WILDLAND MANAGEMENT POLICIES AND GUIDELINES

June 5, 2001

East Bay Regional Park District

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Wildland Management Policies and Guidelines -- Revised June 5, 2001

Introduction

The 1992 Wildland Management Policies and Guidelines were first developed by East Bay Regional Park District staff and an eight-member Range Management Technical Advisory Committee composed of resource management professionals representing outside agencies, academia, environmentalists, and members of the ranching community. The grazing program and the policies of the 1992 report were reviewed again and updated by the East Bay Regional Park District Board of Directors in 2000 and 2001 in a comprehensive public review process conducted by a EBRPD Board-appointed Grazing Review Task Force. At the conclusion of this process the Board and Task Force made the findings shown below. This report has been revised in accordance with these findings.

- EBRPD parklands need to be managed to achieve specific goals and these goals need to be clearly enunciated in the District's Wildland Management Policies and Guidelines. The 1997 District Master Plan and Wildland Management policy language (1992) are appropriate in terms of the intent and direction for program management, but program guidelines should be revised to better protect riparian areas, to improve monitoring and restoration activities, to improve conditions for park users, to encourage alternative management techniques, and to improve public understanding about grassland management.

- An important goal (of the grazing program) would be to improve conditions for park users and to improve public understanding about grassland management.

- Grasslands are important to preserve the visual quality of the parkland, to reduce the hazard of wildfires and to provide open areas for the health and well being of native plants and wildlife that depend on open grassland environments.

- The habitat conditions maintained by cattle grazing support many notable wildlife species including golden eagle, San Joaquin kit fox, California red-legged frog, California tiger salamander and burrowing owl.

- A well regulated grazing program is a proper means to maintain a parkland vegetation mosaic that includes substantial areas of grassland.

- Cattle grazing is a management tool. Overgrazing and inadequate program management could have a negative effect on parkland resources.

This document provides general guidance to persons responsible for the administration and stewardship of park district wildlands to insure the proper use and enhancement of wildland resources. The policies and guidelines apply modern resource management practices based on scientific principles supported by available research. This information also provides a framework upon which to base subsequent development of site-specific guidelines for each of the individual parks.

Park wildlands are typically undeveloped lands of considerable size that include a mosaic of open grassland, shrubland, oak savanna, and/or oak woodland vegetation. These areas provide watershed, open space, recreation, wildlife habitat, and forage for free-ranging wild and domestic animals. The District considers the conservation of these lands and their associated resources to be of primary importance. Regional Parks with Grazing Leaseholds are identified on the map in Appendix C. Grasslands and woodlands are the most common wildland plant communities, and make up about 60% and 34% of the total vegetative cover respectively. Shrublands occupy the remaining 6% of these areas. The vegetation is a mixture of native and non-native species comprised of woody plants primarily of native origin, and native and non-native annual and perennial herbaceous plants. Park wildlands are also home to over 350 wildlife species. Management of these areas requires conservation practices that accomplish resource and fire control objectives consistent with park and recreational uses and values.

The District recognizes that research and monitoring will continue to improve standards and solutions to resource management issues on park wildlands. Biologists do not yet understand all of the natural and human-caused influences affecting the wildland environment. Much work is needed in this field, and the District will incorporate into its management program new scientific information as it becomes available.

District Wildland Management Policy and Program

Policy

The District's primary mission is to acquire preserve, protect, develop, and operate regional parklands in perpetuity for public use, while conserving these lands to make the outdoor environment available for the enjoyment and education of the public. The goal of the District wildland management program is to conserve and enhance important resource values such as soil, vegetation, wildlife and water to ensure that natural parkland ecosystems are maintained in a healthy and productive condition.

Program Elements

Vegetation Management

Wildland vegetation management will conserve and enhance natural communities, promote the restoration of indigenous vegetation, preserve and protect populations of rare, threatened, endangered, and sensitive plant species and their habitats, reduce fire hazard conditions, and, consistent with the above objectives, limit the encroachment of selected shrub species, such as coyote brush, poison oak, and broom. Management alternatives used to achieve these goals will include grazing, prescribed burning, mechanical treatment, integrated pest management, and/or habitat protection and restoration.

Grazing Management

Scientific management practices will be used to determine appropriate forage utilization levels and achieve desired conditions on individual grazing units. Monitoring will be conducted to insure conformity to lease provisions, to verify compliance with established standards for grazing on park land, and to evaluate whether management goals are being met. Grazing animals will be excluded from areas otherwise suitable for grazing when exclusion is dictated by the need to protect other resource and recreational values.

Site-specific unit management plans will be developed for all park wildlands. These plans will identify management issues, define objectives, prescribe actions to resolve conflicts with other resource and recreational uses, and provide recommendations for achieving more effective management of the units. Site-specific plans will be evaluated in accordance with the District's land use planning process (EBRPD Master Plan 1997) and applicable State laws.

Conservation of Notable Areas

The District will identify, evaluate, and conserve notable areas such as archaeological sites, developed recreation areas, riparian and other wetland communities, and habitats of rare, threatened, endangered, or sensitive species of plants and animals. The conservation of these areas will take precedence over other uses and management practices that are determined to have an adverse effect on these resources.

Wildland Improvements

Wildland improvement practices (water development, fencing, herding, supplemental feeding, seeding, restoration, wetland protection) will facilitate improved grazing management and enhance other resource uses and values. Treatment methods and materials will be selected to suit site conditions. The need to conserve soil, plant, animal, water, and cultural resources will be given priority during planning and implementation of improvement projects.

Pest Management

Plant and animal pests will be controlled by utilizing Board-adopted integrated pest management (IPM) procedures and practices. Pest management site assessments will determine the extent of pest infestations on individual management units and provide a means for control.

Wildlife Management

The District will protect, conserve, and enhance wildlife populations and their habitats, and minimize conflicts and competition between wildlife and other uses, including grazing. The District's Land Stewardship staff and park supervisors will cooperate with appropriate public agencies and recognized wildlife management experts to alleviate any adverse impacts to wildlife associated with wildland management practices.

Watershed Management

Wildlands will be managed to protect watershed values. Soil disturbances resulting from human activities, such as road and trail construction and maintenance, or grazing practices will be identified and corrected. Riparian and other wetland areas will be managed in accordance with EBRPD wetland policies.

Vegetation Management

This section includes a description of the vegetation resource and prescribes actions to be taken in response to vegetation management issues confronting the District. The objectives of wildland vegetation management are to conserve and enhance natural communities, promote the restoration of indigenous vegetation, preserve populations of rare, threatened and endangered plant species and their habitats, reduce fire hazard conditions and minimize the encroachment of coyote brush, poison oak and broom into grassland communities.

Description of the Vegetation Resource

Grassland and Woodland Understory Vegetation

Native perennial grasses once comprised a significant portion of California's grassland and woodland environments. Extensive changes occurred in the composition of grassland and woodland understory vegetation as a result of the introduction of non-native European plant species by early Spanish and Anglo settlers. The interaction of many factors – unrestricted livestock grazing, prolonged drought, conversion of land to intensive agricultural production, urbanization, and fire suppression, paved the way for the widespread establishment of these exotic, annual plants (Burcham 1957, Heady 1977). This plant community is dominated by introduced annual grasses and forbs and, as such, has been classified by Holland (1986) as the non-native grassland type. It occurs extensively over the western two-thirds of the state.

Although native perennial grassland plant communities have been virtually eliminated in most places, numerous native, herbaceous, broadleaf plant species still persist within the non-native grassland type that replaced it. Native grasses within this type generally occur in small, scattered stands and as isolated individuals (Barry 1972). EBRPD lands also include several areas where the plant cover is dominated by native perennial grasses.

Non-native grassland and woodland understories support a diverse mixture of native and non-native annual and perennial plants. Common non-native grasses include wild oats *Avena fatua* and A. *barbata,* bromegrasses *Bromus mollis, B. diandrus, and B. rubens,* annual ryegrass *Lolium multiflorum,* wild barley *Hordeum leporinum,* annual bluegrass *Poa annua,* silver hairgrass *Aira caryophyllea,* and dogtail grass *Cynosurus echinatus.* Common introduced forbs include several species of filaree *Erodium* spp., bur clover *Medicago polymorpha,* cat's *ear Hypochoeris glabra,* English plantain *Plantago lanceolata,* and several others.

The non-natives, while generally representing 90 percent of the vegetative cover, account for less than 40 percent of the total number of herbaceous plant species on Park District wildlands (Legard and Budzinski 1988).Native grasses and forbs make up 60 percent of species diversity, and grow intermixed in varying proportions with the non-native flora. Most common wildflowers, for example, are natives. These include brodiaeas *Brodiaea* spp., *sarticles Sanicula* spp., lupines *Lupinus* spp., clovers *Trifolium* spp., owls clovers *Orthocarpus spp.,* mariposa lilies *Calochortus* spp., mule's ear *Wyethia* spp., yarrow

Achillea spp., farewell to spring *Clarkia* spp., soap plant *Chlorogalum pomeridianum* and numerous others. Native annual fescue grasses *Vulpia* spp. are also well represented. Plant composition can differ appreciably from one location to another (McNaughton 1968), depending on site characteristics, annual weather patterns, and the effects of past and current land use practices.

Native perennial grasses generally occupy grassland, brushland, and woodland communities in various concentrations up to about five percent of the herbaceous cover (Bentley and Talbot 1948). Some areas of park land support significant remnant stands of serpentine grassland and valley needlegrass grassland plant communities. Some of the common perennial grasses include the once-dominant needlegrasses *Stipa pulchra and S. lepida,* wildryes *Elymus glaucus,* and E *triticoides,* California oatgrass *Danthonia californica,* junegrass *Koeleria micrantha, melicgrasses Melica californica, M. torreyana and M. imperfecta, pine* bluegrass *Poa scabrella,* squirreltail *Sitanion hystrix and S. jubatum,* fescues *Festuca californica, F. rubra and F. idahoensis,* meadow bar*ley Hordeum brachyantherum,* and California bromegrass *Bromus carinatus.*

Woodland Vegetation

EBRPD land supports many, diverse, woodland and forest communities that have been classified as distinct elements by Holland (1986). Each community has its own successional dynamics and management needs, which require relevant management strategies. For purposes of discussion, these various plant community elements are addressed herein as simply "woodlands."

Park woodlands exist in a mosaic with other plant communities. The vegetation consists of broad-leaved deciduous and evergreen trees, with an understory of grasses, forbs, and shrubs. Oak woodland tree species include blue oak *Quercus douglasii,* coast live oak *Q. agrifolia,* black oak *Q. kelloggii,* interior live oak *Q. wislizenii,* canyon live oak *Q. chrysolepis* valley oak *Q. lobata,* Oregon oak *Q. garryana,* California buckeye *Aesculus californica,* bay laurel *Umbellularia californica,* and madrone *Arbutus menziesii.*

The interior parks contain extensive stands of open-canopied oak woodlands. These woodlands occupy the ridges, south aspects, and less precipitous north-facing slopes, and are dominated by blue oak with scattered occurrences of coast live oak, black oak, and California buckeye. Isolated stands of Oregon oak are found in some locations. Valley oak, which is generally confined to bottomland areas, is relatively uncommon.

Dense oak/bay woodlands generally occur on steeper north- and northeast-facing aspects, canyon bottoms and associated side slopes. A dominant mixture of oak species, and a disproportionately large number of bay laurel, are characteristic of this type. The relative density of tree species varies considerably, as does the understory vegetation.

The composition and productivity of herbaceous vegetation in the woodland type is a result of topography, aspect, the density and height of the overstory canopy, the amount and duration of sunlight and shade, the accumulation of fallen leaves and needles, past

and present woodland management practices, and fire history. The more open blue oak savannas support an herbaceous layer similar to that of the annual grassland type. The vegetation of the denser woodlands may range from little more than a cover of plant litter to a well-developed understory of shrubs, herbs, ferns, and grasses.

Some native woodlands of the Bay Area have been replaced by introduced exotics, such as eucalyptus, pines, and cypress. Native coniferous forests on park land are limited to a second growth stand of coast redwood *Sequoia sempervirens* in the Oakland Hills, and Coulter pine *Pinus coulteri* occurring in pure stands or in association with oaks in Black Diamond Regional Preserve and Ohlone Regional Wilderness. Other naturally occurring, native conifers found on park land include digger pine *Pinus sabiniana,* and knobcone pine *Pinus attenuata.*

Shrubland Vegetation

Park shrublands include stands of low-growing woody plants that occur intermixed with or bordering grasslands and woodlands. Some stands form impenetrable thickets where understory vegetation is practically eliminated, while other stands support a highly productive understory. EBRPD land supports many, diverse, shrubland communities that have been classified as distinct elements by Holland (1986). Each community has its own successional dynamics and management needs, which require relevant management strategies. Shrubland communities on park land can be grouped into two broad designations based upon this classification – chaparral and scrub.

Chaparral occurs along ridges and dry slopes on shallow, rocky or gravelly soils. Plant associations within this type vary considerably and include such plants as chamise *Adenostoma fasciculatum*, manzanita *Arctostaphylos spp*., wild lilac *Ceanothus spp*., and yerba santa *Eriodictyon californicum.*

The chaparral plant community is adapted to periodic fire (Shantz 1947, Naveh 1967). Many species sprout when cut or burned, and others reproduce only by seed. The seeds of some chaparral species cannot germinate until they have been exposed to the heat and soil conditions associated with fire.

Coastal scrub, another shrubland type, is found at lower elevations within California's coastal mountains. Coastal scrub vegetation on park land is characterized by such species as coyote brush *Baccharis pilularis ssp. consanguinea* blackberry *Rubus* spp., bush monkeyflower *Diplacus aurantiacus,* poison oak *Rhus diversiloba,* black sage *Salvia mellifera,* California sagebrush *Artemisia californica,* cream bush *Holodiscus discolor,* and California coffeeberry *Rhamnus californica.* This community is found on many parks in settings ranging from semi-open associations of brush, grass, or trees, to dense stands covering entire hillsides.

Riparian and Other Wetland Vegetation

Riparian and other wetland areas are transitional lands between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is covered by

shallow water. The vegetation of low grasses and grasslike plants, forbs, shrubs, and trees that distinguishes these communities from others varies markedly in structure and density. Riparian habitats on park wildlands occur primarily in scattered locations along minor, intermittent streams that produce high flows in winter and spring, particularly after heavy rains, and exhibit little or no flow during summer. Wetland areas include marshes, bogs, ponds, vernal pools, and small wet meadows associated with springs and seeps.

Riparian woodland occurs in a narrow band along streambanks and in steep canyons and ravines. White alder *Alnus rhombifolia,* big-leaf maple *Acer macrophyllum,* western sycamore *Platanus racemosa,* Fremont cottonwood *Populus fremontii,* and various willows *Salix spp*. are generally present in locations where ground or surface water is accessible along the streamcourse. Streambanks in other areas support oaks, bays, and other trees representative of the surrounding woodland community.

Typical moisture-dependent herbaceous vegetation occurs in perennially wet locations along streams, within and around ponds and marshes, and in small, wet meadows associated with springs and seeps. Grasses and grasslike plants include rabbitsfoot grass *Polypogon monspeliensis,* salt grass *Distichlis spicata var. nana,* bentgrasses *Agrostis spp*., rushes *Juncus spp.,* tules *Scirpus spp.*, sedges *Carex spp*., horsetails *Equiseyum spp*. and cattails *Typha spp*. Some common forbs are buttercups *Ranunculus spp.,* watercress *Rorippa nasturtium-aquaticum,* stinging nettle *Urtica holosericea and U. urens,* brass-buttons *Cotula coronopifolia,* mints *Mentha spp*., duckweeds *Lemna spp.*, and pond-weeds *Potamogeton spp.*

Over 95 per cent of the historical riparian and wetland habitats in California have been lost. These losses are attributed to many factors: stream channelization and stabilization, irrigation and flood control diversions, upstream impoundments, conversion to agricultural, residential, and industrial use, lowering of groundwater tables, overgrazing, and urbanization.

Rare, Threatened, and Endangered Plants

Several populations of rare, threatened and endangered plants occur on Park District wildlands. Some of these species are endemic to the Bay Area, and others are more widespread in their occurrence (Munz and Keck 1959). Certain plants listed are uncommon enough to warrant continued monitoring, whereas some are considered to be rare throughout their limited ranges and vulnerable to further declines in their populations (Smith and Berg 1988).

A number of species are officially listed as rare, threatened, or endangered by the State of California or the Federal government. District policy is to recognize certain additional "species of special concern" as rare, regardless of whether they have been formally afforded this status by the state or federal governments.

Pest Plant Populations

The major pest plants recognized on park wildlands are artichoke thistle *Cynara cardunculus,* purple starthistle *Centaurea calcitrapa,* yellow starthistle *Centaurea solstitialis,* sweet fennel *Foeniculum vulgare,* and French and Scotch brooms *Cytisus monspessulanus and C scoparius.* Selective weeding and herbicide use have been used with some success in the control of these plant species (Hillyard 1985, Havlik 1985, Amme 1985, Gizinski 1989). Other plants may be recognized as pests under certain situations. Examples of these species include poison hemlock, *Conium maculatum,* pampas grass*, Cortaderia selloana,* milk thistle, *Silybum marianum,* bull thistle, *Cirsium vulgare,* spiny clotbur, *Xanthium spinosum,* and eucalyptus*, Eucalyptus spp.*

Vegetation Management Alternatives

There are several methods commonly used in managing vegetation: (1) fire, (2) mechanical, (3) chemical, and (4) biological. Each method has advantages and disadvantages that determine its suitability for particular situations (Bleier and Lindquist 1986). Each method has different impacts on the species that are to be controlled, and on the species which are to be retained (Stoddart et al. 1975). Timing and intensity of application often have a profound effect on the results achieved by any vegetation management practice. Oftentimes it is best to combine two or more methods.

Fire

Prescribed burning, or the intentional ignition of grass, shrub, and forest fuels for specific purposes, has long been a recognized vegetation management practice. Prescribed burning simulates natural ecological processes by using fire to manage vegetation, reduce fuel accumulations, and enhance wildlife habitat. Timing is critical for maintaining natural species distribution in a fire-adapted plant community. Prescribed burns are designed to be confined to specific areas, are regulated in intensity, and are otherwise controlled to achieve desired results. Burning by prescription reduces the risk of eventual, uncontrolled wildfire and associated air quality impacts (Bleier and Lindquist 1986). Burning is generally less expensive than mechanical and chemical methods, and is practical for use in large, inaccessible areas, steep terrain, or dense brush stands.

Prescribed burns must be carefully orchestrated and implemented and are difficult to carry out in urbanized areas. On-site personnel, firefighting equipment, and construction of control lines are necessary to conduct safe and effective prescribed burning and to minimize the potential for escape. Prescribed burning must also be conducted under specific climatic conditions. The use of this alternative on EBRPD lands, therefore, is limited.

Mechanical

Mechanical methods utilize machinery to crush, uproot, mow, or disk woody and herbaceous vegetation. Mechanical treatments can be applied with fewer seasonal restrictions than prescribed burning and most herbicides. Oftentimes, mechanical

treatment is the most advantageous method for managing vegetation in certain situations. Mechanical methods, while effective, are time consuming, costly, inappropriate on steep terrain, and can cause soil disturbance, which greatly increases the potential for soil erosion and weed invasion (Bleier and Lindquist 1986).

Chemical

Chemical methods involve the use of herbicides to kill or suppress germination and growth of vegetation. Some safe and effective herbicides are available that contain chemical constituents which remain localized, are readily broken down in the soil, and have negligible effects on the environment. Many others may contain chemicals believed to be harmful to humans and other non-target organisms. Most chemicals must be applied during specific seasons, and have the potential to create off-site damage if transported from the site by water or wind (Bleier and Lindquist 1986). Hand application of herbicides on a wide scale basis can be costly. District policy seeks to eliminate the use of chemical treatments and use alternative methods, whenever possible.

Biological

Biological methods fall into two basic categories. The first method involves the use of a host-specific biological agent, such as an insect or fungus, to achieve control of a target plant species. Once a biological agent is successfully developed, this technique is very cost-effective, and can have widespread applicability over broad areas. Sometimes considerable time, energy, and resources are invested into research and development of these agents only to discover that they are ineffective or that other complications arise from their subsequent use.

The second method involves the use of grazing animals to control plant growth and influence plant composition. Herbivores used for this purpose must be carefully managed to minimize resource damage and prevent overuse. Grazing is a practical, readily available, diverse, cost-effective, and easily regulated resource management tool used to accomplish various vegetation management objectives. Conversely, grazing animals defoliate, trample, and deposit manure and urine, which can have a positive or negative ecological impact depending on how they are managed. Large domestic animals can also appear frightening to park users. These effects, however, can often be eliminated or mitigated through proper management.

Vegetation Management Guidelines

Dramatic changes in the Bay Area's population, land use, economic base, extent and types of vegetation, and species of plants and animals have occurred since the first permanent Spanish settlement was established in the region over 200 years ago (Allen 1989). The pre-European landscape embodied ecosystems that were organized both structurally and functionally in patterns distinct from today (Allen 1989). Now, over two centuries later, these ecosystems occur as fragmented, often isolated islands within a broader urban framework. The visual contrast of the remaining grasslands, woodlands, and shrublands

are a small-scale reminder of what was once the larger Bay Area landscape). While many elements of the flora and fauna have changed, numerous native plants and animals remain. Management in the context of the changes that have occurred is necessary to maintain natural landscapes as viable, functioning ecosystems. In many areas throughout the East Bay vegetation management efforts are often necessary to meet fire safety objectives and maintain the ecological well-being of our natural areas.

This section establishes vegetation management guidelines for the various wildland plant communities occurring on park land. Management issues are discussed briefly to provide a basis for understanding recommended actions. General guidelines have been established to describe how these actions will be carried out. The site-specific unit management plans to be developed for individual park units will be integrated with the District's planning process

Management of Grassland and Oak Savanna Understory Vegetation

Plant Diversity

Productive grassland and oak savanna understories dominated by annual herbaceous vegetation can accumulate large amounts of plant material over time. In the absence of a removal mechanism (such as fire, grazing, or mowing with litter removal) such productive sites may accumulate a thick layer of thatch or litter. This plant material acts much like the mulch used to suppress unwanted plants in a garden. The buildup of successive layers of dead vegetation diminishes native herbaceous plant growth and may lead to the spread of undesirable weeds (Talbot et al. 1939, Biswell 1956).

A diversity of native herbaceous plants in grasslands and oak savanna understories can be maintained and enhanced by reducing residue accumulations from non-native grasses and forbs (Talbot et al. 1939, Heady 1956, Bartolome et al. 1980, Menke and Langstroth 1987, Parker 1989). Management to maintain and enhance native perennial grass populations requires treatment methods that involve mowing, burning, and/or grazing practices to reduce competition from the more aggressive, non-native annual plants (Bentley and Talbot 1948, Daubenniire 1968, Parker 1989). Protection must be provided to native perennial grasses during critical growth stages (Menke et al. 1990) to maintain plant vigor. The negative effect of high residue levels on native plant composition is negligible in areas where non-native annual plant production is sparse, such as on shallow, rocky soils and in dense woodlands (Biswell 1956).

Guideline: Vegetation in grasslands and oak savanna understories will be managed to maintain and enhance biodiversity and achieve a high representation of native plants. Management of these areas will recognize the physiological and ecological needs and requirements of the vegetation. The District will consider a full range of options for managing wildland vegetation . These include grazing, fire, mechanical (mowing), chemical (application of herbicides), and biological methods that may include the use of native herbivores.

Fire Hazard Reduction

Throughout the District, fire safety is of utmost concern. Topography, climate, vegetation, and patterns of land use and ownership all contribute to a situation where the risk of fire often exists. Areas that a few years ago would have caused little concern if threatened by fire now contain neighborhoods and isolated homes.

The vegetation on the regional parks is a mosaic of grassland, shrubland, and woodland plant communities. The more productive grasslands and oak savannas are dominated by annual herbaceous vegetation, which produces large amounts of biomass. Herbaceous plant growth within these areas is prolific, and varies in response to weather and site factors. Vegetative production on the more fertile soils is as much as 2-3 tons of dry matter per acre per year. Annual plants do not survive from one year to the next and their life cycle is completed by late spring or early summer. Remnant plant material left standing during the summer months, if left unmanaged, can pose an extreme fire hazard.

Guideline: The District will employ environmentally acceptable, economically feasible, methods to maintain fuels at acceptable levels. The District will consider a full range of options for managing wildland vegetation . These include grazing, fire, mechanical (mowing), chemical (application of herbicides), and biological methods that may include the use of native herbivores. Treated areas will act as firebreaks where natural fuels are modified to create discontinuous units, which will aid in confining fires.

Wildland Seeding

The primary purpose of seeding on park wildlands is to establish plant cover for the protection of bare or disturbed soil. An adequate vegetative cover helps minimize soil erosion, increases soil permeability and storage of soil moisture, and reduces soil surface evaporation. Invasion of undesirable plant species and weed pests can be discouraged by providing an adequate cover of vegetation.

Guideline: Management of park wildlands will be conducted to maintain and enhance native vegetation. Wildland seeding will be used primarily to rehabilitate disturbed ground and minimize erosion. Seeding to enhance plant production and to increase the cover of palatable and nutritious forage species is not a management objective. Rather, recovery of wildlands in poor condition will be achieved by improving the distribution of grazing animals, introducing alternate grazing systems, or reducing stocking levels.

Areas proposed for treatment will be appraised individually to determine the appropriate re-seeding methods to be used. Native and naturalized annual and perennial species adapted to the conditions of the site will be utilized. Species representative of the surrounding natural vegetation will be preferred. Severely disturbed sites with a potential for serious erosion will be stabilized as rapidly as possible by establishing an herbaceous plant cover.

All seeding will take place in the proper season. Timing is critical to insure that adequate soil moisture is available to encourage plant germination and survival. Grazing and recreational use may be deferred to promote plant establishment.

Native Grassland Restoration

Native perennial grasses interspersed with annual and perennial forbs once comprised the dominant vegetation of many grassland environments in the East Bay. Native grassland restoration is an effort to reconstruct elements of this original flora in areas where native biological diversity has been diminished as a result of non-native plant introductions and past land use practices.

If relict stands or scattered individuals of native grasses and forbs are present, management can be used to expand existing populations. Where relict stands of native grasses and forbs are absent, artificial methods that involve the seeding or interseeding of plant species native to the site can be employed. In the latter case, care must be taken to assure that only plant species native to the site are utilized in restoration efforts. Site-specific analyses of climate, soils, and vegetation are necessary to determine species adaptability to site conditions.

Research to date indicates that native perennial grasses do not establish well on most annual grassland sites without some form of site preparation, and follow-up treatment is often necessary to reduce competition from the more aggressive non-native annuals (Heady 1956, McClaran 1981, Fossum 1990). The establishment of scattered native grass plants, however, may be desirable as a first step in achieving broader grassland restoration objectives. Reliable techniques presently exist for re-establishing native grasses and forbs, reducing competition from naturalized annual species, and creating a more favorable environment for native plants. However, continuing investigations are needed to determine successful methods for maintaining extensive stands of native perennial grasses in the wild within the non-native grassland environment.

Guideline: The District shall designate appropriate areas for restoring or reclaiming lost or altered natural biotic communities. Areas where native perennial grasses comprise a significant part of overall plant composition will be managed to maintain and enhance existing natural populations. Grassland restoration efforts will involve seeding or planting native vegetation that is adapted to the site using local stock, where possible. Follow-up treatments such as grazing, burning, or mowing may be necessary to maintain desired conditions.

Management of Woodland Vegetation

Plant Diversity

Changes in the character, species, and density of woodlands affect other values and resources. As woodland regeneration develops and the tree crowns occupy more space, the understory vegetation changes in species and quantity. The resulting dense overstory growth may shade out understory vegetation. The quantity of understory vegetation is inversely related to overstory density (Pase 1958, Blair 1969).

An optimum plant species diversity occurs in woodlands when a variety of woodland types dominated by different species is sustained in a mosaic of different age and size stands (McGuinnes 1969). For the most part, site conditions such as soil, slope, aspect, and precipitation will determine woodland characteristics.

Guideline: Management for plant diversity will consist primarily of conserving woodland areas to allow natural ecological processes to take place. Active management may be used in certain situations to influence stand structure and enhance plant diversity.

Fire Hazard Reduction

In California, the long, hot, rainless summers dry the vegetation rendering it highly flammable, with the result that fires start easily and burn very rapidly. When natural fires are suppressed for many years the understory often accumulates debris and thick undergrowth that acts as a fuel source in the event of a wildfire. A more intense fire usually results under these conditions, and not only kills seedlings and saplings, but also destroys mature trees. Large trees that remain may be weakened, leaving them less resistant to insects and disease. Uncontrolled fire also burns the blanket of plant residue on the forest floor, which is important in conserving water and preventing erosion. Repeated fires turn valuable woodlands into brushlands and may adversely affect resident wildlife populations.

Guideline: Fire hazard reduction in woodlands may involve the use of prescribed fire, mechanical treatments, or the construction of access roads, firebreaks, or fuelbreaks to manage fuels, improve firefighter response time and provide effective fire containment. All appropriate fire hazard reduction methods will be used in a manner consistent with existing policies on oak regeneration and woodland species diversity.

Oak Regeneration

Many oak woodland communities in California are experiencing a low rate of natural regeneration (Muick and Bartolome 1987). Certain sites support an abundant supply of oak seedlings and saplings, whereas stands in other areas consist entirely of mature trees. The reasons for this phenomenon are not fully known.

Investigations have indicated that a number of influences may be responsible. Acorn consumption, browsing, and root damage caused by deer, cattle, rabbits, rodents, and defoliating insects are factors inhibiting seedling growth and establishment (Griffin 1971, 1980, McClaran 1986). Changes in the herbaceous plant cover over the past 200 years, fire suppression efforts, and exploitive land-use practices may have created an environment that is no longer hospitable to seedling growth (Twisselman 1967, Griffin 1971, Anderson and Pasquinelli 1984). Areas that exhibit poor oak regeneration could eventually revert to another type of vegetative cover as existing stand densities of trees decline.

Fire has been found to have a correlation to tree establishment (McClaran 1986, Mensing 1988), and selective thinning has been used to encourage regeneration by sprouting and to maintain healthy stands. The artificial propagation of oaks through the planting of acorns and seedlings has been successful under certain conditions (McCreary 1989).

Guideline: The District will manage oak woodland plant communities to maintain a mosaic of age and size classes, provide structural diversity, and sustain production and recruitment of tree species through natural ecological processes. Active management to encourage oak regeneration, where necessary, may include adjusting grazing practices, protecting oak seedlings, releasing seedlings from competing vegetation, or planting acorns and seedlings from local genetic stock.

Management of Shrubland Vegetation

Plant Diversity

Patterns of shrubland vegetation fluctuate in relation to the fire cycle and to plant succession. In chaparral communities the brush occupies shallow, rocky, infertile soils and persists essentially unchanged through the different stages of plant succession. The coastal scrub community usually occurs where a vegetation cover in a more advanced stage of succession is being replaced by plants of an earlier successional stage as a result of some past disturbance (Sampson and Jesperson 1963). This community ranges from diverse, semi-open associations of brush, herbaceous plants and trees, to dense monotypic stands covering entire hillsides.

The various chaparral and scrub types on the District represent coastal, inland, northern, and southern shrubland communities. These shrublands exist as viable ecosystems of primarily native vegetation that are relatively uncommon in the East Bay, and, as such, warrant careful conservation and preservation.

Guideline: The District recognizes shrublands as important plant community types to be managed for their own intrinsic value as naturally functioning ecosystems, and acknowledges their inherent watershed, wildlife, and botanical value. This philosophy will guide management efforts within these communities.

Fire Hazard Reduction

Mature shrub stands protected from fire for a number of decades present a greater fire hazard than would occur under a more regular periodic burning regime. Some shrublands can become exceedingly dense over time, diminishing species diversity, reducing food and cover for wildlife, and increasing the risk of catastrophic wildfire, which could severely impact other natural resources. Where these fuels occur near residential development, there is an increased possibility that a fire originating on park land will reach adjacent private properties.

Guideline: Where active management, such as prescribed burning, mechanical treatment, or fuelbreak construction, is necessary to reduce fire hazard conditions, such efforts will be consistent with maintaining shrubland community dynamics. The need for such management will be assessed on a case-by-case basis. Consultations

with biologists will be conducted prior to project implementation to identify, evaluate, and mitigate potential resource impacts.

Shrub Encroachment

Grasslands in the East Bay are susceptible to colonization by coyote brush, *Baccharis pilularis ssp. consanguinea,* and poison oak, *Rhus diversiloba.* Parks which are affected most by this occurrence are located within the immediate influence of coastal weather patterns. Shrub encroachment was discouraged in the past by the interaction of recurring fire and subsequent browsing by native and introduced animals that fed on shrub regeneration and inhibited seedling establishment. Successful suppression of fire during this century and the elimination of grazing has contributed, in some instances, to the expansion of coyote brush and poison oak into areas formerly occupied by grassland (McBride and Heady 1968, McBride 1974). Continued livestock grazing has been effective in minimizing the incursion of these shrub species into grasslands of the East Bay.

Where coyote brush occurs on north- and east- facing aspects, there appears to be a prolonged cyclic succession from dense brush to mixed forest to woodland, barring any further disturbance (McBride 1974). Dense monotypic coyote brush stands tend to remain indefinitely on south- and west-facing slopes, rock outcrops, and in valley bottoms.

Guideline: The District will employ measures to minimize the widespread encroachment of monotypic stands of coyote brush, poison oak, and broom on park land. The extensive occurrence of these shrubs on many parks, and their potential for readily infiltrating open grasslands may require active management, which may include the use of grazing, mechanical methods, prescribed burning, and/or chemical treatments as a means of control.

Management of Riparian and Other Wetland Vegetation

Riparian and Wetland Resources

Riparian and other wetland communities occur in stark contrast with the surrounding drier grasslands, woodlands and shrublands. They contribute to the development of edge - transition zones where plant communities or structural conditions within plant communities converge (Thomas et.al. 1979). Areas occurring along this juncture (ecotone) are rich in wildlife (Patton 1975), because there is mingling of species common to each vegetation type, and the addition of other species that are often products of the ecotone itself (Southwood 1972). Riparian vegetation along stream corridors binds the soil, removes sediment from runoff, and dissipates the energy of flood waters.

Since 1992 the District has fenced many of the major, perennial creeks on its parklands to exclude livestock and different grazing strategies are being used in lieu of fencing to manage some riparian areas. Various ponds have been fenced and goats and sheep are being used as an alternative to cattle grazing in several locations, because of their ability to be herded away or temporarily fenced from riparian and wetland areas.

Guideline: Riparian and other wetland environments will be managed to preserve and enhance the natural and beneficial values of these areas and prevent the destruction, loss, or degradation of habitat. Creeks, streams, and other wetlands shall be retained in their natural state, whenever possible, to maintain water quality, biotic diversity, aesthetic values, and recreational opportunities. Direct and indirect disruptive influences on riparian and other wetland communities will be eliminated or controlled.

Action will be taken to protect riparian and other wetland resources in areas where grazing occurs. Periodic or deferred grazing in riparian and other wetland areas will be considered, as well as the selective use of sheep and goats; other circumstances will warrant the elimination of grazing animals altogether. Site-specific unit management plans will prescribe appropriate actions to prevent adverse impacts.

Seeps, Springs, and Wet Areas

The importance of the intermittent creeks, seeps, springs, and water impoundments in supporting wildlife and wetland vegetation is especially evident given the nature of the hot, dry, rainless summers characteristic of the region. These water sources increase the value of the surrounding area as habitat for wildlife, and represent an essential habitat element in themselves for plant and animal species that require free water or a wetland environment for all or part of their life stages.

Guideline: Exclosures will be constructed to protect wetland areas and their ecotones around springs, seeps, and spring-fed ponds on parks where grazing occurs. Alternate drinking water for grazing animals will be provided outside of or near the enclosed area. Where natural water sources have been developed, water storage facilities will be located on dry ground outside of the exclosures. Troughs will be designed to accommodate wildlife use. Overflow water from troughs may be used to create and maintain additional small, protected wetlands. Gravity flow pipeline systems will be installed, as needed, to transport water from isolated spring and pool areas along dry creeks to storage sites outside of the riparian area. Sufficient water will remain to protect wetland values when a water source is developed to accommodate grazing animals.

Management of Rare, Threatened, Endangered and Sensitive Plants

Plants become rare, threatened, and endangered because of changing conditions brought upon by natural processes or through human activities, particularly the destruction of habitats or through the elimination of individual plants Some plants found on park land may be endemic in small geographical areas or in highly specialized habitats, or may be relict species that show little variability and are on the verge of extinction. Others occur in the pioneer or early stages of ecological succession and exist under transitory conditions.

Protection of plant habitats may be insufficient for the preservation of some populations of rare, threatened, endangered and sensitive species. Attempts to protect individual plants by fencing, for example, without consideration of the conditions upon which they depend, may not be effective.

Guideline: The District will protect and maintain the habitats and populations of rare, threatened, endangered, and sensitive plant species. Scientific research will provide guidance for determining appropriate management for these species and their habitats. Management prescriptions based on this research will be carried out to maintain, perpetuate, increase, or restore population levels and viability. Populations of listed species will be monitored, Periodic observations will record population size, condition of habitats, reproduction, viability, and changes in geographical distribution.

Wildlife Considerations

Plant communities are characterized by constant change, which is represented as a series of stages, or successions (Oosting 1950). The pattern of change occurs in reaction to climate, fire, drought, plant competition, and other events. As the plant community changes, so does the animal community. Our native wildlife species evolved with these plant communities, and developed preferences for various successional stages. Some species are adapted only to certain habitat conditions, without which they disappear from the local fauna.

The use of wildlands by terrestrial vertebrate wildlife species is mostly dependent on the structure of the vegetative cover (Cooperrider et al. 1986). Some level of vegetation management often is necessary to maintain the health and diversity of habitats and their associated wildlife species. Research indicates that wildlife habitat may be enhanced by maintaining plant communities in a variety of successional stages (Komarek 1989, Quinn 1982). Grazing and prescribed burning, for example, are widely used as management tools to benefit many wildlife species by altering or maintaining the structure and composition of the plant community (Holechek et al. 1982, Urness 1983, Kie and Loft 1990).

Guideline: Appropriate resource management practices will be used to enhance habitat conditions favorable to a wide variety of native wildlife species. District staff and appropriate outside agency representatives and experts will develop site-specific wildlife management prescriptions for individual management units. These prescriptions will be designed to promote overall species diversity.

Pest Management

District integrated pest management policy includes a process to assess the need for pest suppression activities and to determine strategies necessary to achieve control in situations where pests present unacceptable safety, health, and economic problems, or cause functional damage.

Presently, pest plant populations on certain parks are receiving treatment, and are being studied and documented for rates of expansion or decline. Test plots have been established to measure the effectiveness of various chemical and non-chemical methods for controlling undesirable plants. Ongoing evaluations and research, along with examination of methods used in other areas, will continue to yield solutions to pest problems.

Guideline: The evaluation and control of pest plant problems shall be performed in accordance with EBRPD Pest Management Policies and Practices manual (1987), and applicable State and county regulations. Causes of weed invasion will be identified and corrected.

Public Information

The East Bay Regional Park District began with the actions of informed citizens who expressed the need to create a public park system to preserve the land and the quality of life for present and future inhabitants of the region. Since its inception, the District has made every effort to manage its facilities in a way that is sensitive to the preservation of natural and cultural resources and to communicate these values to park users. For example, the publication of Regional In Nature reaches out to offer park users stimulating recreational and educational experiences that will instill in them an appreciation of the region's natural and cultural resources and motivate them to conserve and protect those resources.

The District's 1997 Master Plan states in part that "the District will broaden its outreach efforts ...to inform the public about its mission, programs and facilities." It goes on to say that "the District will provide public information services to encourage public use of the parklands and to present information on the purposes of the District, the environmental value of parklands, program offerings, and meeting schedules." The District will also provide public information about grassland management and the role that grazing plays in this process.

Guideline: The District will provide information for the general public about the importance of maintaining grasslands, the management of native grasslands, and their fauna and flora, including rare, threatened and endangered species, the purpose of the grazing program and the various means employed to achieve grassland management goals. The District will provide staff to meet with interested individuals and groups to explain its program and to provide advice for how to approach cattle if encountered on the park. The District will conduct annual field trips for interested members of the public to view and discuss grassland management practices.

Grazing Management

The vegetative landscape in the East Bay is a dynamic system which developed under the influences of fire and grazing animals over millions of years. Fire is a natural force that appears in the natural cycle of ecological succession, and many plants and animals have adapted to and depend on recurring fire. The flora of the East Bay evolved with a diverse, large-ungulate grazing fauna of extinct native species comparable to that found today in the national parks of East Africa. A short 10,000 years ago, vast herds of native horses, grazing mammoths, elk, bison, scrub ox, and woodland musk ox grazed on what are now East Bay Regional Park District lands. In pre-European times the effects of large herds of elk and deer, and the deliberate use of fire by Native Americans, contributed to preserving the floristic diversity of the East Bay.

The introduction of European grasses and forbs by early Spanish and Anglo settlers -- exacerbated by uncontrolled grazing practices, the slaughter of expansive herds of native grazing animals, and fire suppression policies that followed the extirpation of Native Americans from their tribal lands with the advent of European settlement resulted in the virtual replacement of the original grassland vegetation with a predominately alien flora. This vegetation is more competitive, productive, and prolific than the native plants with which it coexists, and, if left alone, will tend toward dominance of the plant cover on most park soils, replacing existing native grasses and wildflowers. The non-native grasses also grow rapidly and densely to heights of three feet or more and present an acute fire safety hazard.

At present, a well-conceived, ecologically-sensitive program using grazing and other vegetation management alternatives as a substitute for lost native grazing animals and recurring fire, is the District's only recourse for achieving fire safety objectives and maintaining viable natural plant communities. The District, in addition to using domestic livestock grazing as a resource management tool, will investigate the cost-effectiveness, availability, and feasibility of employing native grazing animals to accomplish vegetation management objectives on park land.

This section provides specific mitigation and monitoring practices that will be used by the District to regulate grazing on park land. Policies and guidelines are defined to determine carrying capacities, establish acceptable forage utilization levels, monitor the degree of grazing use, incorporate alternative grazing strategies where appropriate, install range improvements, and afford protection to other resources on park land.

Management Considerations

The foothill ranges of California are dominated by non-native, introduced annual grasses and forbs. Annual plants do not survive from one year to the next and reproduce only by seed. Plant growth on non-native grasslands is highly dependent upon and responsive to weather conditions. Plant species composition and vegetative production fluctuate drastically from year to year in response to temperature differences and the timing and amount of precipitation during the growing season (Bartolome 1987). Some adjustments in stocking are usually necessary every year to obtain efficient utilization of the vegetation.

Plant growth begins with the arrival of rain and the emergence of new seedlings in the fall. The emergent vegetation continues to develop slowly throughout the cool, wet, winter months. Rapid spring growth

occurs in response to rising temperatures and lengthening days. Plant production during this period exceeds the rate at which grazing animals are able to consume the vegetation under moderate use levels. A majority of the plants reach maturity and die by mid-spring as soil moisture is depleted. Remnant plant material is left standing during the hot, dry summer months.

One measure of good management of non-native grasslands is determined by the amount of residual dry matter, or mulch, that remains on the ground at the end of the grazing season (Jasmer and Holechek 1984). Mulch provides watershed protection, promotes nutrient recycling, prevents high soil surface temperatures, improves the soil as a habitat for organisms, retards evaporation, increases water infiltration and creates favorable conditions for new plant growth (Hopkins 1954). Many resource management objectives can be met solely by managing for residual mulch. On the other hand, excessive mulch buildup may encourage the growth of certain undesirable plant species.

Other practices that facilitate improved management on non-native grasslands involve the use of range improvements (such as water developments, wetland exclosures, fencing, the strategic location of supplemental feeds, seeding, stock trail construction, and herding) and/or the use of alternate grazing systems to influence or control the movement of grazing animals, encourage more uniform distribution of grazing, and maintain rangeland productivity.

Domestic livestock grazing in woodlands is generally limited to open oak savannas and stands immediately adjacent to grasslands supporting an adequate forage cover. Dense woodlands with little understory vegetation (e.g. oak/bay woodlands, eucalyptus forest) occurring in association with grassland or oak savanna are considered to have no forage value when stocking levels are calculated for individual management units, and use of these areas by livestock is discouraged. Domestic livestock use within dense woodlands is largely incidental and insignificant in the course of trailing, resting, or seeking shade and shelter.

Shrublands are considered to have only incidental forage value for domestic livestock on park lands. Most shrubland communities are inaccessible to livestock because of steep terrain or the impenetrability of the vegetation. Forage value is inversely proportional to the density of the brush. Dense shrublands with little or no understory vegetation are generally excluded from consideration in calculating carrying capacity for grazing units. The conversion of shrubland to grassland for improving livestock forage conditions is not a management objective. Grazing is considered to be unsuitable on parks where shrubland and heavily forested plant communities make up the dominant vegetative cover.

Monitoring and Evaluation Standards

Range Forage Utilization

Research indicates that the amount of mulch remaining in any one year can influence plant productivity and plant composition the following growing season. Low amounts of mulch tend to favor the growth of undesirable plants (Heady 1956, Hooper and Heady 1970). An optimum mixture of desirable plant species results on non-native grassland where 600 to 800 pounds per acre are left (Pitt and Heady 1978, Bartolome et al. 1980). Too much mulch results in a thatch, which inhibits new plant growth (Clawson and McDougald 1982).

Guideline: Forage utilization by grazing animals will be regulated to assure that appropriate amounts of residual dry matter, or mulch, remain on the ground to achieve desired resource management objectives. Various residual mulch guidelines exist for different sites in the California annual grassland type (Clawson and McDougald 1982, U.S. Forest Service 1983). EBRPD guidelines will meet or exceed other established standards.

These standards generally translate into 4 to 6 inches of standing vegetation at the end of the grazing season. Individual areas may have special circumstances that will require that additional mulch remain. Residue requirements will vary according to the need to promote soil stability, maintain plant productivity, enhance visual and recreational values, or protect wildlife habitat.

Range Analysis

Several methods are available for estimating stocking levels on rangelands in California. Most approaches used to approximate livestock carrying capacities on rangeland involve conducting an appraisal of a unit's soils, slope, aspect, vegetative features, and water availability. A review of historic and current grazing levels can also provide an indication of the amount of use a given area can sustain.

Guideline: Authorized levels of use will be established for all areas of park land under grazing management. A "range analysis" process will be utilized by the District to estimate the number of animals an area can be expected to support in an average, favorable, and unfavorable rainfall year. The analysis will be conducted on all park lands under grazing management to establish stocking levels that are not to be exceeded in any given year.

These stocking rates will serve as benchmarks from which necessary adjustments in animal numbers can be made in response to annual variations in forage production. The manager will periodically inspect the range during the grazing season to determine if grazing use needs to be adjusted to insure that desired amounts of mulch remain. The range analysis procedure is outlined in Appendix D.

Range Monitoring

Monitoring is a practice used for observing or recording current conditions and trends to determine how well objectives are being met. Monitoring measures change in the status of resources over time commonly through repeated measurements on selected areas. Monitoring efforts may range from making simple observations to establishing detailed plots and transacts. An initial inventory of a given area is necessary to provide a foundation upon which to base a monitoring program. .

Guideline: Monitoring will be conducted to note livestock use levels and to observe wildland conditions, with an emphasis on documenting the location, distribution and abundance of native grasses, wildflower species, and other native flora and fauna. Monitoring will also verify compliance to established standards for grazing on park

land, insure conformity to lease provisions, and to collect information and data that can be used to contribute to improved management. Park wildlands will be monitored using appropriate measurements to determine use levels and assess resource impacts. These include:

Clipping and Weighing

Clipping and weighing vegetation from small sample plots will be used to forecast forage production and estimate residual mulch levels. The usual technique involves clipping representative vegetation from a designated location, drying and weighing the samples, and recording the biomass on a weight per unit area basis in pounds per acre or kilograms per hectare (Clawson and Menke 1981). Circular plots, 0.96 square feet in area will be used, because forage weight in grams times 100 is equal to pounds per acre. Overall forage utilization will be determined by gathering data from random sample areas, and extrapolating the results to the entire grazing unit upon which the data is taken.

Photo Index

Utilization photo indexes will be used to illustrate how an area appears when residual mulch is at a given level. The photographs will consist of one close-up ground photo and one panoramic photo showing minimum mulch levels established by the District. Copies of the photographs will be provided to all appropriate EBRPD personnel and grazing tenants as a simple guide for determining acceptable levels of forage utilization on the grazing units.

Key Areas

Evaluation of forage utilization and its effect on native grasses, wildflower species and other native flora and fauna will be conducted on key areas within the management unit. A key area is a portion of a rangeland area selected as a representative site on which to monitor the effects of grazing use, the principle being that no range of appreciable size can be uniformly utilized. Heavier use is inevitable around watering holes, salt grounds, driveways, level valley floors, and more accessible ridgetops (Stoddart, et al. 1975).

Moreover, some of the private properties acquired by the Park District are obtained in poor condition, and the terracing, gullying, and presence of agricultural pests that may remain as a legacy of past land use practices (overgrazing, farming, clearing, road construction and maintenance) cannot be used to accurately gauge the effects of appropriate grazing management while these other land management issues are being resolved.

Key areas will be identified that reflect the overall effects of current grazing management practices on the unit. Utilization maps that document the degree and distribution of grazing use will be compiled to help identify key areas for monitoring. Inspections will be conducted periodically to determine when utilization levels are approaching the desired grassland condition. When the key areas exhibit evidence that established use standards have been or will soon be reached, the animals will be moved to lesser utilized pastures or will be removed from the units.

Resource Value Ratings

Resource value ratings are defined as the value of the vegetation or other features of a site for a particular use or benefit (Society for Range Management 1983). Values are assigned to various resources to gauge the effects of management on their relative dominance, presence, abundance, or condition. A resource value rating for vegetation will be used to measure the relative presence and composition of native herbaceous plant species as a function of wildland condition on different sites. The District recognizes that variations in soils, slope, aspect, the timing and amount of rainfall, past land use practices, and other factors also influence herbaceous plant composition in non-native grassland communities, and will take this fact into account when making resource value rating assessments for individual areas.

Unit Management Plan

A unit management plan is a program of action designed to best achieve park management goals. Management plans identify prescriptions and practices necessary to manage wildlands for grazing in conjunction with other resource and recreational uses.

District parklands are a refuge for many from the stress of living in an urban environment. Year round park use has increased in the last ten years and, although cattle grazing has been an established land use in the region for two centuries, park users may not accept the inconvenience or difficulty of "sharing the park" with cattle. The appearance of parklands is also a concern. Certain areas in the landscape may appear overgrazed due to the feeding habits of livestock, which do not use the land uniformly and have a preference for certain locations. Livestock may trample and leave pockmarks in the trails during the rainy season. Cattle excrement and urine is objectionable to many people, some park users are fearful of large grazing animals, and there is a potential for confrontations with bulls or with cows protecting their young calves from dogs or people.

Guideline: Site-specific guidelines will be developed for each park where grazing occurs. Unit management plans will incorporate a strategy for the management of the grazing units consistent with associated resource management and land use plans. Specific attention will be given to minimize potential user conflicts and to maintain the scenic appearance of the management units. This may include trail resurfacing, the exclusion of cattle from certain areas, or a combination thereof. The timing and duration of grazing activities will also be evaluated to reduce user conflicts and to maintain the attractiveness of the parkland. The unit management plans will include a narrative evaluation of inventory data, identify major resource issues and concerns, and clarify the direction and priorities for management of the units. Specific measures necessary to solve related problems, minimize conflicts with other uses, and achieve desired management goals and objectives will be identified for implementation. All available resource mapping, inventory data, and monitoring information will be used in the development of the plans. The plans will be reviewed and updated periodically.

Facilitative Management Practices

Grazing Systems

A grazing system is a plan or schedule for grazing one or more pastures for designated periods of time. This practice allows the land alternate periods of grazing and rest. The proper degree of grazing use plus occasional rest during critical periods of growth can bring about improved management and desirable changes in plant communities. Distinction among the various types of grazing systems is based upon the sequence and timing of the grazing and rest periods within pasture divisions over the course of one to several grazing seasons. To be effective, grazing systems must be tailored to accomplish site-specific land management goals.

Guideline: Alternative grazing systems will be used in situations when continuous grazing alone does not fully achieve vegetation management objectives. A transition to seasonal or rotational grazing will be made on parks that are currently grazed on a year-round basis.

The development of an appropriate grazing system will be governed primarily by the potential for achieving improvement of the land. The investment of implementing such a practice must demonstrate a return in the form of improved management, better utilization, or increased vegetation enhancement.

Circumstances in which grazing systems may be used include, but are not limited to:

- reducing demonstrated conflicts among domestic grazing animals, wildlife, and other environmental values.
- manipulating plant species composition by varying season, frequency, and intensity of grazing.
- maintaining or enhancing native plant populations.
- providing protection, if warranted, to areas requiring special protection, e.g. riparian zones, rare plant populations, recreational sites, etc.
- controlling or reducing agricultural pests.

Implementation of grazing systems may require new fencing, additional watering facilities, or different stocking densities and grazing pressures. Associated lands owned or leased by a tenant may be included to form logical management units, or to provide additional pastures onto which domestic livestock can be rotated.

Rest

Rest can be defined as a scheduled period of non-use resulting in a temporary suspension of grazing. Rest is a management practice used by the Park District to allow time for a given area of land to recover from the effects of mismanagement, or to defer use of an area during construction or rehabilitation work. Grazed areas are rested at times to improve plant reproduction, encourage

the establishment of new plants, restore the vigor of existing plants, or provide habitat protection during critical periods.

Guideline: The practice of resting areas from grazing will be used where appropriate.

Range Improvement

Range improvements are any developments or treatments undertaken for the purpose of improving the land or facilitating improved management. Improvements such as water development, wetland exclosures, fencing, salting, supplemental feeding, fertilizing, seeding, stock trail construction and herding are practices that are used to control or influence the movement of grazing animals within a given area.

Guideline: Range improvements will be initiated, where necessary, to restore or conserve wildland resources and enhance range condition and animal distribution. Range improvement practices shall be installed and maintained as specified in site-specific management plans for the individual units. Project planning will involve consideration of the proper design, size, location, and installation methods to advance the intended purpose of the improvement and maintain harmony with other uses, values, and activities. Construction and installation will be in accordance with District specifications and instructions.

Grazing tenants shall be responsible for maintaining and repairing in good order and condition all buildings, structures and improvements related to grazing use found on the leaseholds. These include, without limitation, all fences, gates, corrals, cattleguards, wells, pumps and pressure systems, ditches, spring boxes, water troughs and tanks, and wetland exclosures. Range improvement work financed or performed on park land by individuals or other agencies must be authorized by the Park District.

Supplemental Feeding

In fall and early winter domestic livestock often are unable to consume enough forage to meet their nutritional needs. This deficiency may be offset by feeding grains, molasses, or hay. During the late winter and spring, an adequate diet of all the essential nutrients, with the possible exception of salt and certain minerals, can be obtained from the natural forage. Forage quality follows a declining trend as the seasons progress, and further supplementation often is necessary.

Guideline: Supplemental feeding of domestic livestock on park land will be allowed to maintain animals in a healthy and economically viable condition. Supplementation will be used to facilitate improved animal distribution and encourage more uniform use of the forage resource. Supplements will be placed out of sight of roads, trails and public use areas, and in under-utilized areas of the range away from water, whenever possible.

Supplemental feeding of domestic livestock on park land will not be permitted to prolong grazing use in areas where established forage utilization levels have been reached or exceeded. Supplemental feeding sites will be relocated before minimum forage utilization levels in the surrounding area have been achieved.

In the event of unusual or emergency circumstances, such as drought or the loss of vegetation by wildfire, the District will have the discretion to allow short-term supplemental feeding until arrangements can be made to remove domestic livestock from park land. This situation may require confining animals to a restricted location within the park to minimize resource impacts.

Acknowledgments

2001 Grazing Review Task Force

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Appendix A
Glossary

Animal Unit	Considered to be one mature cow with calf or their equivalent. Abbr. A.U.
Annual Grassland	Grassland on which the principal plants are annual grasses.
Annual Plant	A plant that completes its life cycle and dies in 1 year or less.
Annual Range	Range on which the principal plants are self-perpetuating annual grasses and forbs.
Archeology	The scientific study of the life and culture of ancient peoples, usually by excavation of settlements, artifacts, etc.
Aspect	The direction in which a slope of land faces (e.g., southern).
Association	See Plant Association.
Biomass	The amount of living matter per unit area of habitat.
Biotic	Refers to living components of an ecosystem (e.g., plants and animals).
Broadleaf	Having leaves that are broad and flat, rather than needlelike or grasslike.
Browse	That part of current leaf and twig growth of shrubs, woody vines and trees available for animal consumption.
Browsing	The act of eating leaf and twig growth of shrubs, woody vines, and trees.
Brush	Shrub vegetation.
Brushland	An area covered primarily with brush; shrubland.
Bunch Grass	A grass so-called because of its characteristic growth habit of forming a basal bunch or tuft.
Canopy	The upper or aerial portions of vegetation. Usually refers to trees, tall shrubs and vines.
Canopy Cover	The percentage of ground covered by a vertical projection of the overhanging plant foliage.
Climax (Community)	A final, self-perpetuating community of plants and/or animals that persists under stable conditions.
Coastal Scrub	A plant community consisting of low shrubs intermixed with grassy meadows in a maritime climate.
Community	An assemblage of plants and/or animals in a given area in which the various species are more or less interdependent upon each other.
Community (Plant Community)	An association of plants occurring together at any point in time. A unit of vegetation, (e.g., annual grassland community, chaparral community).

Coniferous Forest	A forest dominated by evergreen, cone-bearing trees and shrubs (e.g., pines, spruces, firs, etc.).
Continuous Grazing	Grazing on an area throughout the grazing season.
Cover	The plants or plant parts, living or dead, on the surface of the ground.
Cover Type	The existing vegetation of an area.
Crown	The leafy upper portion of a shrub or tree.
Deciduous (Plants)	Plants having leaves that are shed at a certain stage of development in the life cycle.
Deferred Grazing	The delay of livestock grazing on a specific management unit for an adequate period of time to provide for plant reproduction, recovery or establishment.
Ecosystem	The complex of a community and its environment functioning as an ecological unit in nature.
Ecotone	A transitional zone between two adjacent plant communities.
Edge Effect	The result of the presence of two adjoining plant communities on the number and kinds of animals present in the immediate vicinity.
Endangered Species	A native species whose prospects of survival and reproduction are in immediate jeopardy from one or more causes.
Endemic	Native to or restricted to a particular area or region.
Erosion	Detachment and movement of soil or rock fragments by water, wind, ice, or gravity.
Evergreen (plant)	A plant that retains green leaves indefinitely.
Exclosure	An area fenced to exclude animals, such as livestock.
Exotic	An organism or species which is not native to the region in which it is found.
Firebreak	A temporary barrier used to prevent or retard the spread of fire, usually created by the removal of vegetation.
Flora	The plant species of an area.
Forage	All browse and herbaceous food that is available to livestock or wildlife.
Forage Production	The amount of forage produced on a given area within a growing season.
Forb	Any broadleaf herbaceous plant other than those in the grass (Poaceae), sedge (Cyperaceae) or rush (Juncaceae) families.
Fuel	Flammable vegetation.
Fuel Break	A block or strip of land on which flammable vegetation has been permanently replaced by vegetation with a lower fuel volume and\or flammability, and subsequently maintained to help control fire.
Genus	A classification of plants and animals with common characteristics, divided into subordinate species.

Grassland	Land on which the vegetation is dominated by grasses.
Grazing Capacity	The number of livestock a range unit will support each season over a period of years without injury to resources.
Grazing Distribution	The locating of livestock over the range to obtain uniform use.
Grazing Management Plan	A program of action designed to secure the best practicable control of the forage resources using grazing or browsing animals.
Grazing Pressure	The degree of grazing use on a land area.
Grazing Season	The period of time for which livestock are allowed to graze within any given year.
Grazing System	A specialization of grazing management which defines the periods of grazing and non-grazing.
Grazing Unit	An area of rangeland which is managed as an entity for livestock grazing.
Groundwater	Water within the earth that supplies wells and springs.
Growing Season	The portion of the year when the temperature and the availability of moisture permit plant growth.
Habitat	The natural abode of a plant or animal, including all biotic, climatic, and soil conditions, or other environmental influences affecting life.
Herb	Any flowering plant whose stem withers away to the ground after each season's growth.
Herbaceous	Having little or no woody tissue and persisting usually for a single growing season
Herbage	Total amount of living herbaceous plants above ground.
Herbicide	A chemical used for killing or inhibiting the growth of plants.
Host-specific Biological Agent	An organism used for killing or inhibiting the growth of one specific pest.
Indigenous	Born, growing or produced naturally in an area or region; native.
Integrated Pest Management	A management approach that incorporates the use of ecologically compatible treatment strategies to control or eradicate plant and animal pests.
Introduced (Species)	A species not a part of the original plants or animals of an area.
Invasive (Plant)	Plants that move into and establish themselves in another area.
Key Area	A portion of range, which because of its location, grazing value, and/or use, serves as an indicative sample of range conditions or trends.
Litter	The top layer of dead vegetation on the soil surface.
Livestock	Domestic animals kept or raised for use, pleasure, or profit
Livestock Management	Application of technical principles and business methods to livestock production.

Monitoring	The orderly collection, analysis, and interpretation of data to evaluate progress toward meeting management goals.
Mulch	A layer of dead plant material on the soil surface.
Native (Species)	A species which is one of the original plants or animals in a particular locality.
Naturalized (Species)	A species not native to an area, which has adapted to the area and has established a stable or growing population.
Overgrazing	A condition whereby animals graze to the point of damaging vegetation and soil.
Overstory	The upper canopy of plants, especially trees, tall shrubs and vines.
Overuse	The harvesting of an excessive amount of the current year's plant growth, which, if continued, will result in overgrazing.
Palatability	The relish that an animal shows for a particular species, plant or-plant part.
Pasture	A grazing area enclosed and separated from other areas by fencing or other barriers.
Perennial (Plant)	A plant that has a lifespan of 3 or more years.
Pest	Any unwanted, destructive plant or animal.
Plant Association	A plant community characterized by essential uniformity in terms of its dominant species.
Plant Reserves	Energy stored by a plant for future growth and reproduction.
Prescribed Burning	The use of fire as a management tool under specified conditions for burning a predetermined area.
Productivity	The rate of vegetative production per unit area (e.g., pounds per acre).
Range	Land grazed by livestock.
Range Analysis	A study used to determine the productivity of an area of rangeland.
Range Condition	The existing status of the range brought about by climate, grazing, and all other factors that influence soil and vegetation.
Range Improvement	Any structure or practice used to improve the management or conservation of range resources by livestock (e.g., gates, fences, stock trails, water developments, seeding).
Range Inventory	An itemized list of resources of a management area.
Range Management	A land management discipline that applies an organized body of knowledge known as range science to renewable natural resource systems for two purposes: (1) protection, improvement, and continued welfare of the basic range resource, which may include soils, vegetation, and animals; and (2) optimum production of goods and services in combinations needed by humankind.
Range Site	An area of land having a combination of edaphic, climatic, topographic and natural biotic factors that is significantly different from adjacent areas.

Rangeland	Land on which the native vegetation is predominantly grasses, grass-like plants, forbs, or shrubs that provides forage for livestock and wildlife.
Rare Species	A native species, which although not presently threatened with extinction, is in such small numbers throughout its range that it may become endangered if its present environment worsens.
Relict	A remnant or fragment of a climax plant community that remains from a former period when it was more widely distributed.
Remnant Population	See Relict.
Residual Dry Matter	The amount of dried, dead plant matter left on the soil at the end of the grazing season.
Residual Mulch	The amount of dead plant matter left on the soil at the end of the grazing season.
Rest	Leaving an area ungrazed, usually for one full growing season.
Riparian Vegetation	Plant communities dependent upon the presence of free water near the ground surface, especially along streams and rivers.
Rotational Grazing	A system of grazing where animals are moved between two or more separate pastures on a predetermined schedule.
Salting	Providing salt as a mineral supplement for animals. Also, placing salt on the range in such a manner as to improve distribution of livestock.
Savanna	Grassland with scattered trees, either as individuals or as clumps, often a transitional zone between true grassland and forest.
Scrub	Vegetation consisting mainly of shrubs.
Seep	Wet area, normally not flowing, arising from an underground water source.
Sensitive Species	A native species considered a viable candidate for classification as rare, threatened, or endangered.
Shrub	A low-growing, woody plant with several permanent stems as opposed to a single trunk.
Shrubland	Any land on which shrubs dominate the vegetation.
Species	The fundamental classification of plants and animals, a subdivision of a genus, consisting of organisms with many persistent, common characteristics and generally capable of interbreeding only among themselves.
Spring	An isolated source of surface water originating from an underground aquifer.
Stand	A relatively uniform group of plants growing in a continuous area.
Stocking Rate	The number of specific kinds and classes of animals grazing or using a unit of land for a specified period of time.
Subshrub	A low plant with several permanent woody stems that annually grow new, nonwoody shoots that die back at the end of the growing season.

Succession	The progressive replacement of one plant community with another on a site until a stable or climax community is established.
Successional Stage	One of the plant communities that occurs during succession on a particular site.
Supplemental Feeding	The practice of supplying concentrated or harvested feed to correct deficiencies of the range diet.
Thatch	A matted layer of accumulated, partially decayed plant material covering the soil.
Threatened Species	A native species, which although not presently threatened with extinction, is likely to become an endangered species in the foreseeable future in the absence of special protection and management efforts.
Understory	Plants growing beneath the canopy of other plants, usually referring to grasses, forbs and low shrubs under trees or tall shrubs.
Use (grazing)	The proportion of the current year's forage production that is consumed or destroyed by grazing animals.
Use Standards	An established basis of comparison in measuring the amount of use.
Utilization	See Use (grazing).
Vegetation Type	A distinctive stand of plant species or combinations of species which dominate a given area..
Water Table	The upper limit of a portion of the ground saturated with water.
Watershed	The area drained by a stream or river system.
Weed	Any plant growing where unwanted.
Wetland	An area with soils that are usually saturated with water, and support mostly water loving plants.
Wetland Community	Plant community that occurs on sites with soils typically saturated with or covered with water most of the growing season.
Wildland	Undeveloped, uncultivated land in its natural state.
Wildlife	Wild vertebrate animals, not including fish.
Woodland	A land area occupied by trees; a forest or woods.

Appendix B
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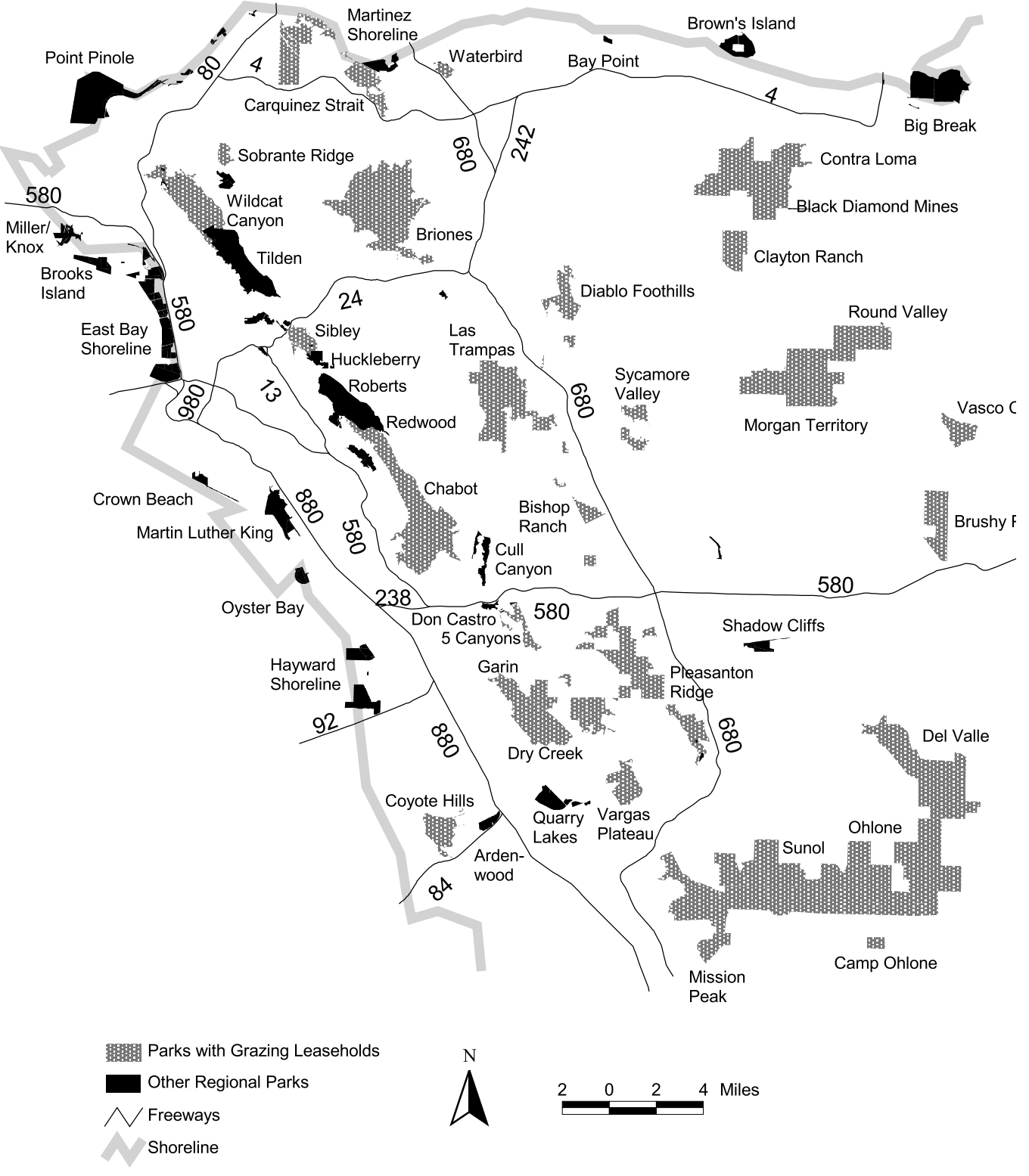
Appendix C
Map of Regional Parks
With Grazing Leaseholds



Appendix D
Range Analysis Process

Overview

The purpose of the range analysis process is to determine stocking rates for all park grazing units consistent with resource conservation objectives. The analysis provides a reasonably accurate estimate for determining the number of livestock an area can be expected to support in an average, favorable, and unfavorable rainfall.

Methodology

County Soil Surveys

Soil surveys are studies prepared for each County by the USDA Soil Conservation Service in cooperation with the University of California Agricultural Experiment Station. The surveys provide useful information about the kind, location, productivity, and suitability of soils for various engineering and agricultural uses, including livestock grazing.

Information contained within the soil surveys of Alameda and Contra Costa counties is used to determine forage production and stocking rates on EBRPD grazing lands. Soils are grouped into “range sites" on the basis of similarities in texture, depth, and slope. Forage production estimates for favorable and unfavorable rainfall years are provided in pounds per acre for each range site. This information is used in conjunction with field mapping data to determine forage production and stocking rate for a particular area.

Mapping Process

1. Aerial photographs included in the county soil surveys are used to identify the soil types found within a particular grazing unit. These soils are grouped into the appropriate range sites on a map overlay.

2. Vegetation types (e.g. grassland, oak woodland, chaparral, etc.) are identified and mapped in the field using aerial photographs and topographical maps. Terrain features, restricted areas, and ponds and springs are also noted during the mapping process. Rock outcrops and excessively steep slopes limit livestock accessibility. Areas of high recreation use, wetlands, and sites containing notable resources may require exclusion from livestock use. The availability of water also has an effect on livestock distribution patterns.

3. Vegetation types identified in the field are overlaid onto the range site maps to determine the number of acres each type occupies within a particular range site. Consideration is given to the fact that forage production varies within different vegetation types. Forage production in open grassland is generally higher than in grazeable woodland and shrubland communities. Woodlands with sparse understory vegetation (e.g. oak/bay woodland, eucalyptus forest), and dense shrublands have little or no forage value. This information is taken into account when calculating total forage production for an area.

Calculations and Adjustments

1. A digital planimeter is used to determine the number of acres each vegetation type occupies within a given range site. Areas that afford little or no forage value are subtracted from the total acreage. Forage production in pounds per acre is calculated by multiplying forage production figures from the County soil survey by the acreage of each useable vegetation type occurring on the unit. Adjustment factors compensate for relative variations in forage production on the different vegetation types. This process provides an estimate of the total amount of forage produced on the unit in an average, favorable, and unfavorable rainfall year.

2. Residual dry matter (RDM) standards are used to determine the amount of each year's vegetative production that should remain on the ground at the end of the grazing season. Ths residue or mulch acts as a protective layer over the soil to guard against erosion, encourage nutrient recycling, and promote optimum conditions for plant growth. For this part of California, the RDM levels are:

   0 to 30% slope: leave 600 lbs./acre
   30 to 50% slope: leave 800 lbs./acre
   greater than 50% slope: leave 1000 lbs./acre

   Another acceptable method of determining forage utilization on annual grasslands is to establish a percentage of the total forage production that livestock can use in a given grazing season. Like RDM standards, percent utilization is used to determine when acceptable use levels have been achieved. A 60 percent level of forage utilization has been established for park land (i.e. 60% of total vegetative production is used by livestock, *40'Yo* is left on the ground).

   To insure proper utilization, both RDM and percent utilization are given consideration in the analysis process. The larger of these two adjustment values is subtracted from the estimated total forage production figures for each range site to determine the amount of forage available for livestock use.

3. The EBRPD has prepared a master inventory containing a listing of all range sites found within Alameda and Contra Costa counties. Corresponding forage production figures are included for each range site, and adjustment factors are used to calculate available forage production. This information is incorporated into a computer program that generates stocking rate estimates for a given area of land, as well as other useful data.

Final Product

The computer produces a four page report which provides the following information:

- total acreage of each range site occurring on the unit
- total acreage each vegetation type occupies within a given range site
- total acreage for each vegetation type
- total acreage available for livestock use

- available forage production in pounds per acre for each range site
- total available forage production in pounds per acre on the unit
- the corresponding number of animal units that the land can adequately support in an average, favorable (wet) and unfavorable (drought) rainfall year.

Once a stocking rate has been established, use levels can be changed to reflect existing conditions. Additional adjustments may be necessary in situations where steep terrain and/or the lack of available drinking water limit or preclude grazing use on certain areas of the range.

The range manager conducts periodic inspections of the range during the grazing season to determine if grazing use needs to be modified to insure that proper utilization is achieved.