisia californica	California sagebrush	372	C
Artemisia douglasiana	mugwort	372	C,FW
Aster chilensis	common California aster	351	FW
Aster radulinus	rough-leaved aster	351	FW

Asteraceae cont.			
Baccharis douglasii	marsh baccharis	346	M
Baccharis pilularis	coyote brush	346	C
Baeria chrysostoma (see Lasthenia californica)			
Calycadenia multiglandulosa	rosin weed	364	G,SG
Carduus pycnocephalus	**Italian thistle**	380	D,G
Centaurea calcitrapa	**purple star-thistle**	377	D,G
Centaurea melitensis	**tocalote**	377	G,SG
Centaurea soistitialis	**yellow star-thistle**	377	D,G
Chamomilla suaveolens	**pineapple weed**	371	D,G
Cichorium intybus	**chicory**	339	D,G
**Cirsium fontinale fontinale*	*fountain thistle*	378	SG
Cirsium vulgare	**bull thistle**	378	D,G
Conyza sp.	horseweed	351	C,FW
Crepis vesicaria taraxacifolia	**hawk's beard**	344	G,SG
Eriophyllum confertiflorum	golden yarrow	366	C,SG,SC
Eriophyllum staechadifolium	lizard tail	366	C
Filago gallica	**narrow-leaved filago**	356	G,SG
Gazenia linearis	**gazenia**		D
Gnaphalium canescens beneolens	fragrant everlasting	355	C
Gnaphalium purpureum	purple cudweed	355	FW
Gnaphalium ramosissimum	pink everlasting	355	C,G
Gnaphalium stramineum (chilense)	cotton-batting plant	355	FW,G
Grindelia camporum	gumplant	346	G
Grindelia hirsutula	hirsute grindelia	346	G
Heterotheca sessiliflora	goldenaster		G
Lactuca serriola	**prickly lettuce**	343	D,G
Lactuca saligna	**willow lettuce**	343	D,G
Helenium puberulum	sneezeweed	367	M
Helianthus californicus	California sunflower	359	M
Hemizonia congesta luzulifolia	hayfield tarweed	364	G,SG
Hesperevax (Evax) sparsiflora	erect evax	356	SG
Hypochaeris glabra	**smooth cat's ear**	341	D,G,SG
Hypochaeris radicata	**rough cat's ear**	341	D,G,SG
Lactuca saligna	**willow lettuce**	343	D,G
Lagophylla ramosissima	common hareleaf	359	G,SG
Lasthenia californica (chrysostoma)	goldfields	368	G,SG
Layia platyglossa	tidy-tips	360	G,SG
Lessingia hololeuca	*woolly-headed lessingia*	*353*	*G,SG*
Madia elegans densifolia	common madia	362	G,SG
Madia exigua	threadstream madia	362	G,SG
Madia gracilis	slender tarweed	362	G,SG
Madia sativa	coast tarweed	362	G,SG
Matricaria matricarioides (see Chamomilla suaveolens)			
Micropus californicus	slender cottonweed	356	G,SG
Microseris douglasii	Douglas' microseris	341	G,SG
Monolopia gracilens	woodland monolopia	367	SC
Monolopia major	cupped monolopia	367	FW
Pentachaeta (Chaetopappa) bellidiflora	*white-rayed pentachaeta*	349	SG
Picris echioides	**bristly ox-tongue**	341	D,G
Psilocarphus brevissimus	dwarf woolly-heads	356	SC,SG
Rigiopappus leptocladus	rigiopappus	367	SG
Senecio aronicoides	groundsel	375	C,FW,MEF
Senecio breweri	Brewer's butterweed	375	MEF
Senecio mikanioides	**german-ivy**	374	M,R
Senecio vulgaris	**common groundsel**	374	D
Silybum marianum	**milk thistle**	377	D,G
Solidago californica	California goldenrod	349	C

Asteraceae cont.

Sonchus asper	**prickly sow thistle**	344	C
Sonchus oleraceus	**common sow thistle**	344	D
Stephanomeria virgata	tall stephanomeria	341	C
Tragopogon porrifolius	**salsify/oyster plant**	342	D,G
Wyethia angustifolia	narrow-leaved mule ears	357	G
Wyethia glabra	mule ears	357	FW,MEF

Boraginaceae Borage Family

Amsinckia menziesii intermedia	fiddleneck	289	G
Cryptantha flaccida	nievitas	291	SG
Cynoglossum grande	hound's tongue	288	FW,MEF
Plagiobothrys nothofulvus	popcornflower	293	G,SG

Brassicaceae Mustard Family

Barbarea orthoceras	winter cress	183	FW
Brassica rapa (campestris)	**field mustard**	179	D,G
Capsella bursa-pastoris	**sheperd's purse**	185	G
Cardamine (Dentaria) californica	milk maids	183	FW,MEF,Rf
Cardamine oligosperma	bitter-cress	183	FW
Guillenia (Thelypodium) lasiophylla	California mustard	184	SC,SG
Lepidium nitidum nitidum	shining peppergrass	186	G,SG
Lobularia maritima	**sweet alyssum**	187	D
Nasturtium officinale (see Rorippa nasturtium-aquaticum)			
Raphanus sativus	**radish**	178	D,G
Rorippa nasturtium-aquaticum	water cress	182	M
Sisymbrium altissimum	**tumble mustard**	184	D

Caprifoliaceae Honeysuckle Family

Lonicera hispidula vacillans	hairy honeysuckle	326	FW,MEF
Sambucus mexicana	blue elderberry	325	FW,MEF
Symphoricarpos albus laevigatus	snowberry	326	FW,MEF
Symphoricarpos mollis	creeping snowberry	326	FW,MEF

Caryophyllaceae Pink Family

Cerastium arvense	field chickweed	161	G
Minuartia (Arenaria) californica	dwarf sandwort	163	G,SG
Minuartia (Arenaria) douglasii	Douglas' sandwort	163	G,SG
Sagina apetala (barbata)	dwarf pearlwort	161	D
Sagina decumbens occidentalis	western pearlwort	162	M
Silene californica	California indian pink	165	SC
Silene gallica	**windmill pink**	165	D,G
Spergula arvensis (arvense)	**spurrey**	163	D,G
Spergularia rubra	**purple sand-spurrey**	164	D,G
Stellaria media	**chickweed**	162	D,G
Stellaria nitens	shining chickweed	162	G,SG

Chenopodiaceae Goosefoot Family

Chenopodium californium	goosefoot	153	FW

Cistaceae Rock-rose Family

Helianthemum scoparium (vulagre)	peak rush-rose	240	C

Convolvulaceae Morning-glory Family

Calystegia (Convolvulus) occidentalis	chapparal morning-glory	275	C,SC
Calystegia (Convolvulus) subacaulis	hill morning glory	275	G,SG

Cornaceae Dogwood Family

Cornus sericea (californica)	American dogwood	262	R
Cornus glabrata	brown dogwood	262	R

Crassulaceae Stonecrop Family

Crassula connata (Tillaea erecta)	pygmy-weed	188	SG

Cupressaceae Cypress Family

Cupressus macrocarpa	Monterey cypress	64	

Curcurbitaceae Gourd Family

Marah fabaceus	California man-root	330	FW
Marah oreganus	coast man-root	330	C,G

Cuscutaceae Dodder Family

Cuscuta californica	dodder	274	SC,SG

Cyperaceae Sedge Family

Carex sp.	sedge	103	M
Eleocharis acicularis	needle spike-rush	109	M
Eleocharis montevidensis	spike-rush	109	M

Dipsacaceae Teasel Family

Dipsacus sativus	**fullers teasel**	327	D,G

Dryopteridaceae Wood Fern Family

Dryopteris arguta	coastal wood fern	59	FW,MEF
Polystichum munitum	western sword fern	58	RF

Equisetaceae Horsetail Family

Equisetum telmateia braunii	giant horsetail	54	M,RF

Ericaceae Heath Family

Arbutus menziesii	madrone	265	FW,MEF
Arctostaphylos regismontana	*Kings Mountain manzanita*	*267*	*C*
Arctostaphylos tomentosa crinita	manzanita	268	C

Euphorbiaceae Spurge Family

Eremocarpus setigerus	turkey mullein	227	D,G
Euphorbia peplus	**petty spurge**	228	D,G

Fabaceae Legume Family

Acacia baileyana	**Bailey acacia**	202	D
Acacia dealbata	**silver wattle**	202	D
Acacia melanoxylon	**black acacia**	202	D
Acacia verticillata	**star acacia**	202	D
Astragalus gambelianus	Gambell's drawf locoweed	217	G,SG
Cytisus scoparius	**Scotch broom**	208	D
Genista (Cytisus) monspessulana	**French broom**	208	D
Lathyrus vestitus	hillside pea	220	FW,G
Lathyrus vestitus ochropetalus	wild pea	221	FW
Lotus corniculatus	**birdfoot trefoil**	210	D,G
Lotus humistratus	short-podded trefoil	210	G,SG
Lotus micranthus	small flowered trefoil	209	SG
Lotus purshianus	Spanish clover	209	D,G,FW
Lotus scoparius	California broom/deerweed	210	C,D
Lotus wrangelianus (subpinnatus)	Chile trefoil	210	G,SG
Lupinus albifrons	bush lupine	205	C,G

Fabaceae cont.			
Lupinus bicolor	bicolor lupine	206	G,SG
Lupinus formosus	summer lupine	205	G,SG
Lupinus microcarpus densiflorus	chick lupine	206	G
Lupinus succulentus	arroyo lupine	206	G
Medicago lupulina	**black medick**	**211**	**D,G**
Medicago polymorpha (vulgaris)	**burclover**	**211**	**D,G**
Medicago sativa	**alfalfa**	**211**	**D**
Melilotus officinalis	**yellow sweetclover**	**212**	**D,G**
Pickeringia montana	chaparral pea	207	C,SC
Robinia pseudoacacia	**black locust**	**207**	**D**
Rupertia (Psoralea) physodes	California tea	211	FW,MEF
Trifolium albopurpureum dichotomum	Indian clover	216	SG
Trifolium barbigerum	bearded clover	214	G
Trifolium bifidum decipiens	deceptive clover	216	SG
Trifolium campestre (procumbens)	**hop clover**	**215**	**D,G**
Trifolium depauperatum amplectens	sack clover	214	G,SG
Trifolium fucatum	sour clover	214	G
Trifolium hirtum	**rose clover**		**D**
Trifolium microdon	valparaiso clover	215	G
Trifolium pratense	**red clover**	**216**	**D**
Trifolium variegatum	white-tipped clover	215	G
Trifolium willdenovii (tridentatum)	tomcat clover	215	SG
Vicia americana americana	American vetch	219	MEF
Vicia benghalensis	**purple vetch**	**218**	**D,FW**
Vicia sativa	**spring vetch**	**219**	**D,G**
Fagaceae Oak Family			
Quercus agrifolia	coast live oak	137	C,FW,MEF
Quercus berberidifolia	scrub oak	137	C
Quercus douglasii	blue oak	137	FW
Quercus durata durata	leather oak	137	SC
Quercus lobata	valley oak	137	FW
Garryaceae Silk Tassel Family			
Garrya elliptica	coast silk tassel	263	C
Gentianaceae Gentian Family			
Centaurium davyi	Davy's centaury	272	G,SG
Centaurium muehlenbergii (floribundum)	June centaury	272	G,SG
Cicendia (Microcala) quadrangularis	timwort	272	G,SG
Geraniaceae Geranium Family			
Erodium botrys	**long-beaked filaree**	**223**	**G,SG**
Erodium cicutarium	**red-stemmed filaree**	**223**	**G,SG**
Erodium moschatum	**white-stemmed filaree**	**223**	**G,SG**
Geranium dissectum	**cut-leaved geranium**	**222**	**G,SG**
Geranium molle	**cranesbill**	**222**	**G,SG**
Grossulariaceae Gooseberry Family			
Ribes (Grossularia) californicum	hillside gooseberry	193	FW,MEF
Ribes malvaceum	chaparral current	192	FW,MEF
Ribes menziesii (Grossularia leptosma)	bay gooseberry	193	FW,MEF
Ribes sanguineum glutinosum	flowering current	192	FW,MEF
Hippocastanaceae Buckeye Family			
Aesculus californica	California buckeye	232	FW,MEF

Hydrophyllaceae Waterleaf Family			
Eriodictyon californicum	yerba santa	287	C,SC
Nemophila heterophylla	variable-leaved nemophila	284	FW,MEF
Nemophila menziesii atomaria	baby blue-eyes	284	G
Nemophila pedunculata	meadow nemophila	284	G
Phacelia californica	California phacelia	285	G,SG
Phacelia distans	common phacelia	286	SG
Phacelia divaricata	divaricate phacelia	286	SG
Phacelia imbricata	imbricate phacelia	286	C,G
Pholistoma auritum	fiesta flower	283	FW,MEF
Iridaceae Iris Family			
Iris douglasiana	Douglas' iris	128	G
Iris germanica	**bearded iris**		**D**
Sisyrinchium bellum	blue eyed grass	126	G,SG
Juglandaceae Walnut Family			
Juglans sp.	**walnut**		**D**
Juncaceae Rush Family			
Juncus bufonius	toad rush	115	G,M
Juncus effusus pacificus	rush	114	G,M
Juncus patens	common rush	114	G,M
Juncus xiphioides	iris-leaved rush	115	G,M
Luzula comosa (multiflora)	common wood rush	115	G,M
Lamiaceae Mint Family			
Acanthomintha (obovata) duttonii	*San Mateo thornmint*	296	SG
Lepechinia calycina	pitcher sage	300	C,FW
Mentha pulegium	**pennyroyal**	**299**	**D**
Monardella villosa	coyote-mint	297	C,G,SC
Pogogyne serpylloides	pogogyne	301	SC,SG
Satureja douglasii	yerba buena	301	C,SC,FW,MEF
Scutellaria tuberosa	Dannie's skull cap	296	FW,MEF
Stachys ajugoides rigida (quercetorum)	rigid hedge nettle	300	C,FW
Stachys pycnantha	short-spiked hedge nettle	300	SC
Lauraceae Laurel Family			
Umbellularia californica	California bay	173	FW,MEF
Liliaceae Lily Family (including Amaryllidaceae, Convallariaceae,Melanthaceae)			
Allium falcifolium (breweri)	sickle leaved onion	124	SG
Allium dichlamydeum	coastal onion	124	SG
Allium lacunosum	pitted onion	124	SC
Allium triquetrum	**wild onion**	**123**	
Brodiaea coronaria	coronary brodiaea	126	SG
Brodiaea elegans elegans	harvest brodiaea	126	SG
Brodiaea terrestris	dwarf brodiaea	126	SG
Calochortus albus	white globe lily/fairy lantern	118	SC,FW,MEF
Calochortus luteus	yellow mariposa lily	120	G,SG
Calochortus venustus	white mariposa lily	120	G,SG
Chlorogalum pomeridianum	amole/soap plant	117	ALL
Dichelostemma capitatum (puchella)	blue dicks	125	SG
Dichelostemma congestum (congesta)	ookow	125	C,SC,SG
Disporum hookeri	Hooker's fairy bells	122	RF
Fritillaria affinis (lanceolata)	mission bells/checker lily	118	FW,MEF
Fritillaria liliacea	*fragrant fritillary*	119	SG
Kniphofia uvaria	**red hot poker**	**118**	**D**

Liliaceae cont.			
Lilium pardalinum	leopard lily	118	R
Muilla maritima	muilla	124	SG
Narcissus jonquilla	**daffodil**		D
Narcissus pseudonarcissus	**daffodil**		D
Smilacina racemosa (amplexicaulis)	fat solomon seal	122	FW,MEF
Smilacina stellata (sessifolia)	slim solomon seal	122	FW,MEF
Trillium chloropetalum	giant trillium	121	RF
Triteleia hyancinthina	wild hyacinth	126	SG
Triteleia ixioides (lutea)	golden brodiaea	125	FW
Triteleia laxa	Ithuriel's spear	125	SG
Triteleia peduncularis	long-rayed hyacinth		
Zigadenus fremontii	Fremont's star lily	116	C,FW,MEF,SC
Linaceae Flax Family			
Hesperolinon congestum	*dwarf flax*	226	SG
Hesperolinon micranthum	small-flowered flax	225	SC
Linum bienne	**narrow-leaved flax**	225	D,G
Lythraceae Loosestrife Family			
Lythrum sp.	loosestrife	746	W
Malvaceae Mallow Family			
Malacothamnus fasciculatus (arcuatus)	*chaparral mallow*	238	SC
Sidalcea diploscypha	fringed sidalcea	236	G,SG
Sidalcea malvaeflora	checker mallow	236	G,SG
Melanthaceae Family see Liliaceae			
Myricaceae Wax Myrtle Family			
Myrica californica	California wax myrtle	133	RF
Myrtaceae Myrtle Family			
Eucalyptus globulus	**blue gum**	244	D
Oleaceae Olive Family			
Olea europaea	**olive**		D
Onagraceae Evening Primrose Family			
Camissonia (Oenothera) graciliflora	slender flowered primrose	251	SG
Camissonia (Oenothera) ovata	sun cups	251	G
Clarkia purpurea quadrivulnera	four-spotted clarkia	250	SG
Clarkia purpurea viminea	large godetia	249	SG
Clarkia rubicunda	farewell-to-spring	249	SG
Epilobium brachycarpum (paniculatum)	willow herb	246	G,SG
Epilobium canum (Zauschneria californica)	California fuchsia	245	C
Epilobium ciliatum(adenocaulon)	northern willow herb	247	M
Epilobium densiflorum (Boisduvalia)	dense-flowered boisduvalia	247	G,M
Epilobium minutum	minute willow herb	246	C
Orchidaceae Orchid Family			
Corallorhiza maculata	spotted coralroot	131	FW,MEF
Corallorhiza striata	striped coralroot	131	FW,MEF
Epipactis helleborine	**orchid**	129	MEF
Piperia elegans (Habenaria unalascensis elata)	elegant piperia	130	M

Orobanchaceae Broom-Rape Family			
Orobanche californica (grayana) jepsonii	Jepson's broom-rape	321	C
Orobanche fasciculata	clustered broom-rape	321	C,FW
Orobanche fasciculata franciscana (not recognized as a variety in Jepson Manual)			
Orobanche uniflora	naked broom-rape	321	FW
Oxalidaceae Wood Sorrel Family			
Oxalis pes-caprae	**Bermuda buttercup**	224	G
Papaveraceae Poppy Family			
Eschscholzia californica	California poppy	174	G,SG
Platystemon californicus	cream cups	174	SG
Pinaceae Pine Family			
Pseudotsuga menziesii	Douglas fir	63	MEF,RF
Plantaginaceae Plantain Family			
Plantago erecta	California plantain	322	G,SG
Plantago lanceolata	**English plantain**	322	G,SG
Poaceae Grass Family			
Agrostis hallii	Hall's bent grass	97	FW
Aira caryophyllea	**silver European hairgrass**	93	G
Avena barbata	**slender wild oat**	90	G
Avena fatua	**wild oat**	90	G
Avena sativa	**cultivated oat**	90	G
Brachypodium distachyon	**purple falsebrome**		G
Briza maxima	**rattlesnake grass**	77	D
Briza minor	**little quaking grass**	77	G
Bromus carinatus carinatus	California brome	78	FW,G
Bromus diandrus (rigidus)	**ripgut grass**	80	G
Bromus hordeaceus (mollis)	**soft chess**	79	FW,G
Bromus laevipes	woodland brome	79	FW
Bromus madritensis	**spanish brome**	79	D,G
Bromus madritensis rubens	**red brome**	79	D,G
Bromus sterilis	**barren brome**		G
Cortaderia sp.	**pampas grass**	75	D
Cynosurus echinatus	**hedgehog dogtail**	76	D
Danthonia californica	California oatgrass	91	G,SG
Deschampsia danthonioides	annual hairgrass	92	G,M
Deschampsis elongata	slender hairgrass	92	FW,G
Elymus glaucus	blue wildrye	87	FW,MEF
Elymus glaucus X E. multisetus (Sitanion hanseni)	squirreltail	86	G,SG
Elymus multisetus (Sitanion jubatum)	big squirreltail	87	SG
Eragrostis sp.	**lovegrass**	76	D
Festuca californica	California fescue	85	FW
Festuca elmeri	Elmer's fescue	85	FW,MEF
Gastridium ventricosum	**nit grass**	95	G
Holcus lanatus	**velvet grass**	92	G,M
Hordeum brachyantherum	meadow barley	86	FW,G
Hordeum marinum gussoneanum	**Mediterranean barley**	86	G
Hordeum murinum leporinum	**farmer's foxtail**	86	G
Hordeum vulgare	**common barley**	86	G
Koeleria macrantha	Junegrass	92	G,SG
Leymus (Elymus) triticoides	alkali ryegrass	88	FW
Lolium perenne (aristatum)	**Italian ryegrass**	89	G
Melica californica	California melic	81	G

Poaceae cont.			
Melica imperfecta	small-flowered melica	82	C,G
Melica torreyana	Torrey's melica	81	G,C,FW,SC,SG
Nassella (Stipa) lepida	foothill needlegrass	94	C,FW,SC
Nassella (Stipa) pulchra	purple needlegrass	94	G,SG
Phalaris aquatica (tuberosa)	**harding grass**	99	D
Phalaris californica	California canary grass	99	M
Phalaris canariensis	**canary grass**	100	D
Phalaris minor	**Mediter. canary grass**	100	D
Phleum pratense	**cultivated timothy**	95	D
Poa annua	**annual bluegrass**	80	G
Poa secunda (scabrella)	pine bluegrass	81	G
Polypogon monspeliensis	**annual beard grass**	94	D
Scribneria bolanderi	Scribner's grass	90	R
Taeniatherum (Elymus) caput-medusae	**medusa head**	87	D
Trisetum cernuum	nodding trisetum	93	FW,MEF
Vulpia bromoides (Festuca dertonensis)	**six-weeks fescue**	84	G
Vulpia microstachys pauciflora (Festuca pacifica and F. reflexa)	few-flowered fescue	84	G,SG
Vulpia (Festuca) myuros	**rattail fescue**	84	G
Vulpia myuros hirsuta (Festuca megalura)	western six-weeks fescue	84	G
Polemoniaceae Phlox Family			
Eriastrum abramsii	Abrams' eriastrum	280	SC
Gilia clivorum	gilia	282	G,SG
Gilia tricolor	bird's eye gilia	282	G,SG
Linanthus ambiguus	*serpentine linanthus*	*278*	*SG*
Linanthus androsaceus	common linanthus	278	G,SG
Linanthus bicolor	bicolored linanthus	279	SG
Linanthus liniflorus	flax-flowered linanthus	278	SG
Linanthus parviflorus	small-flowered linanthus	279	SG
Linanthus pygmaeus	pigmy linanthus	277	SG
Navarretia heterodoxa	Calistoga navarretia	280	C,SC
Navarretia squarrosa	skunkweed	280	G
Phlox gracilis	slender phlox	277	G,SG
Polygonaceae Buckwheat Family			
Eriogonum fasciculatum	California buckwheat	143	G
Eriogonum latifolium	coast buckwheat	142	C,G
Eriogonum nudum	naked-stemmed buckwheat	142	G,SG
Eriogonum vimineum	wicker buckwheat	143	SC,SG
Pterostegia drymarioides	pterostegia	140	C,SC
Rumex acetosella	**sheep sorrel**	145	D
Rumex conglomeratus	**green dock**	145	D,M
Rumex crispis	**curly dock**	145	D,M
Polypodiaceae Fern Family			
Polypodium californicum	California polypody	57	FW,MEF
Portulacaceae Purslane Family			
Calandrinia ciliata (menziesii)	red maids	158	G,SG
Claytonia exigua glauca	common montia	159	SG
Claytonia (Montia) perfoliata	miner's lettuce	159	FW,RF
Lewisia rediviva	bitterroot	160	SG

Primulaceae Primrose Family			
Anagallis arvensis	**scarlet pimpernel**	269	D
Dodecatheon clevelandii patulum	lowland shooting star	270	SG
Dodecatheon clevelandii sanctarum	Padres' shooting star	270	G,SG
Dodecatheon hendersonii (cruciatum)	shooting star	270	FW,SG
Trientalis latifolia	pacific starflower	269	FW,RF
Pteridaceae Brake Family			
Adiantum jordanii	California maiden-hair	60	FW,MEF
Pellaea andromedifolia	coffee fern	61	C
Pellaea mucronata	bird's-foot fern	61	C
Pentagramma triangularis	goldback fern	57	C,FW,MEF
Ranunculaceae Buttercup Family			
Aquilegia eximia	columbine	167	SC
Aquilegia formosa	crimson columbine	167	FW,MEF
Clematis lasiantha	virgin's bower	169	FW,C
Delphinium californicum	California larkspur	169	C,FW
Delphinium hesperium hesperium	western larkspur	169	SG
Delphinium patens	spreading larkspur	169	FW,SG
Delphinium variegatum variegatum	royal larkspur	169	SG
Ranunculus californicus	California buttercup	171	G,SG
Ranunculus hebecarpus	pubescent-fruited buttercup	171	FW
Ranunculus muricatus	**prickle-fruited buttercup**	171	D
Thalictrum fendleri polycarpum	meadow rue	171	C,FW
Rhamnaceae Buckthorn family			
Ceanothus cuneatus (dubius)	buckbrush	235	C,SC
Rhamnus californica	coffeeberry	234	C,SC
Rhamnus crocea	spiney redberry	234	C,FW,MEF
Rosaceae Rose Family			
Adenostoma fasciculatum	chamise/greesewood	198	C,SC
Aphanes (Alchemilla) occidentalis	lady's mantel	196	SC,SG
Cotoneaster pannosa	**cotoneaster**	201	D
Heteromeles (Photinia) arbutifolia	toyon/Christmas berry	201	C,FW,SC
Holodiscus discolor	oceanspray/cream bush	197	C
Horkelia cuneata	wedge-leaved horkelia	195	G
Oemleria (Osmaronia) cerasiformis	oso berry	200	FW,MEF
Physocarpus capitatus	pacific ninebark	197	FW
Potentilla glandulosa	sticky cinquefoil	196	D,FW
Prunus ilicifolia	holly-leaved cherry	200	C,FW
Prunus subcordata	sierra plum	200	C,FW
Pyracantha coccinea	**pyracantha**		D
Rosa californica	California wild rose	199	FW
Rosa gymnocarpa	wood rose	200	FW
Rosa spithamea (sonomensis)	ground rose	200	C,FW,MEF
Rubus discolor (procerus)	**Himalya berry**	199	FW,MEF
Rubus ursinus	pacific blackberry	199	FE,MEF
Sanguisorba minor muricata	**garden burnet**	197	D
Rubiaceae Madder Family			
Galium aparine	bedstraw	325	FW
Galium porrigens	climbing bedstraw	324	FW,MEF
Sherardia arvensis	**field madder**	323	D,G
Salicaceae Willow Family			
Salix lasiolepis	arroyo willow	132	R

Saxifragaceae Saxifrage family			
Lithophragma affine	woodland star	191	FW,MEF
Lithophragma heterophyllum	hill star	191	FW,MEF
Saxifraga californica	California saxifrage	191	FW
Scrophulariaceae Figwort Family			
Antirrhinum vexillo-calyculatum	wiry snapdragon	309	C,SC
Bellardia trixago	**bellardia**	**316**	**D,G**
Castilleja affinis	Indian paint brush	320	C,FW
Castilleja (Orthocarpus) densiflora	owl's clover	318	G,SG
Castilleja exserta (Orthocarpus purpurascens)	common owl's clover	318	G,SG
Castilleja foliolosa	woolly paint brush	319	C,SG
Castilleja rubicundula lithospermoides (Orthocarpus lithospermoides)	cream sacs	318	G,SG
Collinsia heterophylla	purple-and-white chinese houses	309	FW,MEF
Collinsia multicolor (franciscana)	*San Francisco collinsia*	310	FW
Collinsia sparsiflolia collina	chinese houses	310	G
Cordylanthus pilosus	hairy bird's-beak	316	C,SC
Cordylanthus rigidus	stiffly-branched bird's-beak	316	SC
Linaria sp.	toadflax	308	G
Mimulus (Diplacus) aurantiacus	sticky monkey flower	311	C
Mimulus douglasii	purple mouse ears	313	SC,SG
Mimulus guttatus	large monkey flower	312	M
Pedicularis densiflora	Indian warrior	315	FW,MEF
Scrophularia californica	bee plant	310	C,SC
Triphysaria (Orthocarpus) eriantha	butter-and-eggs	318	G,SG
Triphysaria (Orthocarpus) pusilla	dwarf orthocarpus	318	G
Verbascum blattaria	**moth mullein**	**307**	**D**
Veronica americana	American brooklime	314	M
Veronica persica	**Persian speedwell**	**314**	**D,G**
Simaroubaceae Simarouba Family			
Allanthus altissima	**tree of heaven**	**226**	**D**
Solanaceae Nightshade Family			
Solanum umbelliferum	blue witch	303	FW,MEF,SC
Taxodiaceae Bald Cypress Family			
Sequoia sempervirens	coast redwood	64	RF
Thymelaeaceae Mezereum Family			
Dirca occidentalis	*leatherwood*	243	FW,MEF
Typhaceae Cattail Family			
Typha sp.	cattail	64	M
Urticaceae Nettle Family			
Urtica dioica	stinging nettle	138	M
Parietaria judaica	**pellitory**	**138**	**M**
Valerianaceae Valerian Family			
Centranthus ruber	**red valerian**	**328**	**D**
Plectritis ciliosa	long-spurred plectritis	329	G,SG
Plectritis macrosera	white plectritis	329	FW
Verbenaceae Vervain Family			
Verbena lasiostachys	western vervain	294	C

Species in *italics* are Rare and/or Endangered Plants.
Species in **Bold** type are non-native plants.
Page # indicates the page number in Thomas' Flora.

Plant Communities:

ALL =	All plant communities at Edgewood	MEF =	Mixed Evergreen Forest
C =	Chaparral	R =	Riparian
D =	Disturbed areas	RF =	Redwood Forest
G =	Grassland	SC =	Serpentine Chaparral
FW =	Foothill Woodland	SG =	Serpentine Grassland
M =	Moist areas not including riparian		

* no longer at Edgewood (1996)

Nomenclature based on The Jepson Manual, Higher Plants of California, James C. Hickman, Editor. Scientific names in parenthesis are from the Flora of the Santa Cruz Mountains of California, A Manual of the Vascular Plants by John Hunter Thomas.

Updated 8/96

Bibliography

Hickman, J.C., Editor 1993. The Jepson Manual, Higher Plants of California. University of California Press.

Hitchcock, A.S. 1971. Manual of the Grasses of the United States. Dover Publications, Inc., New York.

Munz, P.A. 1968. A California Flora with Supplement. Univerisity of California Press.

Smith, J.P., Jr. 1988. Inventory of Rare and Endangered Vascular Plants of California. California Native Plant Society.

Sommers, S.C. 1987. Partial Flora of Edgewood County Park.

Thomas, J.H. 1961. Flora of the Santa Cruz Mountains of California *A Manual of the Vascular Plants.* Stanford University Press, Stanford California.

CHECKLIST OF PLANTS AT EDGEWOOD ALPHABETICALLY BY COMMON NAME BY TONI CORELLI

Abrams' eriastrum	Eriastrum abramsii
acacia, Bailey	**Acacia baileyana**
acacia, black	**Acacia melanoxylon**
acacia, star	**Acacia verticillata**
alfalfa	**Medicago sativa**
amole/soap plant	Chlorogalum pomeridianum
angelica, wood	Angelica tomentosa
aster, common California	Aster chilensis
aster, rough-leaved	Aster radulinus
baby blue-eyes	Nemophila menziesii atomaria
baccharis, marsh	Baccharis douglasii
barley, meadow	Hordeum brachyantherum
barley, Mediterranean	**Hordeum marinum gussoneanum**
bedstraw	Galium aparine
bedstraw, climbing	Galium porrigens
bee plant	Scrophularia californica
bellardia	**Bellardia trixago**
Bermuda buttercup	**Oxalis pes-caprae**
bigleaf maple	Acer macrophyllum
bird's-beak, hairy	Cordylanthus pilosus
bird's-beak, stiffly-branched	Cordylanthus rigidus
bitter-cress	Cardamine oligosperma
bitterroot	Lewisia rediviva
black locust	**Robinia pseudoacacia**
black medick	**Medicago lupulina**
blackberry, pacific	Rubus ursinus
blow wives	Achyrachaena mollis
blue elderberry	Sambucus mexicana
blue eyed grass	Sisyrinchium bellum
blue gum	**Eucalyptus globulus**
blue witch	Solanum umbelliferum
bluegrass, annual	**Poa annua**
boisduvalia, dense-flowered	Epilobium densiflorum
bowlesia	Bowlesia incana
Brewer's butterweed	**Senecio breweri**
bristly ox-tongue	**Picris echioides**
brodiaea, coronary	Brodiaea coronaria
brodiaea, dwarf	Brodiaea terrestris
brodiaea, golden	Triteleia ixioides (lutea)
brodiaea, harvest	Brodiaea elegans elegans
brome, barren	**Bromus sterilis**
brome, California	Bromus carinatus carinatus

brome, purple false	**Brachypodium distachyon**
brome, red	**Bromus madritensis rubens**
brome, woodland	Bromus laevipes
broom, California/deerweed	Lotus scoparius
broom, French	**Genista (Cytisus) monspessulana**
broom, Scotch	**Cytisus scoparius**
broom-rape, clustered	Orobanche fasciculata
broom-rape, naked	Orobanche uniflora
buckbrush	Ceanothus cuneatus (dubius)
buckeye, California	Aesculus californica
buckwheat, California	Eriogonum fasciculatum
buckwheat, coast	Eriogonum latifolium
buckwheat, naked-stemmed	Eriogonum nudum
buckwheat, wicker	Eriogonum vimineum
bur-chervil (scandicina)	**Anthriscus caucalis**
butter-and-eggs	Triphysaria (Orthocarpus) eriantha
buttercup, California	Ranunculus californicus
buttercup, prickle-fruited	**Ranunculus muricatus**
buttercup, pubescent-fruited	Ranunculus hebecarpus
California bay	Umbellularia californica
California tea	Rupertia (Psoralea) physodes
calla lily	**Zantedeschia aethiopica**
canary grass	**Phalaris canariensis**
cat's ear, rough	**Hypochaeris radicata**
cat's ear, smooth	**Hypochaeris glabra**
cattail	Typha sp.
centaury, Davy's	Centaurium davyi
centaury, June	Centaurium muehlenbergii
chamise/greesewood	Adenostoma fasciculatum
checker lily/mission bells	Fritillaria affinis (lanceolata)
checker mallow	Sidalcea malvaeflora
chickweed	**Stellaria media**
chickweed, field	Cerastium arvense
chickweed, shining	Stellaria nitens
chicory	**Cichorium intybus**
chinese houses	Collinsia heterophylla
chinese houses, sparse flowered	Collinsia sparsiflolia collina
Christmas berry/toyon	Heteromeles (Photinia) arbutifolia
cinquefoil, sticky	Potentilla glandulosa
clarkia, four-spotted	Clarkia purpurea quadrivulnera
clover, bearded	Trifolium barbigerum
clover, bur	**Medicago polymorpha**
Douglas fir	Pseudotsuga menziesii
dove weed/turkey mullein	Eremocarpus setigerus

evax, erect
everlasting, fragrant
everlasting, pink
fairy bells, Hooker's
fairy lantern/white globe lily
farewell-to-spring
fennel
fern, bird's-foot
fern, California maiden-hair
fern, California polypody
fern, coastal wood
fern, coffee
fern, goldback
fern, western sword
fescue, California
fescue, Elmer's
fescue, few-flowered
fescue, rattail
fescue, western six-weeks
fiddleneck
fiesta flower
filaree, long-beaked
filaree, red-stemmed
filaree, white-stemmed
flax, dwarf
flax, narrow-leaved
flax, small-flowered
foxtail, farmer's
Fremont's star lily
fringed sidalcea
fritillary, fragrant
fuchsia, California
garden burnet
gazenia
geranium, cut-leaved
german-ivy
gilia
gilia, bird's eye
godetia, large
goldenaster
goldenrod, California
goldfields
gooseberry, bay
gooseberry, hillside
goosefoot

Hesperevax (Evax) sparsiflora
Gnaphalium canescens beneolens
Gnaphalium ramosissimum
Disporum hookeri
Calochortus albus
Clarkia rubicunda
Foeniculum vulgare
Pellaea mucronata
Adiantum jordanii
Polypodium californicum
Dryopteris arguta
Pellaea andromedifolia
Pentagramma triangularis
Polystichum munitum
Festuca californica
Festuca elmeri
Vulpia microstachys pauciflora
Vulpia myuros myuros
Vulpia myuros hirsuta
Amsinckia menziesii intermedia
Pholistoma auritum
Erodium botrys
Erodium cicutarium
Erodium moschatum
Hesperolinon congestum
Linum bienne
Hesperolinon micranthum
Hordeum murinum leporinum
Zigadenus fremontii
Sidalcea diploscypha
Fritillaria liliacea
Epilobium canum
Sanguisorba minor muricata
Gazenia linearis
Geranium dissectum
Senecio mikanioides
Gilia clivorum
Gilia tricolor
Clarkia purpurea viminea
Heterotheca sessiliflora
Solidago californica
Lasthenia californica
Ribes menziesii
Ribes (Grossularia) californicum
Chenopodium californium

grass, annual beard
grass, annual hair
grass, California canary
grass, California oat
grass, cultivated oat
grass, European silver hair
grass, Hall's bent
grass, harding
grass, hedgehog dogtail
grass, Italian rye
grass, June
grass, little quaking
grass, Mediter. canary
grass, medusa head
grass, nit
grass, pine blue
grass, perennial rye
grass, rattlesnake
grass, ripgut
grass, Scribner's
grass, slender hair
grass, slender wild oat
grass, spanish brome
grass, squirreltail
grass, velvet
grass, wild oat
greesewood/chamise
grindelia, hirsute
groundsel
groundsel, common
Guadalupe Island palm
gumplant
hareleaf, common
hawk's beard
hedge nettle, rigid
hedge nettle, short-spiked
hedge parsley
hedge parsley, California
knotted hedge parsley
hill star
Himalya berry
holly-leaved cherry
honeysuckle, hairy
horkelia, wedge-leaved
horsetail, giant

Polypogon monspeliensis
Deschampsia danthonioides
Phalaris californica
Danthonia californica
Avena sativa
Aira caryophyllea
Agrostis hallii
Phalaris aquatica (tuberosa)
Cynosurus echinatus
Lolium multiflorum
Koeleria macrantha
Briza minor
Phalaris minor
Taeniatherum caput- medusae
Gastridium ventricosum
Poa secunda (scabrella)
Lolium perenne
Briza maxima
Bromus diandrus (rigidus)
Scribneria bolanderi
Deschampsis elongata
Avena barbata
Bromus madritensis
Elymus glaucus X E. multisetus
Holcus lanatus
Avena fatua
Adenostoma fasciculatum
Grindelia hirsutula
Senecio aronicoides
Senecio vulgaris
Erythea edulis
Grindelia camporum
Lagophylla ramosissima
Crepis vesicaria taraxacifolia
Stachys ajugoides rigida
Stachys pycnantha
Torilis arvensis
Yabea (Caucalis) microcarpa
Torilis nodosa
Lithophragma heterophyllum
Rubus discolor (procerus)
Prunus ilicifolia
Lonicera hispidula vacillans
Horkelia cuneata
Equisetum telmateia braunii

fiddleweed
hound's tongue
hyacinth, long-rayed
hyacinth, wild
Indian pink, California
Indian warrior
Iris, bearded
iris, Douglas'
Ithuriel's spear
lady's mantel
larkspur, California
larkspur, royal
larkspur, spreading
larkspur, western
leatherwood
lessingia, woolly-headed
lettuce, prickly
lettuce, willow
lily, leopard
linanthus, bicolored
linanthus, common
linanthus, flax-flowered
linanthus, pigmy
linanthus, serpentine
linanthus, small-flowered
lizard tail
locoweed, Gambell's drawf
lomatium, bladder parsnip
lomatium, California
lomatium, caraway-leaved
lomatium, large-fruited
lomatium, woolly-fruited
loosestrife
lovegrass
lupine, arroyo
lupine, bicolor
lupine, bush
lupine, chick
lupine, summer
madder, field
madia, common
madia, threadstream
madrone
mallow, chaparral

Conyza sp.
Cynoglossum grande
Triteleia peduncularis
Triteleia hyacinthina
Silene californica
Pedicularis densiflora
Iris germanica
Iris douglasiana
Triteleia laxa
Aphanes (Alchemilla) occidentalis
Delphinium californicum
Delphinium variegatum variegatum
Delphinium patens
Delphinium hesperium hesperium
Dirca occidentalis
Lessingia hololeuca
Lactuca serriola
Lactuca saligna
Lilium pardalinum
Linanthus bicolor
Linanthus androsaceus
Linanthus liniflorus
Linanthus pygmaeus
Linanthus ambiguus
Linanthus parviflorus
Eriophyllum staechadifolium
Astragalus gambelianus
Lomatium utriculatum
Lomatium californicum
Lomatium caruifolium
Lomatium macrocarpum
Lomatium dasycarpum
Lythrum sp.
Eragrostis sp.
Lupinus succulentus
Lupinus bicolor
Lupinus albifrons
Lupinus microcarpus densiflorus
Lupinus formosus
Sherardia arvensis
Madia elegans densifolia
Madia exigua
Arbutus menziesii
Malacothamnus fasciculatus

man-root, California
man-root, coast
manzanita
manzanita, Kings Mountain
mariposa, lily white
mariposa, lily yellow
meadow rue
melica, California
melica, small-flowered
melica, Torrey's
microseris, Douglas'
milk maids
milkweed, narrow-leaved
miner's lettuce
mission bells/checker lily
monkey flower, large
monkey flower, sticky
monolopia, cupped
monolopia, woodland
(P)Monterey cypress
montia, common
morning glory, chapparal
morning glory, hill
mountain dandelion
mugwort
muilla
mule ears
mule ears, narrow-leaved
mullein, moth
mustard, California
mustard, field
mustard, tumble
narrow-leaved filago
navarretia, Calistoga
needlegrass, foothill
needlegrass, purple
nemophila, meadow
nemophila, variable-leaved
nievitas
ninebark, pacific
nodding trisetum
oak, blue
oak, coast live
oak, leather

Marah fabaceus
Marah oreganus
Arctostaphylos tomentosa crinita
Arctostaphylos regismontana
Calochortus venustus
Calochortus luteus
Thalictrum fendleri polycarpum
Melica californica
Melica imperfecta
Melica torreyana
Microseris douglasii
Cardamine (Dentaria) californica
Asclepias fascicularis
Claytonia (Montia) perfoliata
Fritillaria affinis (lanceolata)
Mimulus guttatus
Mimulus (Diplacus) aurantiacus
Monolopia major
Monolopia gracilens
Monterey cypress
Claytonia exigua glauca
Calystegia occidentalis
Calystegia subacaulis
Agoseris heterophylla
Artemisia douglasiana
Muilla maritima
Wyethia glabra
Wyethia angustifolia
Verbascum blattaria
Guillenia (Thelypodium) lasiophylla
Brassica rapa (campestris)
Sisymbrium altissimum
Filago gallica
Navarretia heterodoxa
Nassella (Stipa) lepida
Nassella (Stipa) pulchra
Nemophila pedunculata
Nemophila heterophylla
Cryptantha flaccida
Physocarpus capitatus
Trisetum cernuum
Quercus douglasii
Quercus agrifolia
Quercus durata durata

oak, scrub
oak, valley
oceanspray/cream bush
olive
onion, coastal
onion, pitted
onion, sickle leaved
onion, wild
orchid
orthocarpus, dwarf
oso berry
owl's clover
owl's clover, common
oyster plant/salsify
paint brush, Indian
paint brush, woolly
pampas grass
pea, chaparral
pea, hillside
pea, wild
peak rush-rose
pearlwort, dwarf
pearlwort, western
pellitory
pennyroyal
pentachaeta, white-rayed
peppergrass, shining
periwinkle
phacelia California
phacelia, common
phacelia, divaricate
phacelia, imbricate
phlox, slender
pineapple weed
piperia, elegant
pitcher sage
plantain, California
plantain, English
plectritis, long-spurred
plectritis, white
pogogyne
poison hemlock
poison oak
popcornflower

Quercus berberidifolia
Quercus lobata
Holodiscus discolor
Olea europaea
Allium dichlamydeum
Allium lacunosum
Allium falcifolium (breweri)
Allium triquetrum
Epipactis helleborine
Triphysaria (Orthocarpus) pusilla
Oemleria (Osmaronia) cerasiformis
Castilleja (Orthocarpus) densiflora
Castilleja exserta
Tragopogon porrifolius
Castilleja affinis
Castilleja foliolosa
Cortaderia sp.
Pickeringia montana
Lathyrus vestitus
Lathyrus vestitus ochropetalus
Helianthemum scoparium
Sagina apetala (barbata)
Sagina decumbens occidentalis
Parietaria judaica
Mentha pulegium
Pentachaeta bellidiflora
Lepidium nitidum nitidum
Vinca major
Phacelia californica
Phacelia distans
Phacelia divaricata
Phacelia imbricata
Phlox gracilis
Chamomilla suaveolens
Piperia elegans
Lepechinia calycina
Plantago erecta
Plantago lanceolata
Plectritis ciliosa
Plectritis macrosera
Pogogyne serpylloides
Conium maculatum
Toxicodendron diversilobum
Plagiobothrys nothofulvus

poppy, California
primrose, slender flowered
pterostegia
purple mouse ears
pygmy-weed
pyracantha
radish
rattlesnake weed
red hot poker
red maids
red valerian
redberry, spiney
redwood, coast
rigiopappus
rose, ground
rose, wild California
rose, wood
rosin weed
rush, common
rush, common wood
rush, iris-leaved
rush, needle spike
rush, pacific
rush, spike
rush, toad
ryegrass, alkali
sagebrush, California
salsify/oyster plant
San Mateo thornmint
sand-spurrey, purple
sandwort, Douglas'
sandwort, dwarf
sanicle, coast
sanicle, pacific
sanicle, poison
sanicle, purple
sanicle/turkey pea
saxifrage, California
scarlet pimpernel
sedge
sheep sorrel
sheperd's purse
shooting star
shooting star, lowland

Eschscholzia californica
Camissonia graciliflora
Pterostegia drymarioides
Mimulus douglasii
Crassula connata
Pyrancantha coccinea
Raphanus sativus
Daucus pusillus
Kniphofia uvaria
Calandrinia ciliata (menziesii)
Centranthus ruber
Rhamnus crocea
Sequoia sempervirens
Rigiopappus leptocladus
Rosa spithamea (sonomensis)
Rosa californica
Rosa gymnocarpa
Calycadenia multiglandulosa
Juncus patens
Luzula comosa (multiflora)
Juncus xiphioides
Eleocharis acicularis
Juncus effusus pacificus
Eleocharis montevidensis
Juncus bufonius
Leymus (Elymus) triticoides
Artemisia californica
Tragopogon porrifolius
Acanthomintha duttonii (obovata)
Spergularia rubra
Minuartia (Arenaria) douglasii
Minuartia (Arenaria) californica
Sanicula laciniata
Sanicula crassicaulis
Sanicula bipinnata
Sanicula bipinnatifida
Sanicula tuberosa
Saxifraga californica
Anagallis arvensis
Carex sp.
Rumex acetosella
Capsella bursa-pastoris
Dodecatheon hendersonii
Dodecatheon clevelandii patulum

shooting star, Padres'
sierra plum
silk tassel, coast
silver wattle
skunkweed
slender cottonweed
snapdragon, wiry
sneezeweed
snowberry
snowberry, creeping
soap plant/amole
soft chess
solomon seal, fat
solomon seal, slim
speedwell, American
speedwell, Persian
spurge, petty
spurrey
squirreltail, big
star-thistle, purple
star-thistle, yellow
starflower, pacific
stephanomeria, tall
stinging nettle
sun cups
sunflower, California
sweet alyssum
sweet cicely
tarweed, coast
tarweed, hayfield
tarweed, slender
tauschia, Kellogg's
teasel, fullers
thistle, bull
thistle, common sow
thistle, fountain
thistle, Italian
thistle, milk
thistle, prickly sow
tidy-tips
timothy, cultivated
timwort
toadflax
tocalote
toyon/Christmas berry

Dodecatheon clevelandii sanctarum
Prunus subcordata
Garrya elliptica
Acacia dealbata
Navarretia squarrosa
Micropus californicus
Antirrhinum vexillo-calyculatum
Helenium puberulum
Symphoricarpos albus laevigatus
Symphoricarpos mollis
Chlorogalum pomeridianum
Bromus hordeaceus (mollis)
Smilacina racemosa (amplexicaulis)
Smilacina stellata (sessifolia)
Veronica americana
Veronica persica
Euphorbia peplus
Spergula arvensis (arvense)
Elymus multisetus (Sitanion jubatum)
Centaurea calcitrapa
Centaurea solstitialis
Trientalis latifolia
Stephanomeria virgata
Urtica dioica
Camissonia (Oenothera) ovata
Helianthus californicus
Lobularia maritima
Osmorhiza chilensis
Madia sativa
Hemizonia congesta luzulifolia
Madia gracilis
Tauschia kelloggii
Dipsacus sativus
Cirsium vulgare
Sonchus oleraceus
**Cirsium fontinale fontinale*
Carduus pycnocephalus
Silybum marianum
Sonchus asper
Layia platyglossa
Phleum pratense
Cicendia quadrangularis
Linaria sp.
Centaurea melitensis
Heteromeles (Photinia) arbutifolia

trail plant
tree of heaven
trefoil, birdfoot
trefoil, Chile
trefoil, short-podded
trefoil, small flowered
trillium, giant
turkey mullein/dove weed
venus' needle
vervain, western
vetch, American
vetch, purple
vetch, spring
virgin's bower
walnut
water cress
wax myrtle, California
white globe lily/fairy lantern
wildrye, blue
willow, arroyo
willow herb
willow herb, minute
willow herb, northern
windmill pink
winter cress
woodland star
woolly-heads, dwarf
yampah
yarrow
yarrow, golden
yerba buena
yerba santa

Adenocaulon bicolor
Ailanthus altissima
Lotus corniculatus
Lotus wrangelianus (subpinnatus)
Lotus humistratus
Lotus micranthus
Trillium chloropetalum
Eremocarpus setigerus
Scandix pecten-veneris
Verbena lasiostachys
Vicia americana americana
Vicia benghalensis
Vicia sativa
Clematis lasiantha
Juglans sp.
Rorippa nasturtium-aquaticum
Myrica californica
Calochortus albus
Elymus glaucus
Salix lasiolepis
Epilobium brachycarpum
Epilobium minutum
Epilobium ciliatum(adenocaulon)
Silene gallica
Barbarea orthoceras
Lithophragma affine
Psilocarphus brevissimus
Perideridia kelloggii
Achillea millefolium
Eriophyllum confertiflorum
Satureja douglasii
Eriodictyon californicum

Bryophytes

Alan Whittemore of the Missouri Botanical Gardens, who is cataloging bryophytes in the conterminous United States, found the bryophytes listed in this section in Edgewood Natural Preserve in May 1994 and 1995. The bryophytes are listed in three tables: liverworts, hornworts, and mosses.

In these tables, habitat notes refer to the general habitat in San Mateo County, not to the specific site in the park that each record came from. Here, "dry" refers to sites that are damp only during rainy periods (thus drying out early in the spring and perhaps at times during the rainy season); "wet" sites dry out only after the rains have been over for some time, and may retain somewhat humid even into the summer.

Several interesting records were found in the park. *Cephaloziella stelluifera*, *Phaeoceros bulbiculosus*, and *Bestia longipes* are not very common locally; all three are plants of mesic sheltered sites, found on the slopes above Sylvan Way and the vicinity of the spring. On the other hand, several species, notably *Pseudobraunia californica* and *Grimmia laevigata* (found on the large outcrop in the northern part of the park) and *Pottia starkeana* are common in the interior foothills of California but much less common in the outer coast ranges. One other species of *Pottiaceae* was collected near where the *Pottia* grew; Susan Sommers has not been able to identify this yet, but believes it is surely something unusual.

In sum, Dr. Whittemore found 57 bryophyte species: 13 liverworts, 3 hornworts, and 41 mosses.

Table A-3 Liverworts

Family	Species	Source	Habitat
Aytoniaceae	*Asterella bolanderi*	(Aust.) Underw. (5277)	Dry soil.
	Asterella californica	(Hampe) Underw. (5252)	Dry soil, on banks and around rocks
Targioniaceae	*Targionia mexicana*	Lehm. & Lindenb. (5251)	Dry soil on banks. Formerly identified as *Targionia hypophylla L.*, an Old World species that doesn't occur in North America.
Ricciaceae	*Riccia californica*	Aust. (5265)	Bare soil in reather dry places.
	Riccia nigrella	DC. (5227B)	Dry soil.
	Riccia sorocarpa	Bisch. (5220)	Dry soil.
Fossombroniaceae	*Fossombronia longiseta*	Aust. (5232, 5255)	Dry soil.
Gymnomitriaceae	*Marsupella bolanderi*	(Aust.) Underw. (5269A)	Dry soil on banks.
Cephaloziellaceae	*Cephaloziella divaricata*	(Smith) Schiffn. (5227A, 5275)	Dry soil.
	Cephaloziella stellulifera	(Tayl.) Schiffn. (5256)	Soil in sheltered places.
	Cephaloziella turneri	(Hook.) K. Müll. (5269B, 5350)	Soil, usually on banks, in damp to rather dry sites.

Table A-3 (Continued) Liverworts

Family	Species	Source	Habitat
Porellaceae	*Porella bolanderi*	(Aust.) Pears. (5239, 5241, 5242)	Bark and rocks, varying from wet shaded sites to dry exposed sites.
Jubulaceae	*Frullania bolanderi*	Aust (5222)	On dry bark.

Table A-4 Hornworts: Family *Anthocerotaceae*

Species	Source	Habitat
Anthoceros fusiformis	Aust. (5266)	Dry or more or less humid soil.
Phaeoceros bulbiculosus	(Brotero) Prosk. (5245)	Dry soil.
Phaeoceros pearsonii	(M.A. Howe) Prosk. (5254, 5342)	Dry soil.

Table A-5 Mosses

Family	Species	Source	Habitat
Ditrichaceae	*Anisothecium varium*	(Hews.) Schimp. (5267)	Dry soil.
	Ceratodon purpureus	(Hedw.) Brid. (5349)	Dry, sandy soil.
Fissidentaceae	*Fissidens curvatus Hornsch.*	(5248)	On dry soil; probably introduced from the tropics.Formerly known as *Fissidens milobakeri* F.W. Koch.
	Fissidens limbatus	Sull. (5244)	Usually on soil, many habitats.
Pottiaceae	*Didymodon occidentalis*	Zander (5231)	Dry soil or rock.
	Didymodon vinealis	(Brid.) Zander var. *flaccidus* (Br. & Sch.) Zander (5259)	Soil or rock in more or less humid places.
		(Brid.) Zand. var *vinealis* (5336)	Dry soil or rock.
	Pottia starkeana	(Hedw.) C. Müll. var *starkeana* (5345)	Dry sunny soil.
	Timmiella crassinervis	(Hampe) L.F. Koch (5230,5263)	Dry soil.
	Tortula bolanderi	(Lesq) M.A. Howe (5262)	Dry soil of banks.
	Tortula laevipila	(Brid.) Schwaegr. (5226, 5229, 5338)	Dry bark and sometimes rock.

Table A-5 (Continued) Mosses

Family	Species	Source	Habitat
	Tortula princeps	De Not. (5236)	Dry rock and base of trees.
	Weissia controversa	Hedw. (5253)	Dry soil, usually on banks.
Grimmiaceae	*Grimmia laevigata*	(Brid.) Brid. (5276)	Dry rock, in exposed places, commoner inland.
	Grimmia cf rivulare	Brid. (5224))	Dry rock.
	Grimmia trichophylla	Grev. (5223, 5271, 5272)	Exposed surfaces of large boulders and rock outcrops.
Funariaceae	*Funaria hygrometrica*	Hedw. (5335)	Trampled soil in disturbed areas.
	Funaria mjhlenbergii	Turn. (5261)	Dry soil of banks.
Bryaceae	*Bryum argenteum*	Hedw. (5344)	Dry sunny soil.
	Bryum canariense	Brid. (5257)	Dry soil.
	Bryum capillare	Hedw. (5273)	Dry soil, rock or sometimes bark.
	Bryum flaccidum	Brid. (5340)	Bark or rock, usually in dry shaded places. Doubtfully distinct.
	Epipterygium tozeri	(Grev.) Lindb. (5337)	Shaded soil beneath rocks.
Bartramiaceae	*Anacolia menziesii*	(Turn.) Paris (5274)	Dry rock; commoner inland.
	Bartramia stricta	Brid. (5246, 5347)	Dry soil.
Orthotrichaceae	*Orthotrichum lyellii*	Hook. & Tayl. (5343)	On bark, dry or humid places.
	Othotrichum rupestre	Schleich. ex Schwaegr. (5225)	Dry rock.
	Orthotrichum tenellum	Bruch ex Brid. (5221)	Dry bark of tree trunks (usually oaks).
Hedwigiaceae	*Pseudobraunia californica*	(Lesq.) Broth. (5270)	Dry rock, in exposed places, commoner inland.
Leucodontaceae	*Alsia californica*	(Hook. & Arn.) Sull. (5243)	Bark of trees, more or less humid places.
	Antitrichia californica	Sull. in Lesq. (5228)	Bark of trees, dry or rather humid places.
	Dendroalsia abietina	(Hook.) E.G. Bridd. (5264)	Bark of trees, more or less humid places.
	Pterogonium gracile	(Hedw.) Smith (5233, 5234)	Bark or rock, dry or rather humid places.
Thuidiaceae	*Claopodium whippleanum*	(Sull. in Whipple & Ives) Ren. & Card. (5260)	Dry or wet soil.

Table A-5 (Continued) Mosses

Family	Species	Source	Habitat
Brachytheciaceae	*Bestia longipes*	(Sull. & Lesq.) Broth (5238, 5240)	Rock or bark in sheltered places.
	Eurhynchiun praelongum	(Hedw.) Schimp. in B.S.G. (5238)	Soil and decaying plant material.
	Homalothecium arenarium	(Lesq.) Lawt. (5348)	Dry soil, often in chaparral.
	Homalothecium nutallii	(Wils.) Jaeg. (5249)	Bark of trees, dry or rather humid places.
	Homalothecium pinnatifidum	(Sull. & Lesq.) Lawt. (5237, 5247, 5268)	Dry soil.
	Isothecium myosuroides	Brid. (5235)	Soil, rock, or wood, many habitats.
	Scleropodium californicum	(Lesq.) Kindb. (5219, 5250)	Dry or wet soil.
	Scleropodium touretti	(Brid.) L.F. Koch (5339, 5341)	Dry shaded soil, rock, or sometimes wood.

WILDLIFE AT EDGEWOOD

Class	Order	Species
		centipedes, millipedes
	Hymenoptera	wasps, including yellowjackets and tarantula wasps
		bees, including honeybees and native solitary bees
		ants, including native black ants
	Lepidoptera	butterflies, including the Bay checkerspot (*Euphydryas editha bayensis*), monarch, tiger swallowtail, zebra swallowtail, blues, dusky wing, buckeye, western painted lady, mourning cloak, California sister
		moths
	Coleoptera	beetles
	Arachnidae	spiders and arachnids: argopiope, tarantula, blind harvestman (*Calicina minor*), Edgewood micro-blind harvestman (*Microcina edgewoodensis*)
Amphibia	*Caudata*	California slender salamander (*Batrachoseps attenuatus*) California newt (*Taricha torosa*)
	Salientia	Pacific tree frog (*Hyla regilla*) Western toad (*Bufo boreas*)
Reptilia	*Squamata*	Northern alligator lizard (*Gerrhonotus coeruleus*) Western fence lizard (*Sceloporus occidentalis*)
	Herpes	California common kingsnake (*Lampropeltis getulus californiae*), Pacific gopher snake (*Pituophis melanoleucus*), Western ringneck (*Diadophis punctatus*), Western rattlesnake (*Crotalus atrox*), garter, California boa, green water
Chordata	*Marsupialia*	opossum *(Didelphis marsupialis)*
Mammalia	*Insectivora*	mole: presence observed but no species identified shrew: presence observed but no species identified
	Aves	(See Appendix D, 'Bird Species at Edgewood')
	Chiroptera	Seen but non-specific identified: bats
	Rodentia	Western gray squirrel (*Sciurus griseus)* pocket gopher *(Thomcmys bottae)* California Meadow vole (*Microtus californicus)* Western harvest mouse (*Reithrodentomys megalotis*) dusky-foot woodrat (*Neotoma fuscipes*)

Wildlife at Edgewood
(continued)

Class	Order	Species
	Carnivora	racoon (*Procyon lotor*)
		fox, gray (*Urocyon cinereoargenteus*)
		fox, red (*Vulpes fulva*)
		coyote (*Canis latrans*)
		bobcat (*Lynx rufus*)
	Lagomorpha	desert cottontail (*Sylvilagus auduboni*)
		black-tailed jackrabbit (*Lepus californicus*)
	Artiodactyla	California mule deer (*Odocoileus hemionus columbianus*)

e-append

ATTACHMENT A-4

BIRD SPECIES SIGHTED AT EDGEWOOD

1. Bird Species at Edgewood

3. Edgewood County Park - Birds to Look For,
San Francisco Peninsula Birdwatching, 1996

BIRD SPECIES AT EDGEWOOD

The following birds are believed to be resident, or that local Audobon Society members have sighted at Edgewood.

Bird	Aerial	Grassland	Riparian	Oak Woodland	Chaparral
Vultures, hawks, falcons					
turkey vulture	x				
black-shouldered kite	x	x	x		
sharp-shinned hawk	x			x	
Cooper's hawk	x			x	
red-tailed hawk	x	x		x	
red-shouldered hawk	x			x	
northern harrier	x	x			
kestrel	x	x			
Gallinaceous birds					
California quail		x	x	x	x
Pigeons and doves					
band-tailed pigeon	x			x	
mourning dove		x		x	
rock dove	x			x	
Owls					
great horned owl				x	
Hummingbirds					
Anna's hummingbird			x	x	x
Allen's hummingbird			x	x	x
Woodpeckers					
common flicker			x	x	
hairy woodpecker				x	
downy woodpecker				x	
Nuttall's woodpecker				x	
Flycatchers					
ash-throated flycatcher				x	
black phoebe			x		x
western wood peewee				x	

Table C-1 (Continued) Birds at Edgewood

Bird	Aerial	Grassland	Riparian	Oak Woodland	Chaparral
Swallows					
violet-green swallow	x			x	
rough-winged swallow	x				
barn swallow	x				
Jays and crows					
scrub jay				x	x
Stellar's jay				x	
common raven	x				
common crow	x				
Chickadees					
chestnut-backed chickadee			x	x	
plan titmouse			x	x	
bushtit			x	x	
Nuthatches and creepers					
brown creeper				x	
Wrentits and wrens					
wrentit			x	x	x
Bewick's wren				x	x
Mockingbirds and thrashers					
mockingbird		x		x	
California thrasher				x	x
Thrushes					
American robin				x	
varied thrush				x	
hermit thrush				x	
Swansen's thrush			x		
western bluebird		x		x	
Gnatcatchers and kinglets					
blue-gray gnatcatcher				x	x
ruby-crowned kinglet				x	
gold-crowned kinglet				x	
Waxwings, starlings, vireos					
starling				x	
Hutton's vireo				x	
Wood warblers					
orange-crowned warbler			x	x	x
yellow-rumped warbler			x	x	
Townsend's warbler				x	
Wilson's warbler				x	

Table C-1 (Continued) Birds at Edgewood

Bird	Aerial	Grassland	Riparian	Oak Woodland	Chaparral
Meadowlarks, blackbirds, orioles					
western meadowlark		x			
Brewer's blackbird		x		x	
northern oriole			x		
Grosbeaks, finches, sparrows					
black-headed grosbeak			x		
purple finch				x	
house sparrow		x		x	x
pine siskin	x	x		x	
American goldfinch			x		x
lesser goldfinch				x	x
rufous-sided towhee			x	x	x
brown towhee			x		x
dark-eyed junco				x	x
white-crowned sparrow		x		x	x
golden-crowned sparrow			x	x	x
fox sparrow			x		x
lark sparrow		x			
song sparrow			x		
chipping sparrow				x	
savannah sparrow		x			
Gulls					
western	x				
herring	x				
Shore birds					
killdeer		x			

Birds to look for

Year-round species
Turkey Vulture, Cooper's, Red-tailed and Red-shouldered Hawks, American Kestrel, Golden Eagle (rare), California Quail, Band-tailed Pigeon, Mourning Dove, Rock Dove, Anna's Hummingbird, Northern Flicker, Downy, Hairy and Nuttall's Woodpeckers, Black Phoebe, Scrub and Steller's Jays, Common Raven, American Crow, Chestnut-backed Chickadee, Plain Titmouse, White-breasted Nuthatch, Bushtit, Brown Creeper, Wrentit, Bewick's Wren, Northern Mockingbird, California Thrasher, American Robin, Western Bluebird, European Starling, Hutton's Vireo, Western Meadowlark, Brewer's Blackbird, California and Rufous-sided Towhees, Dark-eyed Junco, Song and Savannah Sparrows, Purple and House Finches, Pine Siskin, Lesser and American Goldfinches and House Sparrow.

Spring and summer species
Allen's Hummingbird, Olive-sided, Pacific-slope and Ash-throated Flycatchers, Western Wood-Pewee, Violet-green, Tree, Barn, Cliff and Northern Rough-winged Swallows, Swainson's Thrush, Blue-gray Gnatcatcher, Orange-crowned and Wilson's Warblers, Brown-headed Cowbird, Northern Oriole, Black-headed Grosbeak, Chipping and Grasshopper Sparrows.

Winter species
White-tailed Kite, Sharp-shinned Hawk, Northern Harrier, Say's Phoebe, Hermit and Varied Thrushes, Ruby-crowned and Golden-crowned Kinglets, Yellow-rumped and Townsend's Warblers, Golden-crowned, White-crowned and Fox Sparrows.

Directions

There are three entrances to the park: Sunset Way; Edgewood Road west of Interstate 280; and the Old Stage Day Camp entrance on the south side of Edgewood Road adjacent to Crestview Drive. The best entrance to the ridge trail is at the junction of Sunset Way and Hillcrest Way. Take Jefferson Avenue west from El Camino Real in Redwood City. Watch for Jefferson to turn right sharply at Farm Hill Boulevard. After making the turn, proceed about 1.8 miles and turn right on California Way. (Look for the firehouse on the corner). Park at the junction of Sunset Way and Hillcrest Way. Walk past the PG&E substation to the

Toni Corelli, Botanist
Rare & Endangered Plant Chairperson
San Mateo County
California Native Plant Society
P.O. Box 773
Half Moon Bay, CA 94019
(415) 726-0689

March 10, 1997

Patrick Sanchez and Bernadine Alling
San Mateo County Parks and Recreation Division
590 Hamilton Street, Fourth Floor
Redwood City, CA 94063

Dear Director Sanchez and Ms. Alling:

This letter concerns the Edgewood Natural Preserve Master Plan draft of February 1997, pages 26, 38 and 39. I submit the following suggested changes:

Table 2

Species of Concern at Edgewood Natural Preserve. I think this table should be as shown below so as to include all of the plants that occur in the "Inventory of Rare and Endangered Vascular Plants of California", fifth edition. All of these plants have been documented with the Department of Fish and Game using Field Survey Forms.

SCIENTIFIC NAME COMMON NAME	LEGAL STATUS STATE FEDERAL	CNPS	HABITAT AT EDGEWOOD
Acanthomintha duttonii San Mateo thorn-mint	Endangered Endangered	1B	Serpentine grassland.
Arctostaphylos regismontana Kings Mtn. manzanita	CEQA? none	4	Franciscan sandstone in evergreen forests.
Collinsia multicolor San Francisco collinsia	CEQA? none	4	Moist, shady evergreen woodland.
Dirca occidentalis western leatherwood	CEQA none	1B	Moist, shady evergreen woodland.
Fritillaria liliacea fragrant fritillary	CEQA Species of Concern	1B	Moist areas in serpentine grasslands.

Hesperolinon congestum Marin western flax	Threatened Threatened	1B	Serpentine grasslands.
Lessingia hololeuca woolly-headed lessingia	CEQA? none	3	Serpentine grasslands.
Linanthus ambiguus serpentine linanthus	CEQA? none	4	Serpentine grasslands.
Malacothamnus arcuatus arcuate bush mallow	CEQA? none	4	Chaparral.
Pentachaeta bellidiflora white-rayed pentachaeta	Endangered Endangered	1B	Serpentine grasslands.

SENSITIVE PLANTS THAT MAY OCCUR AT EDGEWOOD OR HISTORICAL RECORDS OF SENSITIVE PLANTS

Cirsium fontinale fontinale fountain thistle	Endangered Endangered	1B	Serpentine grasslands in seeps and ravines.
Eriogonum luteolum caninum Tiburon buckwheat	CEQA? none	3	Serpentine in chaparral and grassland.
Pedicularis dudleyi Dudley's lousewort	Rare Species of Concern	1B	Coniferous forest
Silene verecunda verecunda San Francisco campion	CEQA Species of Concern	1B	Sand hills and rocky soils in open areas.

Abbreviations and Comments:

The California Native Plant Society (CNPS) Lists

1B	=	Plants Rare, Threatened, or Endangered in California and Elsewhere
3	=	Plants About Which We Need More Information - A Review List
4	=	Plants of Limited Distribution - A Watch List
CEQA	=	CEQA (California Environmental Quality Act) consideration is mandatory for CNPS List 1&2 plants.
CEQA?	=	It is recommended that evaluation for CEQA consideration for CNPS List 3&4 plants.

Federally-listed Plants - Former C1 and C2 taxa are now referred to as "Species of Concern" by the US Fish and Wildlife Service.

Nomenclature used is from "CNPS Inventory of Rare and Endangered Vascular Plants of California", fifth edition.

References:

Corelli, T., Chandik, Z. 1995. The Rare and Endangered Plants of San Mateo and Santa Clara County with Photographs and Illustrations. Monocot Press.

Skinner, M.W., Pavlik, B.M., eds. 1994. Inventory of Rare and Endangered Vascular Plants of California. California Native Plant Society Special Publication No. 1 (Fifth Edition).

Special Plants, January 1997. California Department of Fish and Game Natural Heritage Division, Natural Diversity Data Base. Quarterly publication.

Plant Species of Concern (these are my comments for pages 38 and 39 in the draft)

There are 10 rare and endangered plant species documented with the Department of Fish and Game that have extant populations at Edgewood County Park. Three of them are listed by the State and Federal Government as Threatened or Endangered and one is listed as a Species of Concern. These are:

Acanthomintha duttonii, San Mateo thorn-mint is an annual plant endemic to serpentine grassland with one population found at Edgewood. Historically this species occurred in a number of populations in San Mateo County from the Emerald Hills in Redwood City to Crystal Springs Reservoir. The San Mateo thorn-mint is now known from only two natural occurrences, both in San Mateo County. This plant is listed by the State and Federal Government as Endangered.

Fritillaria liliacea, fragrant fritillary is a herbaceous perennial plant which grows from a bulb. There are three populations found at Edgewood. There are many extant populations found from Sonoma County to Monterey County. In San Mateo County there are seven extant populations. This is listed by the Federal Government as a Species of Concern.

Hesperolinon congestum, Marin western flax is an annual plant endemic to serpentine soils with three populations found at Edgewood. Historically this species occurred quite extensively from Marin to San Mateo County there are now fourteen extant populations within Marin, San Francisco and San Mateo County. This plant is listed by the State and Federal Government as Threatened.

Pentachaeta bellidiflora, white-rayed pentachaeta is a small annual plant with one population found on serpentine grassland at Edgewood. Historically this species occurred in Marin, San Mateo and Santa Cruz counties. The white-rayed pentachaeta is now known from only two natural occurrences, both in San Mateo County. This plant is listed by the State and Federal Government as Endangered.

Other Plant Species of Potential Concern:

Cirsium fontinale fontinale, fountain thistle is a perennial herbaceous plant endemic to serpentine seeps and ravines in San Mateo County. There is one documented population at Edgewood but no plants have been found at this location since 1996. Recent surveys in July and August 1996 (by T. Peterson, Thomas Reid & Associates, and Dr. W. Savage, San Jose State University) failed to show any evidence of the plant, or seedling material. Dr. Savage noted, however, that in the long term (greater than 5 years), the area presents a favorable habitat for the return of the fountain thistle.

There are four extant populations found only in San Mateo County. This plant is listed by the State and Federal Government as Endangered.

The status of several other plant species known to occur at Edgewood is under investigation. These plants are not listed as endangered or threatened, or as species of concern by the State or Federal Government, but it is recommended by CNPS and the Department of Fish and Game that they be given CEQA consideration. They are: (1) Arctostaphylos regismontana, Kings Mountain manzanita, (CNPS List 4) that occurs as one plant at the edge of the evergreen woodlands; (2) Lessingia hololeuca, woolly-headed lessingia, (CNPS List 3) that occurs in one population on serpentine grassland; (3) Linanthus ambiguus, serpentine linanthus, (CNPS List 4) that has three populations in the serpentine grasslands; (4) Malacothamnus arcuatus, arcuate bush mallow, (CNPS List 4) occurs in one population in the chaparral; (5) Collinsia multicolor, San Francisco collinsia, (CNPS List 4) that occurs in the evergreen woodlands; (6) Dirca occidentalis, western leatherwood, (CNPS List 1B) that occurs in four populations in the evergreen woodlands.

Other sensitive plants reported by CNPS and other private individuals to possibly occur at Edgewood are Eriogonum luteolum caninum, Tiburon buckwheat, Silene verecunda verecunda, San Francisco campion, and Pedicularis dudleyi, Dudley's lousewort. The Tiburon buckwheat's presence at Edgewood has not been confirmed, and currently it is thought that the species may not extend south of Marin County. A specimen is at the UC Herbarium at Berkeley (with Barbara Etter, Curator) undergoing taxonomic investigation to determine if Edgewood has a population of this plant. The San Francisco campion and Dudley's lousewort were at one time on the Edgewood Park plant list but never vouchered at a herbarium as having occurred there, so their existence at the park is doubtful. These plants have been looked for but not found and the habitat for these two plants does not appear to occur within the park. Therefore, they have been removed from the list of species occurring at Edgewood.

Three plants occurring at Edgewood have been dropped from consideration due to either a change in rare status or taxonomic clarification. These are: Quercus lobata, valley oak, Clarkia rubicunda rubicunda, farewell-to-spring and Quercus dumosa, scrub oak. The valley oak and farewell-to-spring are no longer in the "CNPS Inventory of Rare and Endangered Plants", fifth edition. The Quercus dumosa has undergone a taxonomic reclassification and according to the Jepson Manual the scrub oak that occurs in our area is Quercus berberidifolia, scrub oak which has never had any protection.

These are my suggested changes, I would be glad to discuss any of these suggested ideas with you or your staff. Thank you for your efforts in moving this master plan process forward.

Sincerely,

Toni Corelli

Toni Corelli, Botanist
(415) 726-0689

cc: Carolyn Curtis
David Tibor, CNPS Botanist
Diane Elam, U.S. Fish and Wildlife Service

ATTACHMENT A-6

21 JUNE 1993

The Status of the Bay Checkerspot Butterfly at Edgewood County Park: 1979-1993

Alan E. Launer

Dennis D. Murphy

Stuart B. Weiss

Center for Conservation Biology

Department of Biological Sciences

Stanford University

Stanford, CA 94305

Introduction

This report contains information gathered by researchers at Stanford University on the Bay checkerspot butterfly (*Euphydryas editha bayensis*) population residing in the serpentine soil-based grasslands of Edgewood County Park (San Mateo County, CA). This report includes both summary information from the period 1979 to 1992, and results of 1993 field work.

Basic biology and habitat requirements of the Bay checkerspot butterfly

The Bay checkerspot butterfly is univoltine (one generation per year), with adult butterflies typically present at a given location for an approximately three week period during late winter or early spring. Egg masses of 50 to 250 eggs are laid on *Plantago erecta*, *Orthocarpus densiflorus*, or *Orthocarpus purpurascens* (note that recent taxonomic revisions have placed the two *Orthocarpus* species in the genus *Castilleja*). Eggs hatch after ten days to two weeks, and the larvae initially feed on the plant on which they were laid. The larvae feed for several weeks, occasionally moving to nearby plants, and then go into a dormancy period (diapause). This dormancy lasts until late November or early December, after autumn rains have allowed the larval food plants to germinate and begun to grow. Postdiapause larvae are comparatively mobile, and generally feed until early February. At that time the larvae pupate. Bay checkerspot butterflies exist as pupae for one to two weeks. Most mortality occurs when the larval hostplants senesce before the larvae have reached size large enough to survive the dormancy period. Additionally, both prediapause and postdiapause larvae are susceptible to parasitoids, and approximately 50% of the individuals that pupate do not survive to become adult butterflies. Individual butterflies generally live a week to ten days as adults.

The Bay checkerspot butterfly is restricted to patches of native California

grassland containing a mixture of its larval hostplants (*Plantago erecta*, *Orthocarpus densiflorus* , or *O. purpurascens*), and adult nectar sources (including *Lasthenia chrysostoma*, *Layia platyglossa*, *Allium* species, *Muilla maritima*, *Amsinkia intermedia*, *Linanthus* species, and *Lomatium* species). The only areas that presently support this mixture of grassland forbs are found on the patchily distributed serpentine-derived soils. Serpentinitic rock weathers to form shallow, nutrient poor soils, low in nitrogen and calcium, and high in magnesium, nickel, and chromium. Serpentine soils are easily saturated by rains, but dry rapidly, and are comparatively harsh substrates for most plant species. For these reasons, grasses and forbs from Eurasia, which now dominate many California grasslands, have been unable to dominate many areas of serpentine soils. As a result, the Bay checkerspot butterfly is currently restricted to remnant patches of native grasslands that are limited in area and isolated from one another.

Variations in the timing of the adult flight period and hostplant senescence makes the Bay checkerspot butterfly highly prone to weather-induced population fluctuations. Following years favorable to the Bay checkerspot butterfly, that is years that favor postdiapause larval growth and prediapause larval survival, the number of butterflies may dramatically increase; some populations have been observed to exhibit a five hundred percent increase in population size from one year to the next. Conversely, following years with comparatively little spring rain, which results in the early senescence of larval hostplants, the number of butterflies may decrease by an order of magnitude. Not surprisingly, Bay checkerspot butterfly populations crashed in numbers during the severe droughts of 1975-1977 and the late 1980's, and a number of populations are thought to have gone extinct during these periods.

The topographic configuration of specific patches of serpentine soil-based grasslands plays a critical role in determining the ability of an individual habitat patch to support Bay checkerspot butterfly populations through extreme weather years. Variations in aspect, slope and elevation across hillslopes create distinct solar exposure regimes, which result in distinct microclimates (for example, south-facing slopes are warmer and drier than north-facing slopes, because south-facing slopes receive much more solar radiation on clear days than do north-facing slopes). This microclimatic variation affects the timing of both butterfly and hostplant development. Bay checkerspot butterfly larvae on warm south-facing slopes may develop faster and emerge as adults a month (or more) earlier than larvae on cool north-facing slopes. Hostplant senescence is also dependent upon solar exposure; hostplants on south-facing slopes may flower and senesce three or four weeks before those on cooler slopes.

The spatial pattern of prediapause survival, and, hence, distribution of postdiapause larvae, across the microclimatic gradient changes from year to year. If the timing between an adult butterfly flight period and hostplant senescence is such that prediapause larvae can survive on warm slopes, the population may be able to sustain a "thermal advance." Population increases are often associated with thermal advances. Conversely, if the timing between adult butterfly flight period and larval hostplant senescence is such that prediapause larvae can only survive on cool slopes, then the population may experience a "thermal retreat." Population declines are often associated with thermal retreats.

These ever-shifting patterns of larval survival emphasize the importance of topographic diversity in maintaining populations of the Bay checkerspot butterfly. A variety of microclimates across a habitat patch apparently acts to buffer the population from weather fluctuations, and greatly increases the

chance of long-term persistence. The range of slope exposures determines the overall range of microclimates available.

Additionally, specific microclimates are apparently very important to the long-term persistence of the Bay checkerspot butterfly. In particular, microclimatically cool exposures, typically north-facing slopes, appear to form "core" habitat in which at least some individuals will survive during most drought conditions. Even small areas of cool microclimate (north-facing slopes) will confer to a population resistance to extinctions during short or mild periods of drought.

Warmer slope exposures are also important. Postdiapause larvae have been found to disperse to warmer slopes on which they grow more rapidly. Hence, the lack of adjacent warm slopes may act to inhibit postdiapause larval development. Reduced developmental rates may result in later flight periods, and may lead to timing problems between adult flight period and hostplant senescence. Additionally, even warm slope exposures far beyond the dispersal ability of postdiapause larvae, can contribute to the persistence of the population by providing early season nectar, which can serve to increase female fecundity.

Metapopulation dynamics of the Bay checkerspot butterfly

On the San Francisco Peninsula, the Bay checkerspot butterfly survives as a single metapopulation. The extinction of local demographic units within this metapopulation and the subsequent recolonization of temporarily unoccupied habitat patches seems to be a common occurrence. Historical records, as well as recent observations, indicate that during periods with average or slightly greater than average seasonal rainfall, the size of individual populations and the total number of populations tend to increase and the geographic range of the butterfly tends to

expand. Conversely, during periods of drought or much higher than average precipitation, the number and sizes of populations tend to decrease and the geographic range tends to contract.

At the present time, only two populations of the butterfly are known to exist on the San Francisco Peninsula (Jasper Ridge Area H and Edgewood County Park). While direct evidence of dispersal between these two locations is scant, genetic studies indicate a linkage such that the populations should most likely be considered to be components of a single metapopulation. Until the late 1980's the butterfly was found on at least four other Peninsula serpentine soil-based grasslands, including those located at San Bruno Mountain, northeast of the Highway 280 and 92 interchange, south and west of Farm Hill Boulevard, and Jasper Ridge Area C. While poorly documented, it is generally assumed that several other populations of the Bay checkerspot butterfly existed on the Peninsula until the 1960's.

Bay checkerspot butterfly habitat in Edgewood County Park

The serpentine grassland habitat located in the park and on adjacent San Francisco Water Department lands can be divided into seven distinct subareas (identified by letters A through G on the attached map). Subarea A is in the "triangle" on the west side of highway 280, on San Francisco Water Department land. Subarea B is the "main" block of habitat east of highway 280, and is the largest subarea. Subarea C is near the Hillcrest gate. Subarea D is just off Hillcrest Way, next to the *Acanthomintha* population. Subarea E is to the north of the main hill of the park. Subarea F is just to the north of the the freeway overpass. Subarea G is the small semi-isolated patch of serpentine grassland to the south of subarea B.

Historical records

While the serpentine grasslands of the San Francisco Peninsula have long

been known to support populations of the Bay checkerspot butterfly, the Edgewood population of this species was only first studied in any detail during the late 1960's by Stanford University graduate student Michael Singer (see Singer 1971). Since Singer's work, researchers from the Stanford group have continued to study the Edgewood population.

Table 1 provides a summary of our presence-absence data for Bay checkerspot butterflies during the period from 1979 to 1993. Effort was not consistent during each of these years, but most of the subareas were visited on several occasions in each year.

Larval distribution

Larvae have been found in every subarea in the Park, except for subarea F (see Table 1). Subareas B, C, and D have probably supported Bay checkerspot larvae every year since 1979. Subareas A, E, and G have supported larvae only during years of high population levels.

During the study period, subarea B consistently supported the largest number of butterfly larvae. However, the observed densities of larvae in subareas C and D were often as high as those in recorded in subarea B, but given the much more limited extent of these two subareas, the total number of larvae in these subareas was much lower than the total in subarea B.

Distribution of adult butterflies

Adult butterflies have been found on every subarea in the Park at least once since 1979. Subarea B invariably supports the most adult butterflies -- 100,000 butterflies were estimated to be present in that subarea in 1981. The number of butterflies has declined dramatically in recent years, and there have been no more than 3,000 to 10,000 adult butterflies present during each of the last five years. Adult

butterflies have also been consistently observed in subareas C and D. Lower densities of butterflies have been sporadically observed in each of the other subareas.

Dispersal of Bay checkerspot butterflies between subareas

Our observations indicate that all serpentine grasslands in the Park have been utilized at one time or another by Bay checkerspot butterflies. Mark-recapture studies conducted at the Park have shown that adult butterflies are generally quite sedentary, but that approximately 2.5% of butterflies will transfer between adjacent subareas (i.e. between subarea B and subarea C). This low rate is sufficient to tie the subpopulations together genetically, but are low enough that the subpopulations probably act as independent demographic units in all but very high population level years. For example, at the 2.5% transfer rate, with the subarea B subpopulation size of 100,000 in 1981, an estimated 2500 individuals originating in subarea B would be expected to disperse to each of the adjacent subareas. While the mechanics of dispersal are poorly understood, it is generally thought that certain physical features may act to facilitate dispersal (based on our work at Edgewood, Jasper Ridge, and Kirby Canyon). Of primary importance is habitat type -- Bay checkerspot butterflies appear to preferentially fly over grasslands. Serpentine soil-based grasslands, typically supporting relatively abundant adult nectar resources, are probably preferred by the butterflies over grasslands composed primarily of non-native grasses, but dispersal through patches of non-serpentine grasslands is common. Dispersal through non-grassland habitat, such as chaparral or oak woodlands is probably less frequent. Topography is also a factor in dispersal.

Additionally, adult Bay checkerspot butterflies often congregate at hill tops or along ridgelines ("hill topping" is a common behavior in male butterflies). As a result, movements to and from hill tops and along ridgelines have been frequently noted in the Bay checkerspot butterflies, and may contribute to dispersal between patches of

habitat supporting larval host plants.

1993 Surveys

Surveys for Bay checkerspot butterfly larvae were conducted in late February 1993, a time when postdiapause larvae were large enough to be readily found, but when the larvae had not yet begun to pupate. Time-constrained searches were conducted (covering an area of approximately 2,000 square meters) by two experienced field workers (AEL and SBW). The position of each larva was marked with a flag, and the total number of larvae observed in each ten minute time period was noted (five minutes for each of two observers). This method allows for a rapid estimation of relative densities of larvae over large areas of habitat, and has been calibrated and used extensively at sites in Santa Clara County.

Larvae were found in subareas B, C, and D. Larvae were well distributed across subarea B. No larvae were found in subareas A, E, and F (see map for location of search areas and number of larvae found during ten minute searches). Densities of larvae ranged from 0 to 9 larvae per 10 minute search period. Larvae were most dense on the north-facing slope in subarea C, and in the central portions of subarea B.

1993 Adult Survey

Bay checkerspot butterflies were observed flying on numerous occasions in subareas B, C, and D. No butterflies were observed by Stanford University personnel in any of the other subareas in 1993.

CONCLUSIONS

Historic records and recent surveys show the following:

1) Bay checkerspot butterflies have been observed in all serpentine grassland

Summary of Bay checkerspot butterfly observations at Edgewood County Park
+ = Bay checkerspot butterflies present; **0** = Bay checkerspot butterfies not observed during several site visits; - insufficient number of site visits during appropriate weather or season

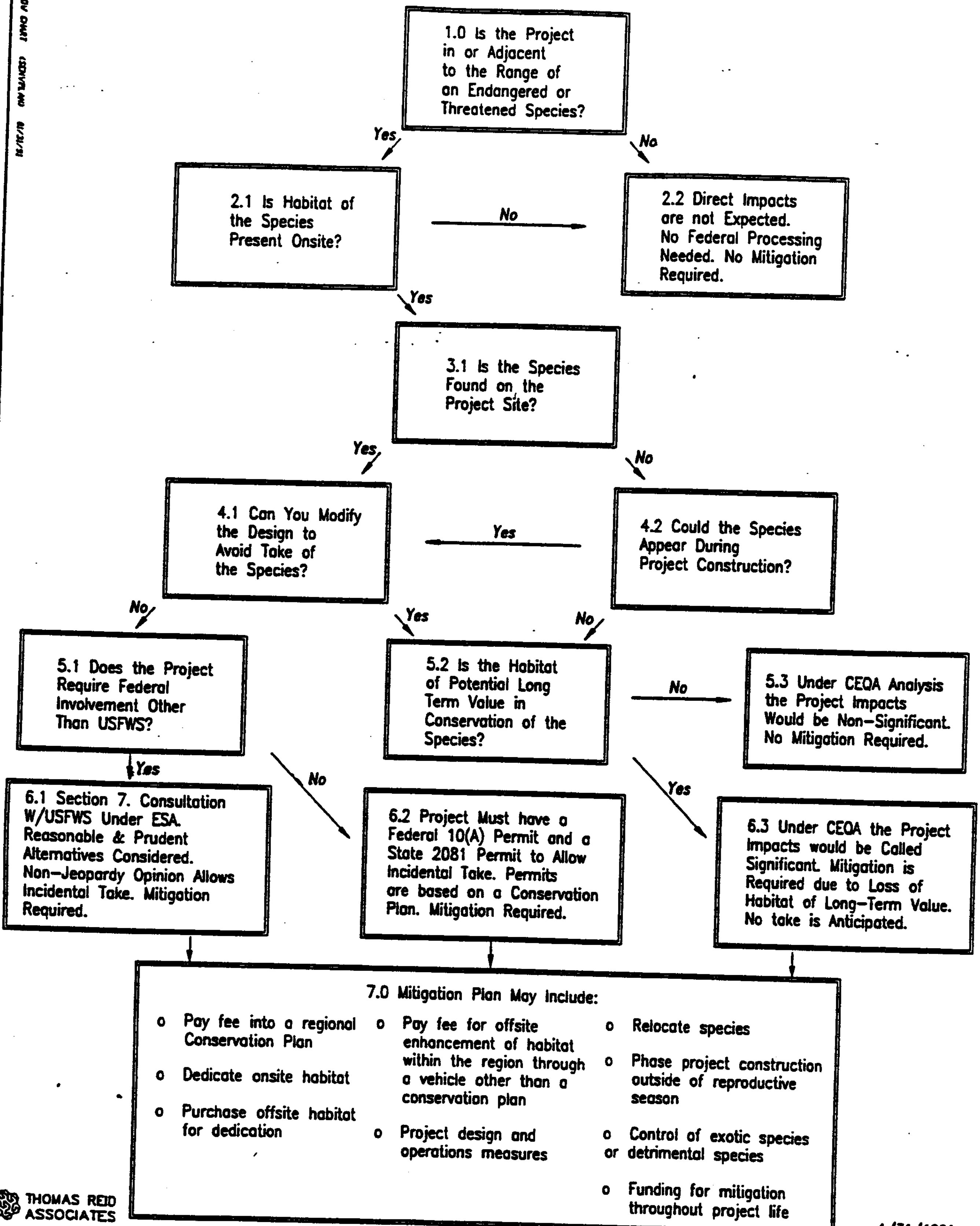
BUTTERFLY ADULTS

	A	B	C	D	E	F	G
1979	+	+	-	-	-	-	-
1980	+	+	-	-	-	-	-
1981	+	+	-	-	+	+	-
1982	+	+	-	-	-	-	-
1983	+	+	+	+	+	+	+
1984	+	+	+	+	+	+	-
1985	+	+	+	+	-	+	-
1986	+	+	+	+	-	+	-
1987	-	+	+	+	-	+	-
1988	-	+	+	+	-	+	-
1989	-	+	+	+	-	+	-
1990	0	+	+	+	-	+	-
1991	0	+	+	+	-	+	-
1992	0	+	+	+	-	+	-
1993	0	+	+	+	0	0	0

BUTTERFLY LARVAE

	A	B	C	D	E	F	G
1979	-	+	-	-	-	-	-
1980	-	+	-	-	-	-	-
1981	-	+	-	-	-	-	+
1982	-	+	-	-	-	-	-
1983	+	+	+	+	+	-	-
1984	-	+	-	+	-	-	-
1985	-	+	-	+	-	-	-
1986	-	+	+	+	-	-	-
1987	-	+	+	+	-	-	-
1988	-	+	-	+	-	-	-
1989	-	+	-	+	-	-	-
1990	0	+	-	+	-	-	-
1991	0	+	-	+	-	-	-
1992	0	+	-	+	-	-	-
1993	0	+	+	+	0	0	-

HABITAT CONSERVATION PLAN DECISION FLOW CHART



THOMAS REID ASSOCIATES

1/31/1991

areas at Edgewood Park at some time since 1979.

2) While subareas B, C, and D have apparently supported butterfly larvae continuously during this time period, subareas A, E, and G each supported larvae at least once.

3) The number and distribution of Bay checkerspot butterflies at Edgewood Park fluctuate greatly from year to year. Two of the smaller subpopulations (E and A) have apparently gone extinct.

4) Despite their small extent, subareas D and C have supported high densities of Bay checkerspot butterflies during each year since 1979.

5) The 1993 number of larvae in Edgewood Park is on the order of several thousand individuals, with the majority found in subarea B.

6) Individually, each of the subareas at Edgewood County Park is of limited topographic diversity, and, hence, each subarea by itself probably does not provide enough "environmental buffering" necessary for the the long-term persistence of a butterfly population. However, when all the subareas are viewed as supporting components of a single, albeit somewhat diffuse, population, then there is considerable topographic diversity present and a large buffering capacity.

7) Non-native grasslands located between the serpentine soil-based grasslands probably act to facilitate Bay checkerspot butterfly dispersal between subareas

These results indicate that the subpopulations at Edgewood are tightly linked one another and should be considered components of a single population. Each of these components and dispersal routes between the subareas are probably necessary for the long-term persistence of the butterfly at Edgewood County Park. In addition, the Bay checkerspot butterfly population at Edgewood County Park is undoubtedly key to the long-term persistence of the San Francisco Peninsula metapopulation as the only other known Peninsula population, at Jasper Ridge Area H, declined to approximately 30 individuals in 1993. Populations reaching this low level are highly susceptible to extinction.

APPENDIX B

HISTORICAL SETTING

Appendix B

Contents

GEOLOGIC AND VEGETATIVE HISTORY OF EDGEWOOD

By Susan Sommers, Friends of Edgewood
1996

GEOLOGIC HISTORY

Between about 160,000,000 and 35,000,000 years ago, much of the clastic rock (composed of fragmented materials resulting from the breaking up of other rocks) that underlies western California in the coast ranges formed between two converging tectonic plates, the oceanic Farallon plate and the North American plate. Only small remnants still exist of the Farallon plate, which subducted beneath the North American plate.

Many of the rocks that make up the coast ranges east of the San Andreas fault are clastic and include predominantly graywacke and argillite that were deposited along trench, trench slope, and slope basins that formed along the active margin. Small blocks of chert, limestone, basalt, diabase, and ultramafic rock, including serpentinite, were also scraped off the descending oceanic plate as it subducted along the margin.

The rarest and most spectacular rock type that formed part of the subduction complex is moderate- to high-grade metamorphic rocks, including eclogites, glaucophane, bearing blueschists, and garnet amphibolites, which formed many tens of kilometers deep in the subduction zone. These rock types are now often found in association with serpentinite and are commonly associated with major fault zones.

Serpentinite is a metamorphic rock type formed by the hydration of ultramafic rocks under a variety of conditions. The ultramafic rock is of mantle origin and typically underlies the crust at depths of 5 to 35 kilometers. Ultramafic rock is common in the oceanic crust; much of it was probably associated with either the subducting slab or, at considerable depth, with the upper plate of the subduction zone. Serpentinized ultramafic rock has a very low density. Like salt, it tends to be fairly mobile in the upper crust and is frequently found along major crustal fault zones within active plate margins.

During the middle Tertiary, the converging Farallon and North American plate boundaries changed from subduction to strike-slip with the evolution of the San Andreas fault zone between the Pacific and North American plates when the ancient spreading center, the Pacific Rise, impinged on the margin. Folding and faulting of Tertiary and Quaternary strata and uplift of the coast ranges have been consequences of the deformation associated with the active strike-slip plate boundary.

Present-day horizontal displacements along the active strands of the San Andreas system are measured on the order of cm/year. Vertical uplift rates are typically on the order of mm/year, except during catastrophic seismic events, when displacements can be on the order of meters/ event. Thus, tectonic activity, sedimentation, and rock deformation are ongoing processes that continue to modify the landscape today.

VEGETATIVE HISTORY

The California floristic province has been roughly defined as an area starting in southern Oregon in the north and extending south into northern Baja California in Mexico. On the east, it is delimited by the eastern slopes of the Cascade and Sierra Nevada ranges, and reaches west to the Pacific Ocean. Within this area is a very diverse flora. Edgewood County Park is but a small window on that diversity.

The diverse vegetation and abundant plant life in the preserve have a rich heritage, the result of geological and climatological changes on landforms and on the ancient geofloras. Throughout California, three Tertiary period geofloras (Neotropical, Arctic, and Madrean) colonized and intermingled over long periods of time and over many climatic shifts. Relic endemic species from the Tertiary times survived in sheltered locations. This history resulted in a flora that richly supported wildlife and provided amply for the needs of early man.

Relics of Neotropical forests at Edgewood are the California bay laurel *(Umbellularia californica)*, the rare western leatherwood (*Dirca occidentalis*), and California buckeye (*Aesculus californica*).

Relics of the Arctotertiary forest at Edgewood are the coast redwood, (Sequoia sempervirens), purple needlegrass (*Nassella pulchra*), milkmaids (*Cardamine californica*), sandworts *(Arenaria spp.*), Douglas fir (*Pseudostsuga menziesii*), saxifrages (*Saxafraga spp.*), and various members of the snapdragon family (*Scrophulariaceae*).

The Madrotertiary is the most recently developed geoflora (one million years ago). It colonized the dry icy slopes and rocky outcrops in the Eocene epoch and occupied California by the mid-Eocene. During this time, newly evolved endemics developed prolifically in mountainous regions where soils were diverse, local climates were varied but temperate, and plant species from different sources and/or geofloras intermingled.

Many of Edgewood's endemic plant species developed in the Madrotertiary period. Edgewood and some adjacent sites have several endemic representatives from Madrotertiary geoflora, including madrone (*Arbutus menziesii*), manzanita (*Arctostaphylos spp.*), buckbrush (*Ceanothus cuneatus*), several species of oaks (*Quercus spp.*), poison oak (*Toxicodendron diversilobum*), locoweed (*Astragalus spp.*), morning glory (*Calystegia spp.*), sunflower family members (*Helianthemum spp.*), Lotus, Prunus, and clovers (*Trifolium spp.*).

Nearly half of the species in the California floristic province (non-desert California) are endemics, that is, native to a well-defined geographic region and restricted to that region. Indeed, endemism is prevalent throughout the California floristic province. Two factors responsible for the high endemism in California are the Mediterranean climate that developed in the latest of Tertiary times, and the geographic isolation from other Mediterranean climate regions. In the Xerothermic period (8000 years ago), rising temperatures stimulated a virtual explosion of speciation that especially affected the flora of California.

Edgewood exhibits a number of such endemics as well as those known to occur in the San Mateo County serpentine grasslands. Many plant species at Edgewood are restricted to serpentine soils; these species are found both narrowly and broadly throughout serpentine grasslands from Marin County south into Santa Clara County.

A BRIEF HISTORY OF EDGEWOOD COUNTY PARK AND NATURAL PRESERVE

By Nita Spangler, Friends of Edgewood
1997

4000 B.P.

Before the arrival of the Ohlone-speaking peoples, hunters occupied a camp in in East Palo Alto dated 4000 B. P. by archeologists. In 1993, archeologists discovered a campsite of 6000 years ago on an earthquake fault at Moss Beach on the Fitzgerald Marine Preserve.

500 A.D.

Ohlone-speaking peoples came into the San Francisco Bay Area about 500 A.D. from the San Joaquin-Sacramento areas, coinciding with what the archeologists have referred to as a Late Horizon assemblage. (fn. 8 L. J. Bean)

However, the Ohlone knew nothing of these earlier residents, but found the San Francisco Peninsula so inviting that they established several villages between San Francisco and Monterey Bay. They were probably the largest tribe in California at the time the Spanish first visited their lands in 1769 with their population centered in the San Andreas valley west of Redwood City. From the great rift valley of the San Andreas Fault where they settled, the largest groups of Ohlone enjoyed a diversity of climate and foods within a few miles of ocean beaches, bayland marshes, freshwater streams, forests, and grasslands. They acquired intimate knowledge of their environment, enjoyed a Mediterranean climate, and enjoyed the abundance of foods that made their lives as hunters and gatherers relatively comfortable. Simple structures sufficed for shelter. The Ohlone had little need for household goods as they moved short distances to harvest the variety of seasonal foods. Expertly made baskets carried their food supplies and what few personal possessions they had . They acquired great skills in making stone tools which they often left at work sites, and they produced reed boats and wove mats and nets from a variety of natural materials.

Studies of these Ohlone tell us today that they were different from most other California Indians in that their social organization was less structured. The Ohlone were dependent upon the season, they saw themselves as part of animal and plant life about them, and they observed frequent rituals, singing and dancing. They were among the first California Indians to enter the Spanish Mission system, the colonization plan authorized by the King and the Church. They were among the first California natives to leave their homelands and to be decimated by this acculteration.

Their villages in the San Francisco Peninsula rift zone, the Canada de Raymundo, are noted by a number of archeological sites, including those at Filoli and the newly acquired Phleger addition to the GGNRA. Both are within view and a mile of two of Edgewood County Park and Preserve.

A main trail from the San Andreas to the Bay followed Cordilleras Creek.

1769

In 1769, the Spanish army exploring party led by Captain Don Gaspar de Portola, marched through the Canada de Raymundo and camped on San Francisquito Creek at the edge of the Bay marsh. The arrival of expedition in the Bay Area was the first Spanish-Ohlone encounter, and it introduced domestic livestock to the area.

Portola's men were seeking to encircle the South Bay in order to reach Punta del Reyes, and while scouts went ahead, the main party of 64 men and about 200 horses and mules remained in camp to recover from fatigue and illness. When the scouts could not cross the Carquinez Straits, they returned, and the entire expedition retraced their steps through the canada on the long way back to San Diego.

1776

There were subsequent land explorations in expeditions led by Lieutenant Pedro Fages (1700), Captain Fernando Rivera y Moncada (1774), and Captain Juan Bautista de Anza (1775) . They and their soldiers traveled from Monterey through the canada to explore and determine a settlement site close by the opening of San Francisco Bay. In 1776, a year after he led his own exploration, Anza in a march from distant Sonora and accompaniedby two Franciscan priests, led the first settlers to the northern part of the Peninsula where they began a presidio and mission. The mission lands extended south to San Francisquito Creek which was the northern boundary of Santa Clara Mission. Anza's party included 14 soldiers, 7 settlers, the missionary priests Francisco Palou and Pedro Carbon, the women and children (one more than had started at Sonora!) and a retinue of 13 young Indian servants who drove a large mule train and a herd of 286 cattle.

Seventy-five people set up a 15-tent city in Mission Valley, immediately attracting the natives within walking distance, who were cordially treated by the Spanish and given gifts of red flannel cloth and beads. The cattle astonished the Indians who watched them move into convenient pastures near springs.

In 1777, the Spanish established another mission 40 miles south of the Golden Gate in the Santa Clara Valley, and more livestock were imported. By year's end, the Mission at Santa Clara had 117 cattle, 18 mules, 16 horses, other horses and mules of the soldiers, 20 sheep, 16 goats, four pigs, 20 chickens, and three roosters. The livestock were set out in the fields that supplied the local tribes with greens, root crops, and seed harvests. The livestock multiplied rapidly after being introduced.

The Indians were denied ownership of any horses or guns, although some men were put to work as vaqueros. By 1780, the town of San Jose already had 600 head of various animals on the meadows, and livestock grazed the herbs and seed meadows

which belonged to the women of the surrounding native towns, causing extensive damage to root and seed crops. In the fall of 1782, natives near the San Francisco Presidio and the at the Pueblo of San Jose were killing cattle and horses. The Governor took action to punish the aggressors, while priests noted that livestock were already damaging the wild crops upon which the natives depended. Livestock were also damaging the some of the fields planted by the Indians.
Within two decades of the Spanish arrival, the principal tribes of the upper Peninsula--the Urebure at San Bruno, the Pruristac at Pedro Valley, the SSalson at San Mateo, the Chiguan at Half Moon Bay, and the Lamchin near Redwood City—had left their native villages for the missions. In 1784, most of the Yelamu, the Urebure and Pruristac villages had been brought into the San Francisco community.

1786

In 1786, the outstation of San Pedro y San Pablo was founded by Mission San Francisco, its purpose to reduce crowding at the Mission, to produce more food, and to strengthen contacts with tribes living near the Coast. As early as 1784, military officials at the Presidio wanted to move the growing numbers of government cattle from nearby overgrazed lands onto recently vacated tribal lands south of the mission, but when the governor thought the move would cause grave harm to the Indians, it was not allowed. Three years later, in 1787, missionaries complained that the Christian Indians of Mission San Francisco were seeing their fields cut to pieces and their pinole seeds despoiled, and the Presidio herds were moved south to the Royal Ranch near Monterey.

1793

A way station for travelers and a farm for small animals was established at San Mateo in 1793 . The harvests of crops at this estancia were substantial by 1810. At one time, the padres reported 10,000 sheep.

1797

In 1797, a new royal ranch (Rancho Buri-Buri) was established on the abandoned lands of the Urebure Group. (FN Milliken 1995)\

1830

Still another expansion of mission facilities, the Rancho de las Pulgas of 35,000 acres between San Mateo and San Francisquito Creeks, was established for the mission's large animals. After 1830, when the missions were secularized, it was claimed by Jose Arguello and his son, Luis. Each had served as Comandante of the Presidio. They proved their claim with U.S. Officials in 1856, but were unsuccessful in their claim to the adjoining Canada del Raymundo. The latter, containing valuable redwood forest lands, was a 2 1/2 league grant to John Coppinger by Mexican officials in 1840, and was patented in 1859 by his widow.

A small adobe house was headquarters for The Pulgas Rancho at the edge of the foothills west of today's San Carlos. Another small adobe for herders was in today's Menlo Park. A governor's report In 1796, stated three straight years of drought was destroying pasture lands. While animals moved to greater distances for grazing, this meant more destruction of Indian seed harvest lands. conditions that forced Indians to rob cattle and grain fields. In 1835, a census declared there were 4000 cattle and 2000 horses.

The mission system went into steep deline as Indians suffered high disease rates, the disintigration of tribal cultural, environmental deterioration resulting in significant loss of food resources, and oppression by the Spanish. Seed crops were reduced by the cessation of native fire management practices which had been banned by theSpanish authorities in order to protect the cattle.

In 1821, when Mexico won its independence from Spain, Mexican authorities attempted to isolate Alta California and to control its commerce with the outside world, but San Francisco Bay and Coastal areas were attractive to sea otter hunters, smugglers, yankee traders, the hide and tallow trade, and military ships. All brought sailors who had their own reasons for leaving their ships. The forests bordering Canada de Raymundo offered refuge for a growing community of foreign rogues— most were illegals— who made a living with their sawpits and carpentery. Mexican authorities welcomed their production. After the Gold Rush, they led the way for commercial agents and the pioneer lumbermen who made it possible for San Francisco to rebuild quickly after four major fires.

WEST UNION (1851)
In 1851, Willard Whipple brought a steam mill which he installed on the site of an abandoned Ohlone village on West Union Creek, just north of the crossroads store of Parkhurst and Tripp. Along the Indian trail that followed Cordilleras Creek to San Francisco Bay, Whipple constructed a crude road to Redwood Embarcadero where he delivered his lumber to small boats. As lumbermen brought their families, the village of West Union grew alongside Whipple's Mill Road. In 1859, the community hired a school teacher and in 1861 constructed a school building.

Miles Swift moved there in 1857 with his wife, Mary Hedge, and began farming, but he had to cut cordwood to supplement his income. With the help of his 14- year-old son, James, in 1876, with two horse teams, he delivered wagon loads of firewood to tidewater in Redwood City for shipment by barge to San Francisco's wood stoves. Two year later, James was hired by a Redwood City newspaper where he became owner and publisher.

Jacob Kreiss built a small farmhouse on the western slope of today's Edgewood County Park, and he and his wife reared a family. Kreiss was active in the school

district where his children attended the one room school.

1881

In 1881, a party of Italian capitalists bought 2000 acres of the Miramontes Ranch fronting on Canada Road at a sheriff's sale "at an exceedingly low price", and they constructed a large brick winery. A year later, S. Scalmanini & Co. planted 1700 acres of vineyard. One of their employes was Cesar Lodi who reared his family on a small farm before moving to Redwood City in 1913. His son, Joseph, later was Chief of the Redwood City Fire Departmen

Timothy Guy Phelps, a New Yorker who made a fortune during the Gold Rush and invested in a San Carlos acreage, in 1868 purchased 3500 acres from the Arguellos at the western edge of the Pulgas Ranch. On Whipple's Mill Road, he surveyed a grid for a canada townsite, but his speculation came to naught. Phelps had recently been in Washington, D.C., as a San Mateo County Congressman. Although he liked to wear overalls and call himself a farmer, Phelps actively promoted construction of the Pacific Railroad. Phelps still owned the property at the time of his death in 1899, and later owners in 1927 sold a site to the City of San Francisco for its Hassler Health Farm, a sanitarium for tuberculosis victims.

Agriculture on the overgrazed West Union lands at best was marginal, but even when lumbering ran out, some residents were reluctant to leave. In the 1930s, the San Francisco Water Department bought West Union lands to expand its watershed and all buildings were demolished. A few surviving fruit trees and trees and shrubs that were planted to mark driveways or homes are remaining reminders of he community.

1894

On the eastern slope of Edgewood County Park, John Isaac, employed in San Francisco by the State Horticultural Commission, purchased land onto which he moved the dismantled Monterey Building when the 1894 Midwinter International Exposition closed in San Francisco. For his labor in removing the building, the materials were hauled to Redwood City by the railroad. A year later, he married and commuted to his job, being driven daily by his bride the 3 l/2 miles to and from the Redwood City railroad station in a horse drawn buggy. Winter weather and bad roads eventually discouraged this suburban life, and when Isaac was offered work in Sacramento early in 1900 he sold to Henry C. Finkler, another San Francisco commuter . Finkler was secretary to the State Supreme Court, was once a large wheel bicycle champion in California, and soon turned to the automobile for his commute.

He and his wife, Betty, became well known in Redwood City where she was a founding member of the Redwood City Women's Club. He had a strong interest in civic affairs. They entertained frequently at their large house, adding to their lands

until they had 200 acres. In the summer of 1917, Finkler prevailed upon the County road department to build a concrete bridge which is still in use as the entrance to Edgewood County Park. Maps still show it as Finkler's Bridge. He is also credited with keeping weather records that were used when a prize winning slogan in a Chamber of Commerce promotion declared Redwood City to have "Climate Best by Government Test".

Finkler was getting ready to subdivide his lands when his wife died in 1927. He took his own life three years later, leaving a contested estate which by court order was divided between two of his working associates from the Supreme Court office. The family of B. Grant Taylor occupied the home until the property was sold in 1967 in anticipation of constuction of a new State college campus.

Months before, a real estate agent had been consolidating land in the area for a major subdivision, but the speculation encountered delays, and when state officials announced a search for an additional college site, the Edgewood site was offered and chosen. The western slope of Edgewood was consolidated for the site and some San Francisco Watershed land was included, but by 1970, the state had abandoned the idea.

Early in 1971, the San Francisco Public Utilities Commission authorized first steps for a $7 million recreation complex in the watershed west of Redwood City. Although the idea was almost void of environmental concerns, the Commission announced its plans for four 18-hole golf courses, at least three swimming pools, and 30 tennis courts. The PUC manager was ready to call for bids, when San Mateo County Supervisors and Peninsula conservationists asked for a delay and called for a "noble plan". It would not be until 1995 that a million dollar watershed study with a plan was finally completed. It was conspicuously without any recreation development.

Meanwhile, the 250-acre Edgewood site was appropriated and misused by off road vehicles and motorcycles whose drivers brought out special motorcycle and small airplane patrols by county park rangers and sheriff deputies. Scarred hillsides have been slow to heal.

Golfing advocates intensified their lobbying, and in 1979, a purchase plan for the Edgewood site was implemented in which half of the acquisition money came from the U.S.Land and Water Conservation Fund, one quarter from the Midpeninsula Regional Open Space District, and the remaining quarter from the County Charter for Parks Fund. It was finalized in October 1980.

A year later, the Parks and Recreation Commission and the Board of Supervisors approved a concept plan for a park featuring an 18-hole public golf course, clubhouse, and limited recreational and picnic area. Supervisors agreed to go ahead

and hired a consulting team to develop a master plan and an EIR. Paul Ehrlich and other scientists at Stanford University's Center for Population Studies immediately protested, citing the danger to the Bay checkerspot butterfly population.

In September 1984, the U.S. Fish and Wildlife Service published a rule to give the Bay Checkerspot butterfly (Euphydras editha bayensid) endangered species status. A year process of input and review would follow. Supervisors intensified their intent and the Grand Jury suggested the Supervisors delay.

In December 1985, two lawsuits filed by the California Native Plant Society were settled out of court. The settlement called for a financial analysis and it gave CNPS review rights for future plans. In other developments, the San Mateo Thornmint (Acanthamentha obovata) is listed as a federally endangered species.

A public hike organized by Margot Patterson Doss brought out a crowd in Apri 1986. Golfers announced that they were advertising and circulating petitions.

SEPTEMBER 1987

The Department of Interior Fish and Wildlife Service issued a final rule that the Bay Checkerspot was endangered. Supervisors were told that this would add $250,000 or $500,000 to the golf course costs. Supervisors asked for proposals for developing only part of the 467 acre site as a golf course.

1981

Opposition to any golf course in the watershed was growing. The Town of Woodside, the Audubon Society, Sierra Club, Filoli, and the chairman of the San Francisco Public Utilities Commission all objected to a course.

1991

In January Brian O'Neill, superintendent of the Golden Gate National Recreation Area opposed a golf course. Supervisor Tom Huening then withdrew his support for a golf course there, but suggested a committee be formed to see another site.

That fall, members of the California Native Plant Society again testified against a proposal for a nine hole course and driving range. On September 10, they met with the Sierra Club Loma Prieta Chapter, the California Oak Foundation to organize, and in a week, they had support from the Committee for Green Foothills and other groups. The Save Edgewood Park Coalition was ready to obtains signatures on a petition and hand out information fliers to park users. There were 25 organizations and 3 businesses when the group held its first press conference in November.

1992

In January, San Francisco officials began a long range planning project that would

deal with all aspects of the San Francisco Peninsula Watershed of 23,000 acres.
In May, the San Mateo County Board of Supervisors recommended that Edgewood County Park be declared a Preserve.

1993

An election placed two new members on the Board of Supervisors to strengthen the environmental vote.
In July, Thomas Reed Associates declared that as a result of a new feasibility study, "there is insufficient land for a regulation golf course unless significant use is made of serpentine vegetation from 50 to 100 acres...Given the status of the listed Bay checkerspot butterfly, it is unlikely that the County could obtain the permit required by federal law." There were now 43 organizations, three local homeowner groups and a business member of the Coalition to preserve Edgewood.

AUGUST 27, 1993

The Board of Supervisors unanimously passed an amended Joint Powers Agreement with the MidPeninsula Regional Open Space District, removing all references to a golf course and other intensive development, and to declare all of Edgewood County Park a Natural Area Preserve.
That fall, the Coalition set up Friends of Edgewood County Natural Preserve to work with County Parks and Recreation on a program to provide docents, to remove invasive weeds, to maintain trails and signs, to revegetate eroded aeas, and to provide informal trail patrol.

NOTES:

1. A comprehensive history entitled "A Short History of Edgewood County Park & Natural Preserve" is available from Parks & Recreation Division's administrative office (phone: 415-363-4020).

2. References for this "Brief History of Edgewood County Park & Natural Preserve" are found in the Bibliography section of this Master Plan.

EQUESTRIAN TRAIL HISTORY OF EDGEWOOD PARK

By Adda Quinn
1996

Since before the beginning of the century, equestrians have used trails through what is known today as Edgewood County Park and Natural Preserve. A string of private and commercial stables ran the length of San Mateo County for riders to access the area. Some of their names were: Carolands (Hillsborough), the Polo Grounds, Walter Johnson's, the Gymkana Club, House on the Hill, Tobin-Clark, Bar Pasture, Borel Estate (San Mateo), Green Briar, Lazy J and H&H (Belmont), Buck Marsh, Pat Lenfoot, Outlaw Ranch (Redwood City), Lazy Day Ranch (Portola Valley), the Circus Club (Menlo Park), Cavanaugh Ranch and the Stanford Farms (Palo Alto). With civilization accumulating along the El Camino Real and Alameda de las Pulgas, these nearby stables in the foothills provided both transportation and recreation into the beautiful Santa Marina Mountains west of mid-peninsula urban settlements. Equestrians from Daly City to Palo Alto frequented trails up the Farm Hill, Skyline Road and 42nd Avenue to take in the spectacular views afforded by the numerous ridges, then continued on to picnics in the watershed (then owned by the Spring Valley Water Company), or for further westward adventures. Despite the encroachment of civilization and subdivisions in the county foothills, many of the original barns continued in operation until the mid-1950s.

Because it was open property (except for intermittent fencing for livestock containment) and adjacent to both Canada Road and Edgewood Roads, Edgewood was often used as a dumping ground throughout its history. Equestrians learned very early in the century the importance of sticking strictly to well established trails in order to avoid hidden hazards in the Edgewood grasslands.

After World War I, Californians passed a series of bond issues for the "erection of concrete auto highways" which were a standard feature in the County by the mid-1920s to accommodate the rapidly accepted "motor de luxe" which had soon replaced the horse as the preferred form of transportation.[1] Cattle raised on the San Francisco peninsula were still being "driven" to the slaughterhouse at Hunters Point in the 1930s by cowboys who stopped at Olson Nolte Saddlery and Tack Store to repair and reprovision their gear.[2] The Woodside Trail Club was started in the early 1930s by the families of Judge Chamberlain and William Roth of Filoli. By 1939, it had a well developed series of equestrian trails throughout the private property of their friends in the Edgewood/Woodside area, including the Folgers and the

Spreckles.[3] The San Mateo Horsemen's Association was founded in 1940 for the promotion of equestrian events and interests.[4]

When World War II began Olson Nolte Saddlery was impressed into provisioning the US Army Cavalry with belts, and gas masks were still being made by others for mules! During the War, parts of the Santa Marina Mountains were closed to equestrian traffic because the government was using large tracts of land to train attack dogs, notably the ridge just above the "poor farm" north of Edgewood.[5] The Mounted Patrol of San Mateo County was founded during the war in 1942, to watch for invaders and provide security in the western hills which were too rugged for vehicles to patrol. Manpower was in critical short supply at that time. They were specifically invited by the San Francisco Water Department into watershed property and provided with keys to gates to allow access to property which had been closed to the public after its purchase from Spring Valley. The Mounted Patrol continues to provide volunteer search and rescue activities throughout remote portions of the Bay Area to this date.[6]

After the war, local equestrians were active in creation of the Statewide Trails Program which became the backbone of the present day trail systems in many of our public lands. They also secured permission for "right to pass" from private property owners and the Watershed. One equestrian who rode in Edgewood in 1949 reports: "We crossed what is now Edgewood Park's Southwest section and exited a gate at the top of Emerald Hill's backside, around Rocky Way or Hillcrest Way. We rode to Buck Marsh's barn. Picked up a horse and ponyed it over to Pat Lenfoot's (DVM) barn where Roy (Swineger) sold the horse to Peggy Schuman. The horse was a palomino mare called 'Penny'. We then delivered the horse to the Carolands Barn in Hillsborough", again crossing Edgewood.[7]

Aerial photographs obtained from the USGS and made available during the Edgewood Master Plan process in 1996, clearly show well established trails across Edgewood in 1948, 1956 and 1968. The Town of Woodside (southern neighbor of the current park) incorporated in November 1956. During the 1950's and 1960's, the people in Woodside liked to joke that its population of over 5000 horses exceeded the human head count.[8] Many of these horses were stabled around this parcel and were amongst its most frequent users. The property, which was to become Edgewood County Park and Natural Preserve, was owned by a succession of private land holders until 1960-1970, when the State of California acquired most of it as a prospective site for a school campus.[9]

In 1966-1968, when Highway 280 was under construction, equestrians and the Town of Woodside successfully negotiated the construction of the overpass on the West border of the Park contiguous with one side of the Watershed's "Triangle" with CalTrans and the State of California in order to allow equestrians continued safe access on the historic route from Palomar Park

across the north side of the property overlooking Edgewood Road to its intersection at Canada Road.[10] In the mid 1970's, a 4-H equestrian club which stabled at the Outlaw Ranch (by the Watershed aqueduct right-of-way bordering Edgewood Road) further negotiated with state and county agencies for permitted access along this same historic route. In 1977, a Trail Day was attended by 30 people marking the first coordinated effort which brought awareness of the importance of the Edgewood property to public attention.[11] In 1980, San Mateo County concluded financing and negotiations which secured Edgewood as a Park, and the Edgewood Trail is frequently used by both hikers and horsemen today.

The Town of Woodside was an active participant in development of the Environmental Impact Report prepared for the first Edgewood Master Plan of 1982. Woodside specifically requested four formal entrances: Canada Road, Edgewood Road, Hillcrest Way and at the Old Stage Day Camp where existing trails already linked the horse community at the top of the hills around Edgewood with Woodside, barns (now predominantly to the South), and connected to park trails in Huddert, Wunderlich, Pescadero Creek, Memorial, Junipero Serra, the Woodside Trail Club and the Watershed. The trail system in Edgewood also has served as a potential escape route for residents in the event of off-shore wind driven fires such as struck Oakland in 1970 and 1991.[12]

Once the park was secured, it took over three months for the County to clean up litter. Truckload after truckload of broken pipe, rusted barbed wire, garbage, and over 200 abandoned cars were hauled away. In 1982, the present trails system was laid out by the County in consultation with scientists from Stanford, the California Native Plant Society, and equestrians. Equestrians have participated in trail maintenance activities annually since creation of the Park.

The Clarkia Trail was flagged by Harry Dean and E. R. Sheehan at its present location to provide a buffer zone between wetlands/chaparral and the grasslands and replaced previous historic routes on the south side of the property. Tractoring to lay trail tread was begun in 1983, but had to be suspended due to wet weather. Work resumed in 1984, but was impeded by vandals who attacked the tractor rig when it was left overnight. Horsemen stayed with the tractor until wee morning hours subsequently and prevented further damage. Because of this cooperation, the Clarkia Trail was then finished very rapidly. Its construction cost $20,000.[13] As a result of the type of problem experienced here and occurring in other open space properties in the Bay Area, a need was evident for help in the growing park system. The Volunteer Horse Patrol was created in 1985.[14] Equestrian volunteers sought training and began to provide San Mateo County with a responsible presence in its parks to augment limited county staff. Today with nearly 15,000 acres of public lands, horsemen continue to provide this valuable service to both the County and the Watershed.

In the 1980's, equestrians joined a coalition of citizens interested in preserving the grasslands of the Park from development as a golf course. Through a series of public hearings and environmental reviews, this coalition was successful in demonstrating the value of this property for recreation and preservation, as well as the economic unfeasibility of trying to plant grass on infertile soil produced by serpentine. The golf course concept was defeated and the Edgewood charter amended in 1993 to include a Natural Preserve.

Today, increasing urban development on the hills around Edgewood has resulted in paved streets and automobile traffic dangerous for equestrian access to the Park's trails via Hillcrest Way. Because of the trails, barns and services available now primarily to the South, the Clarkia Trail has become of critical importance. Equestrians are exploring new connector routes with the County to try to obtain safe access to the existing trail system which is environmentally protective of the Park.

With almost a century of historic use, being one of the first groups to bring its potential for recreational purposes to the County's attention, and with active interest in operation and maintenance pertinent to present day trails as connecting corridors to the rest of the County, equestrians have long had a special relationship with Edgewood. We hope that the County in its current Master Planning process, will continue to preserve and enhance trails in Edgewood for use by both hikers and equestrians.

---

1. Henry Finkler letter Sept. 21, 1926.
2. "Olson Nolte, A Local Institution". Spring 1994. The San Mateo Horseman, p. 5 and cover picture.
3. "Reminisce, Memories in Barns". April 1976. California Horseman article by Bernice Scharlack, a journalist-historian raised in San Francisco.
4. San Mateo County Horseman's Association 1940-1990 - 50 year history
5. July 25, 1996 interview with Chris Olmo of Redwood City, age 90.
6. San Mateo County Mounted Patrol 50 Year History 1943-1993.
7. July 23, 1996 notes from Janet Estep of Woodside on a horseback ride she took with Roy Swineger in 1949.
8. San Mateo County Horsemen's Association, Ibid., and Woodside Trail Committee members tales retold by Harry Williams and Lew Reed.
9. Nita Spangler. "History of the Edgewood Park Site", Rev. Nov 19, 1995.
10. Recreation Development Plan, San Francisco Peninsula Watershed Lands, Technical Report, August 1975, p. 11.
11. Notes and articles from (retired) San Mateo County Park and Recreation Superintendent Bob Emert on William D. "Mike" Mikesell, 4-H leader.
12. Public hearing San Mateo County Park and Recreation Commissioners July 16, 1981, Minutes, P. 6. Also: Site Development Guidelines Section V, item B. and Equestrian Trails, Public Meeting, February 24, 1982, Status Report, May 1982.
13. San Mateo County Park and Recreation Commission Minutes, August 4, 1983.
14. July 9, 1996 Trails Advisory Committee meeting statement by Marian van den Bosch, Volunteer Horse Patrol President.

APPENDIX C

ISSUES ANALYSIS

Appendix C

CONTENTS

ISSUES ANALYSIS

This section of the Master Plan analyzes issues related to attaining the identified goals and objectives. The analysis will discuss the opportunities and constraints in resolving the resource and land planning issues. Many of the concerns stated in this section are based on comments gathered through public contact and correspondence during the planning process, and from extensive research analysis.

A. General Issues

1. Park and Natural Preserve Uses

Many times, the most desirable areas for park and recreational facilities are also areas of unique and sensitive resources. It is those resources that are most vulnerable and most easily destroyed by inappropriate uses. Consequently, a potential conflict is created between the parks and recreation and the natural preserve elements of Edgewood, since recreational development may adversely impact fragile and highly sensitive habitats.

Since Edgewood is recognized as a park and natural preserve, there are competing concerns that either (1) too much emphasis will be paid to the preserve aspect, at the expense of recreation activities, or (2) too much emphasis will be paid to recreational development, at the expense of resource preservation.

In order to preserve the natural habitats, some visitors believe that more restrictions will be placed on the daily recreational use of Edgewood, and this will eventually lead to the closure of some facilities. In contrast, if more recreation activities are provided, other visitors believe that the additional and continued "wear and tear" on the surroundings will not only negate preservation and restoration efforts, but will eventually lead to the depletion of Edgewood's prime natural resources.

To reiterate, there are existing legal statutes and institutional agreements that set the parameters for this planning process. First of all, Federal and State statutes compel the County of San Mateo to protect Edgewood's rare, threatened, and endangered species and habitats. Secondly, the General Plan guidelines pertaining to "Natural Preserve" (also outlined in Resolution 56062) are also applicable to the sensitive areas within Edgewood. Thirdly, the MROSD Modified Open Space Easement limits the land uses allowed at Edgewood to low-intensity recreational activities. Accordingly, if the protection and enhancement of Edgewood's prime

natural resources are threatened by potential development, resource protection should prevail. In other words, this Plan is designed such that natural resource protection goals would not be compromised by competing or conflicting recreation or development-oriented goals.

This Edgewood Master Plan provides the basis for determining a compatible balance between the recreation and the natural preserve elements of the site. Not only does the Plan identify an acceptable level of low-intensity recreational uses deemed to be congruent with preservation efforts, but more ideally, it prescribes recreational activities which would enhance preservation efforts. For example, an interpretive program is a low-intensity recreational activity that can lead to increased environmental protection.

Locating recreational uses away from environmentally sensitive areas is an effective method for minimalizing impact on the natural resources. Within Edgewood there are areas, such as the vicinity of Old Stage, which are distant from highly sensitive areas. In these locations, recreational impact on sensitive habitats will be minimal.

Recreation uses can also be designed so that related activities and development protect prime natural resources. Within Edgewood, some portions of trails, as well as the service road, cross serpentine grassland and chaparral, or in some cases infringe on the protected species' areas. Methods to harmonize trail use and resource protection are discussed in the 'Trails' section.

2. Value of Protecting Prime Natural Resources

The availability, quality, and stabilization of Edgewood's fragile natural resources are of importance to the people of San Mateo County. The serpentine soils play a vital role in sustaining the ecological system. These soils help to (1) sustain endangered and native plant life, (2) provide habitats for insect and animal species, (3) provide natural ground cover that protects resources from accelerated erosion, and (4) provide opportunities for scientific and educational pursuits.

3. Value of Providing Recreational Opportunities

The parks and recreation system within San Mateo County contribute significantly to the quality of life of its residents and visitors. Nature-oriented open spaces located close to urban areas, such as Edgewood, provide an escape from mental and physical stresses that come with urban living. Participation in activities such as picnicking, camping, nature watching, hiking, jogging and horseback riding not only help in maintaining a healthy community environment, but also in learning

much about the natural environment.

4. Preservation Demands

Natural resources can be quickly lost when disturbed by natural phenomena, as well as human activities. Thus, it becomes vital that natural resources be protected, and where possible, restored. Fortunately, accelerated depletion of natural resources can usually be avoided through appropriate management practices. Protection issues and measures which will guarantee the continued availability of Edgewood's natural resources will be discussed under 'Natural Resource Issues'.

5. Recreational Demands

According to the County's General Plan, there is a need for leisure activities that are easily accessible. A review of previous studies indicates that such demand focusses on access to pedestrian and equestrian trails, general nature study areas, and picnic areas, particularly for the physically impaired and the increasing population of seniors. Nature-oriented parks or preserves have been identified as the preferred type of outdoor recreation area. Edgewood, in its present state, can accommodate many of the foregoing recreational needs and still conform to existing legal and institutional parameters. However, careful attention to siting, design and impact mitigation would be required.

B. Natural Resource Issues

Natural resource management issues include: examining techniques to heighten resource protection, coordinating efforts related to the protection of native plants and sensitive habitats, and, in general, addressing adverse impacts associated with human intrusions.

1. Resource Management Techniques

Natural resource management techniques are available to: (1) preserve and enhance the natural vegetation, (2) promote the restoration of native vegetation, (3) preserve and protect unique species and habitats, and (4) reduce wildfire potential.

At Edgewood, the passive and active techniques include: (1) regulating land use for habitat protection, (2) classifying sensitive habitats, (3) installing protective barriers to create buffers adjacent to sensitive habitats, (4) educating visitors to some

extent, (5) enforcing regulations, (6) hand weeding, (7) mowing and cutting, (8) removal of large specimens by hand, and (9) restoring degraded areas by planting native grasses. To reiterate, these efforts have resulted in the successful revegetation, as well as the successful removal of exotic and invasive plant species in some areas of the site.

Of interest is whether additional protective measures are needed or desired to increase the existing level of protection given to Edgewood's water, soil, plants and animals. There are several management methods tried in preservation areas that are typically applied on a long-term basis, and include: prescription or controlled burning, controlled or managed livestock grazing, biological controls (such as the weevil), biodegradable chemicals (such as glyphosate (Roundup)) and triclopyr (Brush-B-Gon), and mechanical methods (such as mowing).

Since it is doubtful whether one option would be effective at managing all targeted species, a mix of management strategies is usually considered for the long term. Resource management techniques are typically first tried on an experimental basis. Experimentation usually involves: (1) selecting a number of small plots, (2) trying different intensities of the prescribed method over different periods of time or seasons (e.g., summer, winter), and (3) monitoring any impacts on the resource.

With respect to Edgewood, if additional methods are proposed, they must be in compliance with existing agreements, particularly the MROSD Easement which states that burning, spraying, grazing, etc. is not allowed, "except to ... control ... exotics." Moreover, in addition to County-issued permits, USFWS recommends that, if the resource management activity involves even a small amount of 'take', a permit or exemption be obtained (as described under 'Relevant ... Laws Regarding Sensitive Habitats and Endangered Species').

2. Other Resource Protection Issues

Another issue associated with resource protection relates to facility, utility, and resource management efforts in general. If persons performing activities such as trail maintenance, utility maintenance, exotic plant removal, and habitat restoration are not knowledgeable about the intricacies of the Bay checkerspot butterfly's mating season, migration, feeding patterns, etc., the host vegetation containing butterfly larvae could possibly become disturbed. With the assistance of government agencies and the scientific community, the County could initiate a program of specific and clearly defined guidelines that fully informs and directs staff, utility providers, and volunteers of ways to avoid and mitigate habitat disruption.

Concern has also been voiced about the unauthorized removal of native plant and seed specimens by, for example, visitors and students on Edgewood field trips. This activity could be to the detriment of preservation and restoration efforts. As such, it may be necessary to restrict the removal of on-site species to habitat restoration or reintroduction purposes only. To ensure this restriction, open space providers usually increase security and environmental awareness efforts.

To verify the effectiveness (or lack thereof) of foregoing resource management endeavors, a monitoring program is invaluable. Monitoring programs are used to track the existence of identified biotic species, and periodically evaluate, for example, whether populations of these species are responding as expected. Monitoring allows for changes in management strategies in order to compensate for any unexpected population trends. Monitoring also addresses the quality and quantity of occupied and potential habitat for the species. USFWS recommends that a monitoring program be implemented every 5 years.

There is also concern that: (1) routine route maintenance operations carried out primarily in the serpentine grassland may be harmful to rare plants, animals and their habitats (this issue will be discussed under 'Trails and Service Road'), (2) off-trail use by visitors may lead to trampling of sensitive areas such as the serpentine bunchgrass habitat which becomes extremely sensitive to traffic damage during summer months (this issue will be addressed under 'Circulation, Parking and Access'), and (3) a potential uncontained fire may threaten not only adjacent neighborhoods, but also sensitive areas (this issue will be discussed under 'Fire Access Route and Fire Management').

C. Recreational Facility Development Issues

1. Amenities to Enhance Visitor Experience

Recreational amenities and facilities are usually installed in parklands to increase overall visitor use and enjoyment. When deciding whether new improvements are appropriate or desirable, park providers usually focus their attention on both providing the necessary support services and assessing whether such facilities are compatible with a site's intended use, setting and character.

a. Old Stage Day Camp. The name "Old Stage Day Camp" does not reflect the primary use of this area which is picnicking. Because the name is misleading, potential visitors may not be attracted to the area if they are unaware that other activities are carried on. One way to increase visitor awareness is to incorporate, to the degree necessary, the primary function of that facility in its name. For

example, to reflect its intended uses, "Old Stage Day Camp" could be renamed "Old Stage Picnic Area and Day Camp." Alternatively, a generalized name reflects a range of activities carried out in an area. For example, if the interpretive center proposed in the 1982 Edgewood Park Master Plan materializes, Old Stage Day Camp could be renamed "Old Stage Recreation Area."

The purpose of the Old Stage area is to cluster the structural facilities and some of the permitted recreational activities on the edge of the site which is furthest from the highly sensitive habitats. Clustering upholds a basic planning objective of the Master Plan -- to preserve (and therefore maximize) open space so as to allow natural processes and desirable ecosystem changes to take place. By clustering, natural resource protection goals will not be compromised, and the impact on the natural environment will be minimized. Appropriate facilities and activities, such as picnic sites and an interpretive center, will be discussed later.

b. ***Trails and Paths.*** In many areas of Edgewood, trails and paths are available for scenic walking, hiking, jogging, and horseback riding. These trails and paths are not as widely used when compared with usage in other County facilities. This is partially because complementary facilities such as benches, bicycle racks, portable toilets, hitching posts and water holes for horses, which are intended for the trail users' safety and convenience, are very limited. Edgewood patrons have expressed a desire for these amenities along the trails, and at on-site and off-site parking areas.

c. ***Signs.*** The extent of Edgewood's resources is relatively unknown to the general public. Information about Edgewood is not strategically placed, and visitors are often unsure about where they can go, what they can see, and where use is restricted. For example, restriction signs in sensitive areas are either lacking, inconspicuous, or have been vandalized. This could result in more degradation than would occur with better information. To facilitate full visitor use and awareness, signs of suitable color, material and content, are valuable in indicating where activities are located, distances, names of all trails, restrictions, etc. To minimize the required number of signs, where possible, they are often placed in areas that are most frequented. Signs that are of a standard format provide continuity by maintaining the connection to the rest of the sign system.

d. ***Benches.*** Two existing benches at Edgewood are located (1) along the Sylvan Loop Trail and (2) along the Ridgeview Loop Trail. These provide an alternative to visitor sitting on the ground when resting or enjoying the view. In sensitive areas, sitting on the ground could foster habitat degradation.

Before siting a bench, park providers usually consider the following factors: (1)

cost, (2) potential for vandalism, including littering and smoking problems, and (3) potential to create either unwanted traffic or an unwanted trail, both of which could have adverse impacts on nearby sensitive areas.

e. Picnic Areas. Edgewood's five picnic sites are not used to their full capacity. The existing picnic sites can accommodate groups of no more than 50 persons. In addition, the picnic area is smaller than originally designed because some picnic sites were removed due to area reconfiguration. Park providers usually select picnic site location based on the quality of their viewscapes, good sun exposure, and available canopy. Moreover, picnic areas that are located as far apart as possible provide for a quiet experience. Picnic sites that contain accompanying furniture such as tables, barbecues and trash containers offer maximum enjoyment to visitors.

f. Interpretive Center. Edgewood's outstanding resources and recreational features offer tremendous possibilities for interpretation. To date, interpretive tours and programs have increased mainly through private efforts. Although the tours are increasingly popular, further promotional activities could appeal to the general public at large.

According to MROSD, the principal type of interpretive use is docent-led hikes and talks. However, interpretive centers are useful in reaching a wider audience as it could serve as the central point for printed materials, and information about all types of educational programs. They are effective in providing year-round services to help educate visitors (such as individuals, families and school and youth groups) and increase their awareness about the importance and value of the natural environment, sensitive and fragile resources, and ultimately, how to protect them.

An ideal location for an interpretive center would be in an area that is most frequently visited. At Edgewood, the amphitheatre area, in the western part of Old Stage is fitting because the facility is presently underused and abused. Alternatively, the meadow area could serve an equally functional purpose.

The construction and operation of an interpretive center require significant financial expense, agency discussions, and commitment. Due to ongoing budgetary cutbacks experienced by many parks and recreation departments, planned interpretive centers often do not materialize. Thus, it would be more practical and economical to consider the construction of a small-scaled or temporary structure. In terms of commitment, much effort is needed in developing and operating interpretive programs. This has been MROSD's experience in developing an interpretive center at Skyline Ridge Open Space Preserve. Staff and volunteer help is essential in providing interpretive services since it may not be financially feasible

to employ an on-site naturalist. Regarding Edgewood, even if the construction of an interpretive center is feasible, final approval will be subjected to MROSD design review requirements, as well as the preparation of an environmental document to determine and mitigate significant adverse impacts, if any, as required by the California Environmental Quality Act. Although an interpretive center could still serve as an official meeting place for interpretive programs, further investigation on the specifics of the center and the nature of interpretation at Edgewood, nevertheless, is necessary.

In the absence of interpretive centers, nature interpretation often assumes a more passive form. Trail signs, displays and printed information are made available to the public at convenient locations, both on-site and off-site.

g. Toilet Facilities. For public safety and convenience, a bench and a toilet provided in the same area makes for an optimum rest stop along a route. Edgewood patrons have expressed a need for a portable toilet since the only existing facility is at Old Stage Day Camp. Horses and bicycles are not officially allowed in this area.

Toilet facilities considered ideal in open space areas are those requiring no chemical pollutants, and minimum maintenance. Composting toilets allow human waste, toilet paper and organic material to break down naturally. In addition to being odor-free, they are environmentally safe since they require no septic system, water holding tank, or chemicals, and produce no pollutants. The principal deterrent to siting a toilet is the potential for vandalism.

When siting a toilet, park providers usually consider the following factors: convenience and accessibility for disabled patrons, nearness to other facilities, and separation from sensitive habitats.

h. Edgewood/Cañada Roads Staging Area. Because of accessibility to the Edgewood Trail to enter Edgewood, it has been suggested that the junction of Edgewood Road and Cañada Road be transformed into a staging area. Situated near the Cañada Trail Head, this area provides off-shoulder parking for about 20 vehicles, in an angle perpendicular to Edgewood Road. To enter Edgewood, visitors follow the Edgewood Trail via the I-280 underpass. This off-site area is fully utilized not only by Edgewood visitors, but also by people using Cañada Road for bicycling, especially on the first, third and fourth Sundays from March to October. Thus, any proposed facilities could be shared by both user groups. Amenities could include a low-maintenance portable toilet, bench, interpretive kiosk, bicycle rack, and expanded parking along Edgewood Road. Before plans for a staging area could materialize, the following must be investigated: (1) ability to

obtain an encroachment permit from County Public Works to utilize the area for such purpose, (2) safety factors involved in crossing the street, (3) parking area expansion (4) proper siting of proposed facilities, (5) potential environmental impact posed by increasing access through the western side of Edgewood, and (6) costs.

2. Edgewood Maintenance Facilities

The existing service area and ranger station, located in the same structure as the washroom stalls, is heavily used and does not fully serve current needs. As such, a ranger must go some distance to another County park facility in order to borrow or retrieve equipment. This is time when the ranger is not able to patrol Edgewood. Relocating the present ranger facility to one of the nearby on-site ranger residences, or establishing an off-site service area could reduce this lost time.

3. Trails and Service Road

Erosion can accelerate quickly where trails are steep or poorly located in relation to topography, and where trail traffic is particularly heavy around facilities and trail heads. Soil erosion is further exacerbated when wet trails are disturbed by maintenance vehicles, joggers and horses. Moreover, simultaneous use of narrowed trails by joggers or hikers and equestrians increases erosion at the outer edges of trails. The use of unauthorized trails and pathways also contributes to erosion problems.

Of particular concern is erosion that occurs in portions of routes located in serpentine grassland which contains sensitive plant and butterfly habitats. These areas can be easily disturbed or degraded by human activities and developments. As noted by USFWS, it is difficult to entirely eliminate adverse impacts that could result from recreational, resource management, and maintenance activities. It is likely that such activities would result in small amounts of "take," as discussed previously under "Relevant ... Laws Regarding ... Sensitive Habitats and ... Species."

a. ***Route Maintenance Activities.*** Especially during the wet winter months, well-maintained trails are essential in preventing soil erosion hazards and habitat disruption, as well as in providing access for maintenance and emergency vehicles. To ensure the safety of trail users and resource protection, the following options for maintaining and repairing all-weather trail surfaces have been explored. These options are preferred when the material found at a trail site is inadequate. All are deemed to be environmentally protective and aesthetically compatible with serpentine soils and associated plant and animal species. In selecting an option, it

is important that the physical (runoff) and chemical (nutrient) characteristics of a site be altered as little as possible.

Native Materials

1. Native rock and soil are most biologically and chemically compatible for trail surfaces in sensitive habitats. Based on MROSD's trail building and maintenance experience, avoiding the movement of on-site materials is a primary objective. Thus, the redistribution of native rock and soil could have an equally devastating impact on the areas where such materials are to be excavated. To avoid on-site excavation, a common practice of GGNRA is to 'stockpile' on-site materials when a natural occurrence, such as a landslide, takes place. Another constraint to using native on-site materials to repair serpentine tread trails is that state law prohibits excavation, relocation and compaction of serpentine soils if the asbestos content of that soil exceeds 5%. At present, the level of asbestos content in Edgewood serpentine soils is unknown and would need to be determined if this option is to be pursued. As an alternative, off-site serpentine soil is available from a Bay Area landfill, but its use will be subject to a Health Department oversight because of the soil's asbestos content.

Non-Native Materials

2. Quarried Basalt: The standard rock used in County parks for all-weather trail surfaces is State Class 2 3/4" basalt from Langley Hill Quarry in Woodside. This rock is durable, and binds and compacts well on the trail surface. According to Dr. I. Murarka's testimony (Attachment C-1, No.1), the chemistry of quarried basalt would pose no threat to the Edgewood ecosystem and is suitable for use with serpentine soils since quarried basalt is alkaline, and chemical decomposition occurs only in geologic time scales.

   California Native Plant Society maintains that this rock introduces or promotes exotic plant growth. However, conversations with quarry personnel and transport drivers indicate that this may not be true since (1) the basalt results from virgin rock seams that have undergone intense heat and pressure, and (2) it is unlikely that seeds may become attached to the rock during the short haul period.

3. Quarried Granite: Quarried granite is another standard material used for trails in some preserves, including GGNRA's Marin Headlands. Quarried granite is locally available from Pilarcitos Quarry near Half Moon Bay. Large boulders can be blasted to usable sizes and placed in the trail bed

foundation, before being covered with on-site native material. This procedure is effective in maintaining durability and subsurface drainage. As with quarried basalt, Dr. Murarka has stated that the chemistry of quarried granite would pose no threat to the Edgewood ecosystem.

4. Chert: Chert, an equally durable inert rock, is another non-native rock option. According to Paul Heiple, a local geologist (Attachment C-1, No.2), chert contains only those elements that are already present in serpentine, and is harder, therefore more durable, than both granite and basalt. Also, chert has a lower probability of leaching or breaking down chemically than both basalt and granite. Chert is found within Edgewood, and is available from quarries in Sonoma and Contra Costa Counties.

Non-Rock Techniques

5. Wood chips: Wood chips have been suggested since they can absorb water on a trail. Staff research indicates that wood chips do not provide an adequately firm base for all-weather trails. Moreover, it is not suitable for areas with steep slopes, and where there is equestrian traffic.

6. Duck Walks: In areas where seasonal seeps regularly create a mushy or saturated trail surface, a raised trail is preferable. Slightly raised walkways or "duck walks" are commonly made of redwood or pressure treated fir, and are used in other Bay Area preserves, notably the GGNRA. Because the walkways are raised, foot or equestrian traffic would not impact on sensitive areas. Although these walkways require low maintenance, they may not be suitable in areas of steep inclines.

In conjunction with the above alternatives, it is feasible to consider restoring the trails to multi-use trail width standards that were applied when the Edgewood trails were originally built.

As with any activity, USFWS recommends that if the trail maintenance activity involves even a small amount of 'take', a permit or exemption be obtained (as described under 'Relevant ... Laws Regarding Sensitive Habitats and Endangered Species'). In addition, it should be determined if existing or proposed County-wide operating and maintenance standards are applicable to Edgewood, or whether Edgewood-specific standards would be more appropriate due to Edgewood's sensitive environment. This can only be determined after pertinent issues raised have been resolved.

b. ***Rerouting.*** Another method to avert environmental disruption is rerouting that portion of trails and the service road which infringe on sensitive areas. Where optimum resource protection is sought, this method may not be suitable. Instead, route closure may be considered as a more direct means to attaining resource protection. If, however, some degree of route access is to continue, this method may apply, but it may only be feasible if an alternative route through a non-serpentine area exists.

c. ***Sylvan Way Access.*** Sylvan Way Access is used by residents in adjoining neighborhoods and is considered hazardous. Also of concern is that this entry point is situated on private property. To reiterate, Parks and Recreation Division is currently attempting to obtain an easement for this property. If they are unsuccessful, it may be possible to relocate the entry point to a nearby public right-of-way adjoining the Edgewood boundary. With respect to public safety and convenience, it has been suggested that in addition to providing a directional sign, a bridge can be constructed across the creekbed, linking to both sides of the terrain. As an alternative, stairs can be constructed to overcome the steepness of terrain, and a less elaborate bridge be built on either edge of the creekbed. If none of the suggestions are feasible, it may be necessary to close this entry point.

4. Circulation, Access and Parking

Edgewood is very accessible from any direction. Traffic congestion presents no threat when accessing the site, and it is not expected to be a future issue since no development is anticipated on nearby lands. However, the circulation problem occurs inside, not outside, Edgewood. Although part of Edgewood's charm is its almost casual circulation system, visitors have expressed difficulty in deciphering between authorized and unauthorized entrance points, pathways, and trails. Visitors also expressed concern that there are neither sufficient parking spaces to accommodate their needs on busy days, nor any direct public transportation to the site.

Techniques aimed at improving Edgewood's internal accessibility for full visitor use include determining (1) how to modify and improve the existing system for vehicles, bicycles (to Old Stage), equestrians, and pedestrians, (2) how and where to provide safety and accessibility improvements, (3) how to minimize traffic and parking impacts on adjacent neighborhoods, and (4) how to remove physical barriers for disabled people. All techniques are discussed in conjunction with the aim of maintaining environmental compatibility.

a. ***Unauthorized Access Points and Routes.*** As previously discussed and illustrated on Figure 9, there are several unauthorized entry points and routes

within Edgewood. Similar to authorized trails, unauthorized trails which cross sensitive areas are of particular concern. For example, Trail 1B is one of the most popular unauthorized trails in Edgewood. Since the trail crosses a butterfly habitat, the County historically has tried to restrict its use. However, visitors continue to access it to reach a desirable viewpoint.

Generally speaking, some visitors believe that unauthorized routes exist because authorized routes do not serve the public adequately. Thus, these now-customary entry points and routes should be formally authorized. However, the County believes that if these points and routes continue to exist, their use could lead either to continued trampling and erosion of sensitive areas, or in some cases, safety hazards.

In the interest of preserving and enhancing overall environmental quality of an area, these unauthorized entry points and routes should not be accepted as authorized. Their closure would also be consistent with the goal of preserving Edgewood's prime natural resources.

On the other hand, because of the inherent attraction to some areas, e.g., unique views, visitors most likely will continue to be drawn to these. Consequently, if an unauthorized route is closed, and less than adequate enforcement ensues, degradation of that area may continue. Short of redesignating an unauthorized trail, some park providers pursue a controlled access approach. This could entail: (1) placing protective barriers along the route so that visitors to not wander off authorized areas, (2) providing interpretive information to educate visitors, (3) providing directional and restriction signs, and (4) increasing enforcement through staff and volunteer patrols to help monitor and discourage unsanctioned activities.

Possible basic guidelines for selecting an unauthorized route to be controlled are: (1) if multiple unauthorized routes to the same destination exist, preference should be given to the route located furthest away from sensitive habitats, (2) it should link to an existing authorized trail, (3) if a controlled route instead of route closure presents a better means of environmental protection.

b. ***Route Closure.*** Though route closure has been identified several times as a means to avert environmental impacts, it is a long, time-consuming and difficult task to accomplish. Since the "old" routes are already defined, visitors will be inclined to use them, ignorant of the fact that a route has been closed. In addition, placing multiple signs along a route may detract from the site's natural ambiance. Thus, before route closure can be enforced, it is necessary to examine the existence of methods that have not only been proven to be effective, but also environmentally and aesthetically compatible.

c. ***New Routes and External Linkages.*** To improve internal circulation, it has also been suggested that new internal trails be constructed. In addition, if regional trail linkages proposed by the Trails Advisory Committee were to materialize, it may be necessary to create new trails for such purposes. If new trails are allowed, they must be restricted to areas of low vulnerability and risk so as to protect ecological resources.

d. ***Parking and Transportation Amenities.*** There are one on-site and several off-site parking lots available for use by Edgewood visitors. Consequently, overflow parking occurs on other County and governmental agencies' lands, and adjacent neighborhoods. The off-site parking lots do not provide bicycle racks to accommodate cyclists.

Providing parking for bicycles and buses at entrances could ease the parking situation, and at the same time, encourage the more "environmentally friendly" modes of travel. Any provision of additional on-site or off-site parking spaces should be discussed with relevant parties such as Public Works and San Francisco Water Department, so that future siting and design would cause the least possible site disturbance, as well as minimize safety hazards.

It has been suggested that shuttle buses for transporting visitors between off-site parking and an entry point during the peak visitor season should be examined. However, the provision of direct transport to the site is not the responsibility of Parks and Recreation Division and in any case, a solution is most probably precluded by fiscal constraints. Thus, visitors may have to rely on SamTrans as the primary means of public transportation.

e. ***Bicycle Access.*** Mountain bikers have expressed interest in accessing Edgewood's trails. However, others believe that bicycles are not an appropriate activity in Edgewood because (1) they would pose an environmental as well as a public safety hazard; (2) would disrupt the "sense of isolation" provided to visitors; and (3) extensive bicycle access is already provided in many connected regional parks, preserves, recreation areas and shorelines.

In the early 1980's, bicycle access at Edgewood was tried for the service road. However, bicyclists failed to stay in their designated area. Not only did they endanger the health of an Edgewood visitor, they also caused damage to many off-track areas.

f. ***Access for the Physically Challenged.*** The Americans with Disabilities Act mandates equal access for persons with disabilities. It is difficult to provide access to the physically challenged at Edgewood due to the combination of fiscal

constraints and steep topography.

Disabled visitors have suggested that a switchback ramp heading toward Pulgas Ridge Open Space be placed above the Park-and-Ride lot. At present, there are steep grades leading from this parking lot to Pulgas Ridge. However, the intervening land is owned by San Francisco Water Department. Thus, any proposals must begin with discussions with relevant agencies.

Alternatively, a bridge could be constructed across Edgewood Road. In addition, an all-access route could be constructed from the top of Edgewood Road. Although MROSD is not a grant-making agency, it has been suggested that an MROSD Grant could be obtained for construction purposes. Others have suggested that additional picnic and toilet facilities be located in the meadow near the Old Stage parking area.

g. ***Added Access to Old Stage Day Camp.*** Equestrians and cyclists have requested access to use the picnic areas and washroom facilities at the Old Stage Day Camp. Allowing access for these user groups may also serve as an alternative to the placement of the portable toilet facility previously discussed. To meet their needs, it has been suggested that amenities such as a bicycle rack, hitching post or tie station, and a rake be made available. However, the following factors should be considered in deciding whether to allow access to these user groups: (1) Ability to locate an adequately flat area large enough to accommodate horses on a tie station; for safety reasons, such area should be away from picnickers. It has been suggested that rest stops for horses be located in the North Hill area where a tie rack previously existed, or at the intersection of Edgewood Trail. This is similar to procedures at other parks permitting equestrians, such as Costa Ranch in San Jose. (2) Even though a rake would be provided, horse manure may still present a sanitary problem. The manure inflicts unwelcomed odors on Old Stage users and the ranger residences. Regular waste disposal and constant cleaning of this area would be consideration factors.

h. ***Access for Public Service Providers.*** An unplanned fire in Edgewood could spread toward adjacent residential areas or into sensitive habitats. The rate at which fire would spread depends on factors such as wind velocity, topography and fuel levels.

There are several fire-related concerns pertaining to Edgewood. First of all, the fuel load build-up in Edgewood's biotic communities could be a fire hazard. Generally, excessive, unmanaged and uncleared chaparral old growth and deadwood, as well as highly flammable dry grasses present a fire threat. Controlled burning and grazing have both proven effective in reducing fuel loads elsewhere. With respect

to Edgewood, however, it is uncertain whether these methods are suitable.

Secondly, limited emergency fire access within Edgewood is of concern. If a fire were to ignite in the interior of a site as large as Edgewood, fire prevention trucks would have to make their own route, i.e., cut the most direct path to the fire. This practice may unavoidably trample sensitive habitats. A defined emergency access route which employs existing routes within a site can eliminate the need to drive across untouched areas. Moreover, a prescribed route can enhance response time for fire prevention and rescue.

Another related concern is the threat of fire due to barbeques and campfires in the Old Stage area. Under these circumstances, the most effective method of prevention is frequent patrolling, heightened visitor awareness, and volunteer help.

Before any decisions could be made, consultations with knowledgeable agencies and institutions (such as U.S. Fish and Wildlife Service, California Department of Fish and Game, and Stanford University's Center for Conservation Biology), and public service providers (which include emergency response, utility, and park maintenance personnel) are necessary to undertake a thorough assessment of the fire risk and to map out the best access route which minimizes impacts on sensitive areas.

ATTACHMENT C-1

POTENTIAL IMPACTS
OF USING
IDENTIFIED NON-NATIVE ROCKING MATERIALS
IN SERPENTINE GRASSLAND

1. Potential Impact of Using Basalt or Granite Quarry Stone for Trail Construction and Maintenance in a Serpentine Grassland -- Dr. Ishwar P. Murarka, July 30, 1996

2. The Case for Using Intert Materials to Rock Trails in Edgewood Park. Paul Heiple, Geologist, January 24, 1997

Dr. Ishwar P. Murarka
10446 San Fernando Avenue
Cupertino, California 95014
408-996-9040 phone
408-996-1369 fax

CREDENTIALS

1979	M.B.A.	The University of Chicago, Illinois	Management Science
1971	Ph.D.	Oregon State University, Corvallis	Soil Science / Statistics
1968	M.S.	Oregon State University, Corvallis	Soil Science / Statistics
1964	M.A.	University of Calcutta, India	Geography
1962	B.A.	University of Calcutta, India	Honors in Geography

22 years of research with prestigious national & private research institutions

Life Membership in honorary academic society Sigma XI -Chapter at Large

Membership in professional societies:

Biometrics Society
American Society of Agronomy
Soil Science Society of America
American Society for Testing of Materials (D19 & D34)
American Geophysical Union
Council for Agricultural Science and Technology - Life Member

Over 100 publications (bibliography available on request)

OBJECTIVE

As a Certified Professional Soil Scientist, I have been asked to review and comment on information provided for the purpose of determining the potential impact of using either basalt or granite quarry stone for trail construction and maintenance in a serpentine grassland. I have relied upon the soil descriptions provided by published literature and generally known to be associated with the rock types under consideration. I have neither taken soil samples, nor have I analyzed them. I have been asked to prepare this paper for consideration by a non-technical audience. I am providing this information at no cost, as a public service.

COMMENTS

Weathering is defined as the mechanical disintegration and chemical break down of rock materials that occurs when they are exposed to freeze-thaw cycles, pressure changes, exposure to water, chemical reactions, and other influences at the earth's surface.[1] Both result in microscopic cracks along grain boundaries and within grains and occur at differing rates, Rates of rock weathering can be estimated by a variety of direct and indirect techniques. Direct techniques include laboratory studies. These tend not to be as accurate as other methods for predicting true environmental behavior, but are faster and less costly.[2] The relationship between weathering, rind thickness and age also provides a direct measure of rock weathering rates. Indirect methods require solution of a mass balance equation to account for gains and losses of nutrients in a watershed, and are useful for all elements except phosphorus. They are usually long term field studies and are very costly. References reviewed involved a variety of methods.

Elemental release from rock weathering is highly variable and strongly dependent on the primary mineralogy of the rock. The larger the particle grain size, the more difficult the rock will be to weather. Small pieces of rock or small size minerals weather more rapidly than large pieces because of their greater surface area.[3] In addition, degree of fracturing and chemical zonation of mineral grains are important controls.[4]

Because granite, basalt and serpentine are all base-saturated rocks (alkaline in nature with pH of about 8), their chemical composition is similar. Weathering processes should produce soils with similar elemental constituents. Both basalt and granite contain larger particle sized elements than does serpentine which will cause them to weather slower in comparison to the serpentine.[5] Half inch diameter basalt or granite are commercially available from quarries in San Mateo County nearest the Edgewood Park and Natural Preserve which has the serpentinite grasslands of concern. Of these two quarry stones, the basalt mimics the chemistry of the serpentine soil closest, is the hardest of the three rocks being compared (due to higher iron content) and has the largest grain fractions. The weathering rate of granite has been calculated at 10^{-16} per meter squared per meter per second. This is extremely slow. Studies in California have demonstrated mineral grain depletion and destruction of pyroxene and hornblende take more than a hundred thousand (10^{5}) years. Depletion of these minerals takes several hundred thousand years in the same soils.[6]

To construct a simple analogy, if one took either of these quarry stones and placed them in a glass of water to stimulate decomposition, you might begin to see mechanical changes in 300-400 years. Chemical changes would take a thousand years. The geochemical and geological effect of use of either stone to rock trails in a serpentine soil where grasslands predominate will be non-detectable and probably not measurable except in geologic time scales.

In a practical sense, the use of these quarry stones in the trail bed of a park which will receive "light" use (defined as pedestrian, equestrian and bicycle) the effects of walking or riding on such rocks may create some minor forms of mechanical weathering. Over

time, the most likely outcome is compaction of the rocks into the trail bed. This could have a positive effect of hardening the trail bed.

The climatic zone in which this property is located is Mediterranean, receiving 10-30 inches of rainfall annually, predominantly during winter months. It lies in the rain shadow of the Santa Cruz mountains. These factors may further limit potential weathering of quarry stone used.

It is understood that trails account for 7.5 miles of track approximately three feet wide and that the majority of trails are not to be rocked. Less than 0.3% of the area of Edgewood are in trails in the grasslands of concern. The straying of on occasional stone from a trail bed into the grassland could conceivably alter the surface tension of clays and increase water infiltration potential. However, the effect would likely be much less than that caused by deer hooves during the course of their grazing.

Because transportation costs are often determined by weight, using close sources will be most cost-effective when use is indicated. Langley Quarry which supplies the basalt is located in Woodside; Pilarcitos Quarry which supplies the granite is in Half Moon Bay, both reasonably approximate to the site.

I believe that the information above is an accurate interpretation of the references provided. I understand that the original source material is being provided to the audience of interest along with this review and analysis.

Ishwar P. Murarka, Ph.D.
Certified Professional Soil Scientist

7-30-96.
Date

---

1. Crook p. 395
2. Suarez, p.2
3. Clayton, Nutrient Supply, p. 75
4. Colman, Chemical Weathering p. 3-4, 37
5. Cleaves, p. 437
6. Clayton, Nutrient Supply, p.80, 91 and Colman, Chemical Weathering p. 1

REFERENCES PROVIDED

The following were provided as references:

Complete Soil Evaluation of Granite from Pilarcitos Quarry. 1993. Soil and Plant Laboratory, Inc.

Charmichael, I., F. Turner and J. Verhoogen. 1974. Department of Geology and Geophysics UC Berkeley by McGraw-Hill, p. 9 and p. 611.

Pertinent sections from Torrey and Torrey (1982), Reid (1993), Friends Draft (1996) and Hokholt comments of June 28, 1996.

Clayton, J. Nutrient Supply to Soil by Rock Weathering. Proceedings on the Impact of Intensive Harvesting on Forest Nutrient Cycling. USDA Forest Service, pp. 75-96.

Cleaves, E., D. Fisher, and O. Bricker. 1974. Chemical Weathering of Serpentinite in the Eastern Piedmont of Maryland. Geological Society of American Bulletin, Vol. 85, pp. 437-444.

Colman, S. 1982. Chemical Weathering of Basalts and Andesites: Evidence from Weathering Rinds. USGS. United States Government Printing Office, Washington, pp. 1-39 plus Appendices.

Crook, Jr. R. and A. Gillespie. 1986. Weathering Rates in Granitic Boulders Measured by P-Wave Speeds. Rates of Chemical Weathering of Rocks and Minerals. Academic Press, Inc., pp. 395-417.

Suarez, D. and J. Wood. Short and Long Term Weathering Rates of a Feldspar Fraction Isolated from an Arid Zone Soil. USDA-ARS, US Salinity Laboratory, Riverside California pending publication in Chemical Geology, pp. 1-24.

January 24, 1997

To: Lynn Fritz

From: Paul Heiple
441 Conil Way
Portola Valley, CA 94028

Subject: The case for using inert materials to rock trails in Edgewood Park.

The subject of trail maintenance in Edgewood Park causes a great deal of controversy between those who want to use the park for recreation and those who want Edgewood Park to be manly a preserve. The concern of the conservationist is the introduction of foreign materials into the serpentine areas. It is feared these materials would alter the soils allowing foreign species to invade the areas of serpentine endemic species. Over time the altered soil and the foreign species would slowly but inexorably replace the endemics.

It is for this reason, the Friends of Edgewood suggested in their draft master plan for Edgewood Park using only locally derived materials that are of similar composition to the bedrock surrounding the trail. The San Mateo County Trail Users Group (SaMTUG) in their July 30, 1996 and August 1, 1996 letters suggested the use of serpentine, basalt, gabbro and granite as possible materials that could be used to rock the trails and secured the services of a soil scientist to help with these suggestions. The use of granite and basalt are suggested because they are readily available on the crushed stone market and, in the opinion of SaMTUG's soil scientist, slow weathering enough to pose no danger to the surrounding soils from their difference in chemistry as compared to serpentine.

None of these solutions struck me as being acceptable. Local serpentine is usually highly fractured and would not stand up well to constant foot and horse traffic. The result would be muddy trails that are the problem now. Basalt contains calcium feldspars that could contribute an element into the surrounding soils that serpentine soils are lacking and that many plants need to grow. Granite contains potassium feldspars, another element that is essential to many plants and is lacking in serpentine soils, as well as calcium. The assertion that weathering of these rocks is so slow that it could be ignored was based upon conditions that are not going to be found on the trails where these rocks are going to be placed. Even if the rates are slow, the changes will take place over time and slowly alter the chemistry and mineral composition of the surrounding soil.

As a geologist interested in preserving the plants of Edgewood, it occurred to me that the debate was ignoring the use of an inert material that contains only elements that are already present in serpentine and is harder than both granite and basalt. Chert is just such a material and it one of the rock types found in the Franciscan Rocks that make up the bedrock of Edgewood Park. Chert is found in Edgewood Park along the Clarkia Trail and on the Sylvan loop as rocky outcroppings. It is resistant to weathering and erosion and produces a poor sandy soil when it does weather.

Chert is composed of one mineral, cryptocrystalline quartz. The chemical composition is silicon dioxide with a few impurities. Goldman, 1959 wrote about cherts'

superior properties as a concrete aggregate. In that work, several chemical analyses were performed. The results show that the Franciscan cherts are 93.5% to 95% SiO_2. Other oxides present are Al_2O_3 2.2% to 2.3%, FeO and Fe_2O_3 1.2%, MgO .7%, CaO .1%, Na_2O .4%, K_2O .5%, H_2O .9%, and MnO .2%. Quartz is one of the hardest of the commonly occurring minerals in the earths crust. It does not have cleavage planes so that fracturing the mineral is difficult. The chemical inertness is attested to by the large amounts of quartz sand found on the earth's surface.

Franciscan chert is composed of the shells of radiolarians, one celled creatures who's shells are made of silica. These shells accumulated on the ocean floor at great depth and have been pushed up on the edge of the continent by the forces of plate tectonics. Beds of these cherts are common in the Franciscan rocks, the jasper of jasper ridge is chert.

Chert would not add any significant amounts of nutrient elements to the serpentine rocks. Silicon is a major percentage element in serpentine so its addition will not change significantly add to the soil chemistry. The only consequence might be the dilution of the toxic element found in serpentine soils and the increase of sand to the soil as the chert breaks into smaller pieces. These effects should be confined to the trail area and not spread into the surrounding serpentine soils.

References:

Goldman, H. B. & Kline, I. E., 1959 "Franciscan Chert In California, Concrete Aggregates" , California Division of Mines Special Publication #55

Rapp, J. S. et. al. 1990 "Mines and Mineral Producers Active in California 1988 - 1989" California Division of Mines Special Publication #103

APPENDIX D

DESCRIPTION OF PREFERRED ALTERNATIVE

Appendix D

CONTENTS

THE PREFERRED ALTERNATIVE

A. Review of Alternative Plans

The planning process involved developing three alternatives for future resource protection and recreational development at Edgewood. The alternatives included different mixes of low-intensity recreation and resource management activities. Each alternative varied in their emphasis, but all were consistent with existing legal parameters. A detailed description and evaluation of these alternatives are on file at the County's Parks and Recreation Division.

Through a series of public hearings, the San Mateo County Parks and Recreation Commission considered the alternatives to select a preferred plan. Since much of Edgewood's habitats, vegetation, and wildlife form a natural preserve in an urban setting, the Commission advocated protection, preservation, and enhancement of sensitive resources as the primary emphasis, and coexistence with recreational activities as secondary. The Board of Supervisors largely supported this approach, but sought to improve the coexistence of recreation and resource preservation. The planning process culminated with the Board adopting a balanced management plan where protecting, preserving and restoring Edgewood's natural resources is the primary objective.

B. Description of the Preferred Alternative

The final Master Plan, i.e., the preferred alternative, allows existing low-intensity recreation activities to continue, and limited complementary site improvements to be constructed. Incompatible land uses, disturbance of sensitive habitats, erosion, trespassing, vandalism, and fire hazards are minimized or prohibited.

The proposed plan and its attendant policies are divided into the following categories: (1) definitions and designations (2) permitted uses, (3) natural resource protection, (4) operations and maintenance, (5) access, parking, and associated amenities (6) interpretive activities, (7) coordination activities, and (8) plan monitoring and amendment.

1. DEFINITIONS AND DESIGNATIONS

The Master Plan defines and designates the following key terms:

I) Low-Intensity Uses are defined as passive recreation uses which will not create direct or cumulative adverse impact on Edgewood's natural environment. Although not limited to the following, uses include on-trail

hiking, walking, jogging, horseback riding, nature observation (including birding), education, docent-led group tours, and picnicking and camping in the Old Stage Day Camp area.

ii) Sensitive Habitats are defined and designated as areas which (1) include, or potentially could include, rare or unique species of animals or plants, or (2) has a unique or special biological value, and is easily subject to degradation or disturbance. As a guideline, habitats considered to be sensitive are those containing or having the potential to contain species legally protected and listed by U.S. Fish and Wildlife Service as endangered, or threatened, and/or listed by California Department of Fish and Game as rare, threatened, endangered, or candidate for listing.

At Edgewood, sensitive habitats consist of: areas of serpentine soils; riparian corridors; wetlands; bird nesting and feeding sites; and areas of special scientific study.

iii) Authorized Trail is defined as those trails which are designated for permitted low-intensity uses by the public, and maintained to a standard considered safe by County Parks and Recreation Division. Existing trails designated as authorized include: Clarkia Trail, Edgewood Trail, Ridgeview Loop Trail, Serpentine Loop Trail, Sylvan Trail, Inspiration Heights Trail, Franciscan Trail, and Trail 1B.

iv) Viewpoint is defined as a location along an authorized trail which affords a distinctly scenic view of either Edgewood's natural landscape, or landscape of land beyond Edgewood. In addition, a viewpoint must be accessible by an authorized trail, and their views may include the hills, swales, wetlands, streams, serpentine grassland and associated wildflower field, San Francisco Bay, and San Francisco Watershed.

All designations for sensitive habitats, authorized trails and viewpoints would be determined by Parks and Recreation Division.

2. PERMITTED USES

To ensure that the goal of protecting Edgewood's natural resources is attained, only low-intensity recreation activities and which are conducive to Edgewood's environment are allowed. Permitted uses include the low-intensity recreation activities previously identified, as well as resource management activities, and operations and maintenance activities. These uses and activities would only be permitted (1) in designated areas providing they do not adversely impact on sensitive habitats, (2) is compatible with the site's natural resources, and (3) if such uses encourage a more environmentally-friendly lifestyle for the people of San Mateo County.

Community-sponsored runs or walks would be allowed only by permit from the Parks and Recreation Division. Other related uses or development could be considered by the Parks and Recreation Commission at a public hearing, subject to finding that such uses or development conform with the goals and objectives of this Master Plan.

Alternately, uses that may adversely impact on Edgewood's natural environment would be prohibited. Prohibited uses include high-intensity recreation uses, livestock grazing, the walking of accompanied animals (except for guide dogs on a leash), and after-hours use. Cyclists, although excluded from using all trails within Edgewood, are permitted access to bicycle racks in the Old Stage Day Camp area. Enforcement of all prohibited uses would be mandatory. Individuals violating permitted uses at Edgewood would be cited and prosecuted, without exception.

3. NATURAL RESOURCE PROTECTION

Steps will be taken to protect, preserve, and enhance Edgewood's rare and unique biota. The Plan prescribes coordinating the efforts of existing Parks and Recreation committees and organizations, notably the Trails Advisory Committee, Fish and Wildlife Committee, and other recognized stakeholder groups, to prescribe the optimal set of methods for protecting Edgewood's natural resources.

Some of the primary tasks would be to compile, and update on a regular basis, a comprehensive inventory of Edgewood's natural resources, including soils, water, and plant and animal species. With knowledge derived from the inventory, an evaluation of existing and potential resource management strategies would then be undertaken. This exercise would determine the best means to actively or passively control and eventually eliminate invasive or exotic vegetation, restore and/or enhance identified degraded areas with native species, and protect and preserve existing sensitive habitats. Approval of any proposed management strategy shall rest with the Parks and Recreation Commission.

To further promote the survival of native vegetation, the collection of native plant and seed would be restricted specifically to the restoration of damaged habitats and other recovery activities. Species collection is often undertaken by the scientific community and knowledgeable volunteers. The County would ensure that necessary permit approval and consultation with Federal and State authorities have been undertaken.

Past overgrazing has degraded areas of Edgewood. Consequently, livestock grazing, although considered to be a successful resource management method in some open spaces, would be prohibited.

Non-native (including feral) animals would also be removed from Edgewood. These animals usually survive by killing and eating native plant and animal species. Consequently, all animal species, including domesticated animals which are not identified by knowledgeable institutions such as Sequoia Audubon Society as native, would be removed from Edgewood, and taken to appropriate animal control centers.

Finally, Parks and Recreation Division would ensure that anyone violating Federal, State, and local laws pertaining to endangered species and sensitive habitats is prosecuted to the full extent of the law. Increased security, with the help of volunteers, would also ensure that violations do not occur.

4. OPERATIONS AND MAINTENANCE

Year-round use of authorized trails by joggers, hikers, and equestrians would continue, except when temporary closure becomes necessary for safety, maintenance, or resource management/protection reasons, as determined by the Parks and Recreation Director. Temporary trail closure would not exceed 30 days. If it does exceed 30 days, continued closure would require approval by the Board of Supervisors.

The Parks and Recreation Division would ensure that hazardous conditions resulting from trail erosion is minimized. All routes which have been designated as authorized would be repaired and maintained on a regular basis so as to conform to original trail design for all-weather trails.

The Plan prescribes that where material found at a trail site is inadequate, the following criteria be applied in determining the most environmentally protective and appropriate ways to maintain a durable all-weather trail surface. Selecting trail maintenance materials shall be in the following order of preference:

a. Use of Native Materials for Trail Surfaces: Native soil and rock are preferred for all trail surfaces in Edgewood since they are most biologically and chemically compatible. Therefore, native materials shall be collected and used when trail rebuilding is necessary, provided that it is not habitat disrupting or involves excavation, and that the serpentine soils do not exceed 5% asbestos content (State limit).

b. Alternatives to Native Materials: Where native materials cannot be used, or where, for example, inadequate drainage conditions exist, the Plan requires chemically inert rocks -- quarried chert, quarried basalt, and quarried granite (in that order), or raised wooden walkways or

duck walks.

These locally-available quarried rocks are not only durable, but contain only elements present in serpentine. They will not change or significantly add to the soil chemistry. Raised walkways or duck walks constructed of redwood or pressure treated fir are effective for use in wet areas, or where minimal impact on habitats is desired.

Unauthorized trails are those trails which are not designated as authorized. All unauthorized trails and any future unidentified trails, would be permanently closed and restored to their natural state.

Edgewood's resources will be further protected through regular maintenance efforts, and aggressive enforcement of visitor use regulations, particularly with respect to the prohibition on after-hours use, bicycles, dogs, and use of unauthorized trails. Additionally, the Plan seeks to increase public awareness of restrictions through staff and volunteer efforts, and by posting appropriate signs and protective barriers.

The erection of additional interpretive, regulatory and directional signs is also essential in helping to protect Edgewood's sensitive habitats. Signs would be strategically placed at prominent locations; they should of suitable color, material and content, indicate where activities are located, distances, names of all trails, restrictions, etc.

Protective barriers would be required to restrict access to sensitive habitats where unlawful visitor access is likely. Protective barriers would be compatible with the surrounding environment, and as such, it is suggested that they be a low split-rail fence, or ground-hugging row of logs.

In summary, the key resource protection efforts include (1) increasing enforcement through staff and volunteer patrols, (2) providing interpretive, directional and restriction information, and (3) placing protective barriers along sensitive habitats where visitor incursions are likely. When violations occur, individuals would be cited and prosecuted, without exception.

5. ACCESS, PARKING, AND ASSOCIATED AMENITIES

Promoting the use of nearby off-site parking areas, and providing parking for bicycles and buses would greatly ease the parking situation, and at the same time, encourage more ride-sharing. In particular, the Plan seeks to continue to use the County-owned gravel area adjacent to the Old Stage Day Camp parking lot. Off-

site parking areas and entry points would also be retrofitted with bicycle racks, and efforts would be made to keep Sylvan Way Access open.

At the intersection of Cañada Road and Edgewood Road, near Cañada Trail Head, the Plan promotes establishing a staging area. Amenities would include a low-maintenance portable toilet, bench, interpretive kiosk, bicycle rack, and expanded parking along Edgewood Road. These facilities would likely be utilized by cyclists using Cañada Road, as well as Edgewood visitors.

To the extent feasible, the Plan also seeks to reduce hazards encountered in reaching site facilities situated on gentle slopes. Where physical deterrents cannot be overcome, by providing at minimum, an accessible (low-maintenance composting) toilet, benches, and picnic areas in the Old Stage parking area. When providing amenities, the Plan would strive to meet the minimum Americans with Disabilities Act requirements for disabled visitors

Four trailside bench locations (two existing and two proposed) are identified in the Master Plan. Two benches are presently sited at a viewpoint along Sylvan Trail, and along Ridgeview Loop Trail, respectively. Potential new bench sites are suggested for designated viewpoints (Points A and B, Figure 3) along Inspiration Heights and Ridgeview Loop Trails. However, before a new bench can be placed, the Parks and Recreation Commission, at a public hearing, must determine that there is a compelling reason to place a bench at any of these two locations. In addition, when new bench placement occurs, it would be subject to an initial 12-month review, at which time continuance would be determined by the Commission.

Finally, the Plan recommends that the need for, and location of a service provider access route be evaluated. Such a route would enhance response time in providing emergency services while employing existing routes to the maximum extent possible, and eliminating the need to drive across untouched and/or sensitive areas.

6. INTERPRETIVE ACTIVITIES

The Master Plan promotes interpretive activities that inform and educate visitors about Edgewood's uniqueness and special resources.

In particular, the Plan prescribes interpretive opportunities which include: docent-led hikes and tours, birding activities, the distribution of educational brochures, placement of descriptive displays or signs and information kiosks along trails, entrances and staging area.

The interpretive center would provide a year-round setting for educational and

research activities. It would be effective in reaching a wider audience by serving as a central point for printed materials, and information about docent programs. In addition, the interpretive center would help to promote direct community involvement in efforts to protect Edgewood.

7. COORDINATION ACTIVITIES

In order to efficiently and effectively provide the services outlined in this Master Plan, it is essential that the cooperation and participation of surrounding park, open space, recreation, and service providers. These include: Midpeninsula Open Space District, Golden Gate National Recreation Area, San Francisco Water District, Stanford University's Center for Conservation Biology, Filoli Center, PG&E, and CDF Fire.

Volunteer efforts at Edgewood are also quite beneficial. Parks and Recreation would support and coordinate diverse stakeholder volunteer programs that protect and restore Edgewood's biota, ensure that the site is properly maintained, restore habitats, and maintain trails. Among others, volunteer organizations include California Native Plant Society, California Oak Foundation, Committee for Green Foothills, Friends of Edgewood Natural Preserve, Jack Brook Horse Camp Coordinating Council, Los Viajeros, San Mateo County Mounted Patrol, San Mateo Trails Users Group, Sequoia Audubon Society, Sierra Club, Volunteer Horse Patrol, and West Coast Horse Association.

8. PLAN MONITORING AND AMENDMENT

When necessary and economically feasible, the Plan would be regularly monitored and evaluated to measure its effectiveness toward meeting the stated goals and objectives. If changes are to be made, the Plan's amendment process requires approval by the Parks and Recreation Commission, and the Board of Supervisors, at a public hearing.

BIBLIOGRAPHY

Persons, Organizations and Agencies Consulted

Anderson, Randy. Mid Peninsula Regional Open Space District.

Bentley, Pete. County of San Mateo, Public Works Department.

Casey, Sally. Botanist.

Corelli, Toni. Botanist, California Native Plant Society, Santa Clara Chapter.

Hokholt, Lisa. United States Department of Agriculture, Natural Resources Conservation Service.

Kendall, Jaime. Bay Area Quality Management Board.

Kyhos, Donald. Professor emeritus, UC Davis, specialist in cytogenetics and hybridization of plants of the sunflower family (*Asteraceae*).

Loo, Loren. Pacific Gas & Electric.

Peterson, Taylor. Thomas Reid and Associates.

Savage, Wayne. Professor, San Jose State University

Strothers, John. Professor of Botany, UC Berkeley, Research Botanist, Jepson Herbarium. Specialist in plants of the sunflower family (*Asteraceae*), & plants of California.

Wilkinson, Robert. Sequoia Audubon Society,

Wright, David & Elam, Diane. United States Department of the Interior, Fish and Wildlife Service.

Sample Master Plans Used in Preparing the Edgewood Master Plan

County of Santa Clara. May 1992. *Rancho San Antonio County Park Master Plan.*

East Bay Regional Park District. November 1993. *Las Trampas Regional Wilderness - Final Land Use Development Plan/Environmental Impact Report.*

East Bay Regional Park District. August 1991. *Las Trampas Regional Wilderness - Resource Analysis.*

Midpeninsula Regional Open Space District. August 1993. *A Management Plan for the Pulgas Ridge Open Space Preserve.*

County and Edgewood -related Documents & Correspondence

California Department of Fish & Game. Correspondence re Edgewood, dated November 3, 1992 from Brian Hunter, Regional Manager - Region 3.

California Department of Fish & Game. Correspondence re Edgewood, dated May 19, 1997 from Brian Hunter, Regional Manager - Region 3.

CHNMB Associates, Torrey and Torrey, Inc., *Draft EIR, Edgewood County Park Master Plan, 1982.*

Friends of Edgewood Natural Preserve. *Edgewood County Park and Natural Preserve Master Plan, Final Draft January 20, 1996.*

Heiple, Paul. 1997 (January 24). *Case for Using Intert Materials to Rock Trails in Edgewood Park.*

Modified Grant of Park, Recreation, Scenic, and Open Space Easement, San Mateo County and Mid Peninsula Open Space District, July 27, 1993.

Murarka, Ishwar P. July, 1996. *Opinion re: Use of Granite and Basalt for Rocking of Trails.*

Resolution 56062, dated May 5, 1992 -- Resolution Designating Edgewood County Park as a Natural Preserve Under Terms of the County General Plan.

Resolution 57385, dated July 27, 1993 -- Resolution Authorizing and Directing the Execution of an Amendment to the Joint Powers Agreement with the Midpeninsula Regional Open Space District Entered into on September 16, 1980.

Resolution 57386, dated July 27, 1993 -- Resolution Authorizing and Directing the Execution of a Modification to a Park, Recreation, Scenic, and Open Space Easement Granted to the Midpeninsula Regional Open Space District on September 16, 1980.

San Mateo County, Parks & Recreation Division. 1995. *Trails Plan 1995.*

San Mateo County Department of Environmental Management. 1986. *General Plan.*

San Mateo County Environmental Services Agency. March, 1992. *Zoning Regulations.*

San Mateo County Department of Environmental Management. Planning & Development Division, *Stage II Final Supplement to the EIR for Edgewood County Park Master Plan, 1984.*

Thomas Reid Associates. 1993. *Edgewood County Park Golf Course Site Constraints Analysis.* Palo Alto, CA.

United States Department of Fish and Wildlife Service. Correspondence re Edgewood dated November 3, 1992 from Wayne S. White, Field Supervisor.

United States Department of Fish and Wildlife Service. Correspondence re Edgewood dated October 17, 1996 from Medlin, J., Field Supervisor.

United States Department of Fish and Wildlife Service. Correspondence re Edgewood dated May 23, 1997 from White, W.S., Field Supervisor.

Biological Species

Barbour, M.G., and Major, J. (eds.) 1977. *Terrestrial Vegetation of California*. California Native Plant Society: Sacramento.

Barbour, M., Pavlik, B., Drysdale, F. & Lindstrom S. 1993. *California's Changing Landscapes: Diversity and Conservation of California Vegetation*. California Native Plant Society: Sacramento, CA.

California Department of Fish and Game. July 11, 1996. *Natural Diversity Data Base*.

Cooper, W.S. 1922. *The Broad-Sclerophyll Vegetation of California: An Ecological Study of the Chaparral and its Related Communities*. Carnegie Institute: Washington Publications.

Corelli, T. 1996. *The Flora of Edgewood Park*. Santa Clara Valley Chapter of the California Native Plant Society.

Crampton, B. 1974. *Grasses in California*. University of California Press.

Cronemiller, F.P. 1942. "Chaparral". *Madroño.* Vol. 6.

Gankin, R. & Major, J. 1964."Arctostaphylos myrtifolia, its Biology and Relationships to the Problem of Endemism," *Ecology*. Vol. 45.

Hanes, T.L. 1974. "Ecological Studies on Two Closely Related Chaparral Shrubs in Southern California," *Ecology*. Monograph 35.

Hickman, James C. (ed.) 1993. *The Jepson Manual: Higher Plants of California*. University of California Press: Berkeley & Los Angeles, CA.

Holland, Robert F. Ph.D. 1986. *Preliminary Descriptions of the Terrestrial Natural Communities of California*. State of California Resources Agency, Department of Fish & Game.

McBride, J. 1974."Plant Succession in the Berkeley Hills, California."*Madroño*. Vol. 22.

McCarten, Niall F. 1986. "A Study of Ecological Aspects Related to the Reintroduction of Acanthomintha obovata duttonii," submitted to Susan Cochran, Coordinator, Endangered Plant Project, Non-Game Heritage Program, California Dept. of Fish & Game.

Munz, Phillip, & Keck, David. 1975. *A California Flora*. University of California Press.

Pringle, Laurence. 1981. *Frost Hollows and Other Microclimates*. William Morrow & Co.: New York.

Sequoia Audubon Society. 1996. *San Francisco Peninsula Birdwatching*.

Skinner, M.W. & Pavlik, B.M. (eds.) 1994. *CNPS Inventory of Rare and Endangered Vascular Plants of California.* 5th ed. California Native Plant Society, Sacramento CA.

Sommers, S.C. 1987. Partial Flora of Edgewood County Park.

Sposito, Garrison. 1992. "How Plants Affect Soils; Hans Jenny and the "Biotic Factor' of Soil Formation". *Fremontia*. Vol. 20, No. 3.

Thomas, John Hunter. 1961. *Flora of the Santa Cruz Mountains of California*. Stanford University Press: Stanford, CA.

United States Department of the Interior, Fish & Wildlife Service. *Federal Register*. Vol. 60, No. 23. February 3, 1995.

Whittaker, R.H. 1954."The Ecology of Serpentine Soils IV. the Vegetation Response to Serpentine Soils" *Ecology*. Vol. 35.

Geology and Climate

Atwater, Brian Franklin. 1975. "Serpentine Diapir in Woodside and Redwood City, California," unpublished thesis submitted to Department Geology and Committee on Graduate Studies of Stanford University in partial fulfillment of requirements for degree of Master of Science.

Bakker, Elna. 1984. *An Island Called California*. University of California Press: Berkeley, CA.

Brabb, Earl & Olsen,Jean A. 1986. *Map Showing Faults and Earthquake Epicenters in San Mateo County*. U.S. Geological Survey Map I-1257F.

Brabb, Earl, Pampeyan, Earl, & Bonilla. 1972. *Landslide Susceptibility in San Mateo County*. U.S. Geological Survey Map MF-360 and Basic Data Contribution 43.

California Division of Mines and Geology. 1974. *Alquist-Priolo Special Studies Zone Map -- Woodside Quadrangle*.

California Division of Mines and Geology. 1992. *Fault Rupture Hazard Zones in California*. California Dept. of Conservation. Special Publication 42.

Kruckeberg, Arthur R. 1984. *California Serpentines: Flora, Vegetation, Geology, Soils, and Management Problems*. University of California Press: Berkeley, CA.

Mark, Robert K. 1992. *Map of Debris-Flows Probability, San Mateo County*. U.S. Geological Survey Map I-1257-M.

Mason, H.L. 1946."The Edaphic Factor in Narrow Endemism I: The Nature of Environmental Influences." *Madroño.* Vol. 8.

Miller, W.J. 1961. *California Through the Ages, The Geologic Story of a Great State.* McGraw Hill Book Company: San Francisco, CA.

Norris, R., & Webb, R. 1990. *Geology of California.* 2nd ed. John Wiley & Sons.

Oakeshott, G. B. 1979. *California's Changing Landscape: A Guide to the Geology of the State*. McGraw Hill Book Company: San Francisco, CA.

Oberlander, G.T. 1956. "Summer Fog Precipitation on the San Francisco Peninsula," *Ecology*, Vol. 37.

Soil Conservation Service. 1991. *Soil Survey of San Mateo County, Eastern Part of San Francisco County, California.*

Thomson, Jean Marie & Evernden, Jack Foord. 1986. *Map Showing Predicted Seismic-Shaking Intensities of an Earthquake in San Mateo County, California, Comparable in Magnitude to the 1906 San Francisco Earthquake*. U.S. Geological Survey Map I-1257-H.

Wentworth, Carl, Stephen Ellen, Virgil A. Frizzell, & Julius Schlocker. 1985.*Map of Hillside Materials and Description of Their Engineering Character, San Mateo County.* United States Geological Survey Map I-1257D.

Wieczorek Gerald, Wilson, Raymond C. & Harp, Edwin L. 1985. *Slope Stability During Earthquakes in San Mateo County, California.* U.S. Geological Survey Map I-1257-E.

Wildman, W.E., Jackson, M.L. & Whittig, L.D. 1968. "Iron-Rich Montmorrillonite Formations in Soils Derived from Serpentine." *Soil Science Society American Proceedings*. Vol, 32.

"Report on Potential for Generation of Asbestos Dust, Emerald Hills Sewer Project, County of San Mateo. 1983 (Nov. 22). Directory of Public Works interdepartmental correspondence to the Board of Supervisors, per Board of Supervisors' direction.

United States Department of Agriculture. 1957. *Soil, the Yearbook of Agriculture.* U.S. Government Printing Office: Washington D.C.

Working Group on California Earthquake Probabilities. 1990. *Probabilities of Large Earthquakes in the San Francisco Bay Region, California.* United States Geological Survey Circular 1053.

Geologic History

Burgmann et al. 1994."Rise and Fall of the Southern Santa Cruz Mountains, California, From Fission Tracks, Geomorphology, and Geodesy." *Journal of Geophysical Research*, Vol. 99, pp. 20181-20202.

Dickinson, W.R. 1981. "Plate Tectonics and the Continental Margin of California," pp. 1-28, in Ernst, W.G., ed. *The Geotectonic Development of California.* Prentice-Hall: Englewood Cliffs NJ.

Page, P.M. 1981. *Tectonic Setting of the San Francisco Bay Region.* Special Publication of the California Division of Mines Geology. Vol. 62, pp. 53-55.

General History

Bancroft, Hubert Howe. 1885. *California. Vol 1, 1542-1800.* San Francisco, 1885.

_____. 1885. *California, Vol 2, 1801-1824* San Francisco.

Bolton, Herbert Eugene. 1927. *Fray Juan Crespi, Missionary Explorer on the Pacific Coast, 1769-1774.* University of California Press.

_____. 1930. *Anza's California Expeditions, Vol 2: Opening a Land Route to California.* University of California Press.

_____. 1933. *Font's Complete Diary: A Chronicle of the Founding of San Francisco.* University of California Press.

Boneu Company, F. 1983. *Gaspar de Portola: Explorer and Founder of California.* translated and revised by Alan K. Brown. Lerida.

Brown, Alan K. 1966. *Sawpits in the Spanish Redwoods 1787-1849.* San Mateo County Historical Association: San Mateo.

Browning, Peter, ed. 1992. *The Discovery of San Francisco Bay: The Portola Expedition of 1769-1770. The Diary of Miguel Costanso.* Great West Books: Lafayette, CA.

Dwinelle, John W. 1978. *The Colonial History of the City of San Francisco, San Francisco, 1867.* Reprinted by Ross Valley Book Co.

Engelhardt, F. Zephyrin. 1930. *The Missions and Missionaries of California*. 2nd revised edition, Mission Santa Barbara.

_____. 1924. *San Francisco or Mission Dolores*. Franciscan Herald Press: Chicago.

Geiger. Maynard. 1969. *Franciscan Missionaries in Hispanic California 1769-1848*. The Huntington Library, San Marino.

Hittell, Theodore H. 1898. *History of California, Vol. 2*. San Francisco.

_____. 1878. *The History of San Francisco, and Incidentally of California*. A.L. Bancroft & Company: San Francisco.

Rawls, James J. & Bean, Walter. 1993. *California: An interpretive History*. 6th ed. McGraw-Hill, Inc.

Regnery, Dorothy F. 1978. *The Battle of Santa Clara*. San Jose.

_____. 1991. *The History of Jasper Ridge*. Stanford Historical Society.

Richards, Gilbert. 1973.*Crossroads, People, and Events of the Redwoods of San Mateo County*. Woodside, California.

Soule, Frank. Gihon, John H. M.D. & Nisbet, James. 1966. *The Annals of San Francisco, Together with the Continuation, Through 1855.* Compiled by Dorothy H. Huggins, reprinted by Lewis Osbone: Palo Alto.

Stanger, Frank M. 1963. *Sawmills in the Redwoods: Logging in the San Francisco Peninsula 1849-1967*. San Mateo County Historical Association.

Stanger, Frank M. 1963. *South From San Francisco: San Mateo County, California, Its History and Heritage*, San Mateo County Historical Association.

Stanger, Frank M. & Brown, Alan K. 1969. *Who Discovered the Golden Gate?* San Mateo County Historical Association.

Treutlein, Theodore E. 1968. *San Francisco Bay: Discovery and Colonization, 1769-1776*. California Historical Society: San Francisco.

Sanchez. Joseph P., Jackson, Kenneth T. 1985. *Crabgrass Frontier: The Suburbanization of the United States*. Oxford University Press.

Ohlone History

Articles from *San Jose Mercury News*, March 1, 1995, and *San Francisco Chronicle*, March 10, 1995.

Bean, Lowell John. (ed). 1994. *The Ohlone: Past and Present Native americans in the San Francisco Bay Area*. Ballena Press Anthropological Papers No. 42: Menlo Park.

Cook, Sherburne F. 1976. *The Conflict Between the California Indian and White Civilization*. University of California Press.

Gerow, Bert A & Force, Roland W. 1968. *An Analysis of the University Village Complex, With a Reappraisal of Central California Archaeology*. The Board of Trustees of Leland Stanford Junior University.

Heizer, Robert F. (ed.). 1978. *California, Vol. 8: Handbook of North American Indicans*. Smithsonian Institution: Washington D.C.

Hinton, Leanne. 1994. *Flutes of Fire: Essays on California Indian Languages*.Heyday Books: Berkeley, CA.

Hurtado, A.L. 1988. *Indian Survival on the California Frontier*. Yale University Press.

Hylkema, Mark, & Alan Leventhal. Undated. Unpublished notes about crescent-shaped tool fragments found at Fitzgerald Marine Preserve, Moss Beach.

Jackson, Robert H. 1994. *Indian Population Decline: The Missions of Northwestern New Spain 1687-1840*. University of New Mexico Press.

Kroeber, A.L. 1953. *Handbook of the Indians of California*. Bureau of American Ethnology, Smithsonian Institution, 1923, reprinted by California Book Co., Ltd.: Berkeley.

Margolin, Malcolm. 1978. *The Ohlone Way: Indian Life in the San Francisco-Monterey Bay Area*. Heyday Books: Berkeley.

Moratto, M.J. (ed.) 1971 (July 1). *Contributions to the Archaeology of San Mateo County, California*. Treganza Anthropology Museum Papers, No. 8, Report of Research by San Francisco State College in cooperation with Deane and Deane, Inc.: Half Moon Bay.

Milliken, Randall T. 1995. *A Time of Little Choice: The Disintegration of Tribal Culture in the San Francisco Bay Area 1769-1810*. Ballena Press: Menlo Park, CA.

_____. 1991. "An Ethnohistory of the Indian People of the San Francisco Bay Area from 1770-1810," unpublished Ph.D. dissertation, University of California: Berkeley.

_____. 1983. "The Spatial Organization of Human Population on Central California's San Francisco Peninsula at the Spanish Arrival," unpublished master's thesis, Sonoma State University.

Phillips. George Harwood. 1993. *Indians and Intruders in Central California, 1769-1849*. University of Oklahoma Press.

Rawls, James J. 1984. *Indians of California: The Changing Image*. University of Oklahoma Press.

Rackerby, Frank. 1967 (December). "The Archaeological Salvage of Two San Francisco Bay Shellmounds," in Robert E. Schenk, general ed. *Occasional Papers in Anthropology*. No. 3. Department of Anthropology, San Francisco State College.

Whelan, James. 1967 (December). "A Partial Faunal Analysis of ALA-12 and 13, Two San Francisco Bay Shellmounds" in Robert E. Schenk, general ed. *Occasional Papers in Anthropology*. No. 3. Department of Anthropology, San Francisco State College.

Trails History

Finkler, Henry letter dated September 21, 1926.

The San Mateo Horseman. Spring, 1994. "Olson Nolte, A Local Institution". p.5.

"Reminisce, Memories in Barns". April 1976. California Horseman article by Bernice Scharlack, a journalist-historian raised in San Francisco.

San Mateo County Horseman's Association, 1940-1990 - 50 Year History.

July 25, 1996 interview with Chris Olmo of Redwood City, age 90.

San Mateo County Mounted Patrol 50 Year History 1943-1993.

July 23, 1996 notes from Janet Estep of Woodside on a horseback ride she took with Roy Swineger in 1949.

San Mateo County Horsemen's Association, Ibid., and Woodside Trail Committee members tales retold by Harry Williams and Lew Reed.

Nita Spangler, "History of the Edgewood Park Site", Rev. Nov. 19, 1995.

Recreation Development Plan, San Francisco Peninsula Watershed Lands, Technical Report, August 1975, p.11.

Notes and articles from (retired) San Mateo County Parks & Recreation Superintendent Bob Emert on William D. "Mike" Mikesell, 4H Leader.

Public Hearing, San Mateo County Parks & Recreation Commissioners, July 16, 1981, Minutes, p.6. Also, Site Development Guidelines, Section V, Item B. And Equestrian Trails, Public Meeting, February 24, 1982, Status Report, May 1982.

San Mateo County Parks & Recreation Commission Minutes, August 3, 1983.

July 9, 1996 Trails Advisory Committee meeting statement by Marian van den Bosch, Volunteer Horse Patrol President.

General References

National Center for Appropriate Technology. 1978. *Alternative Waste Systems - Bibliography*. Publication no. B006

Rybczynski, W. & Ortega, A. *Stop the Five Gallon Flush! - A Survey of Alternative Waste Disposal Systems.*

Clivus Multrum - Organic Waste Treatment System (pamphlets).

Clivus Multrum - Organic Waste Treatment System - Questions and Answers (pamphlet).

State of California, Air Resources Board, Stationary Source Division. Feb. 1990. *Proposed Control Measure for Asbestos-Containing Serpentine Rock in Surfacing Applications - Staff Report*. Sacramento, CA.