

GRAZING MANAGEMENT PLAN
FOR THE
LIVERMORE AREA RECREATION AND PARK DISTRICT
SYCAMORE GROVE, BRUSHY PEAK AND
HOLDENER PARK PROPERTIES



PREPARED FOR: Livermore Area Recreation and Park District
PREPARED BY: Lisa Bush, California Certified Rangeland Manager #18
DATE: April 6, 2010

TABLE OF CONTENTS

1.0 Executive Summary	1
2.0 Background and Introduction	2
3.0 Goals, Objectives and Purposes of Livestock Grazing	4
3.1 Medusahead Management	5
3.2 Improved Conditions for Native Grasses and Forbs	8
3.3 Improved Conditions for California tiger salamander	9
3.4 Improved Conditions for California red-legged frog	10
3.5 Fire Fuel Management	12
4.0 Grazing Guidelines for LARPD Grazing Areas	13
4.1 Grazing Agreement	13
4.2 Infrastructure	14
4.3 Grazing Capacity and Stocking Rate	16
4.4 Grazing Season	17
4.5 Livestock Species	18
4.6 Animal Distribution	19
4.7 Monitoring and Evaluation	19
5.0 Sycamore Grove Park	23
5.1 Background	23
5.2 Natural Resources	23
5.2.1 Vegetation	23
5.2.2 Soils	25
5.2.3 Aquatic Features and Associated Threatened Amphibians	27
5.3 Sycamore Grove Park Grazing Recommendations	27
5.3.1 Infrastructure Needs for Sycamore Grove Park	27
5.3.2 Grazing Capacity Estimate and Stocking Rate Recommendations for Sycamore Grove Park	30
5.3.3 Grazing Season Recommendations for Sycamore Grove Park	32
5.3.4 Livestock Species Recommendations for Sycamore Grove Park	32
5.3.5 Animal Distribution Recommendations for Sycamore Grove Park	32
5.3.6 Recommendations for Achieving Grazing Goals and Objectives at Sycamore Grove Park	33
5.4 Monitoring and Evaluation	33
5.5 Summary of Grazing Recommendations for Sycamore Grove Park	34
6.0 Brushy Peak	36
6.1 Background	36
6.2 Natural Resources	36
6.2.1 Vegetation	36

6.2.2	Soils	37
6.2.3	Aquatic Features and Associated Threatened Amphibians	38
6.2.4	Rocky Outcrops	38
6.3	Brushy Peak Grazing Recommendations	39
6.3.1	Infrastructure Needs for Brushy Peak	39
6.3.2	Grazing Capacity Estimate and Stocking Rate Recommendations for Brushy Peak	41
6.3.3	Grazing Season Recommendations for Brushy Peak	43
6.3.4	Livestock Species Recommendations for Brushy Peak	43
6.3.5	Animal Distribution Recommendations for Brushy Peak	43
6.3.6	Recommendations for Achieving Grazing Goals and Objectives at Brushy Peak	43
6.4	Monitoring and Evaluation	44
6.5	Summary of Grazing Recommendations for Brushy Peak	44
7.0	Holdener Park	46
7.1	Background	46
7.2	Natural Resources	46
7.2.1	Vegetation	46
7.2.2	Soils	46
7.2.3	Aquatic Features	47
7.3	Holdener Park Grazing Recommendations	47
7.3.1	Infrastructure Needs for Holdener Park	47
7.3.2	Grazing Capacity Estimate and Stocking Rate Recommendations for Holdener Park	47
7.3.3	Grazing Season Recommendations for Holdener Park	48
7.3.4	Livestock Species Recommendations for Holdener Park	48
7.3.5	Animal Distribution Recommendations for Holdener Park	48
7.3.6	Recommendations for Achieving Grazing Goals and Objectives at Holdener Park	48
7.4	Monitoring and Evaluation	51
7.5	Summary of Grazing Recommendations for Holdener Park	51
	Literature Cited	52
	Personal Communications	53
	Appendices	
	Appendix A Grazing Capacity and Stocking Rate Calculations	
	List of Figures	
	Figure 1 Sycamore Grove Park Grazing Plan Map	
	Figure 2 Brushy Peak Grazing Plan Map	
	Figure 3 Holdener Park Grazing Plan Map	

List of Tables

- Table 1. Compliance monitoring for grazing agreement
- Table 2. Effectiveness monitoring variables for evaluating achievement of goals and objectives
- Table 3. Monitoring schedule
- Table 4. Sycamore Grove Soils
- Table 5. Soil Survey Alameda Area and NRCS on-line Soil Data Mart range site forage production estimates for Upper Sycamore Grove Park
- Table 6. Forage production estimates for Lower Sycamore Grove Park
- Table 7. LARPD Brushy Peak soils
- Table 8. Soil Survey Alameda Area and NRCS on-line Soil Data Mart range site forage production estimates for LARPD Brushy Peak
- Table 9. Comparison of grazing capacity estimation results for Brushy Peak
- Table 10. Holdener park soils
- Table 11. Alameda County Soil data range site forage production estimates for Holdener Park
- Table A-1 Animal unit equivalents

List of Abbreviations

ACRCD	Alameda County Resource Conservation District
AU	Animal unit, a 1,000-pound cow, including her nursing calf or equivalent
AUM	The amount of forage that one AU consumes in one month
BPP	Brushy Peak Regional Preserve Land Use Plan (Brushy Peak Plan)
CTS	California tiger salamander
CRLF	California red-legged frog
NRCS	Natural Resources Conservation Service
RDM	Residual Dry Matter
RMP	Sycamore Grove and Veterans Regional Park Resource Management Plan
SCS	Former name for NRCS, still used in conjunction with soil surveys published before 1994
UCD	University of California at Davis

1.0 Executive Summary

This plan was designed to enhance natural resources and manage fire fuels through livestock grazing at Livermore Area Recreation and Park District (LARPD)'s Sycamore Grove Park, Brushy Peak Regional Preserve, and Holdener Park. As demonstrated by research and observational studies, native grassland plant diversity and habitat for the federally threatened California tiger salamander (CTS) (*Ambystoma californiense*) and California red-legged frog (CRLF) (*Rana aurora draytonii*) can be positively affected by grazing. Additionally, some noxious weeds and fire fuels can be effectively managed with grazing. For these reasons, LARPD has chosen to utilize livestock to help manage appropriate properties. Seasonal grazing by cattle during winter and spring is recommended.

Although livestock related conflicts can arise on public recreational lands, utilization of livestock grazing was deemed beneficial because non-native annual plants that now dominate most of California's grasslands, have degraded habitat conditions at these LARPD properties. Without grazing, non-native grassland plants compete with natives for water and sunlight, and can prevent germination and growth of certain native plants. Grazing will also be important in maintaining CTS and CRLF habitat to ensure a mix of emergent vegetation and open water.

This plan includes general background information and recommendations that pertain to all three of the subject properties, as well as site-specific recommendations for each site. The following three sections (2.0, 3.0, and 4.0) provide general information and recommendations applicable to three properties. They include background information, a discussion of grazing purposes and goals and objectives, and grazing guidelines. The last three sections (5.0, 6.0, and 7.0) include site-specific recommendations for grazing areas at Sycamore Grove Park, Brushy Peak, and Holdener Park. Calendar dates, stocking rates, and other quantitative recommendations should be used as sound guidelines, but are intended to be flexible to accommodate natural variations in forage production and other site conditions.

The best available information was used in developing recommendations contained in this plan. Numerous publications as well as individual specialists were consulted. Because benefits of livestock grazing on CTS and CRLF habitat have been noted only recently, there is still much to be learned about grazing interactions with these species. In light of this, LARPD should continue to seek out the most up to date information on these species and adapt management activities as needed.

The primary purpose of this plan is to provide guidelines and direction to LARPD for the use of livestock grazing to meet rangeland and resource conservation goals for its open space parklands. Grazing should be used in conjunction with other rangeland management tools, such as prescribed burning and focused mowing.

2.0 Background and Introduction

The Livermore Area Recreation and Park District (LARPD) acquired three significant undeveloped rangeland properties since 1975. The nature of these rangeland properties is much different than typical regional parks, requiring a very different management approach—one aimed primarily at maintaining and enhancing natural resource values. The three properties—Brushy Peak Regional Preserve, Sycamore Grove Park, and Holdener Park—all include significant areas of grassland and have historically been used for livestock ranching. Holdener Park, Brushy Peak, and the portions of Sycamore Grove Park recommended for grazing are hereinafter referred to as the Grazing Areas.

Why Grazing is Important in California Grasslands. Many grasslands are rich biological reservoirs supporting myriad plant and animal species. They are complex ecosystems that vary in composition and structure depending on climate, soils, past uses, and current management, among other factors. Disturbance, which can be in the form of fire, grazing, trampling, and other natural processes such as drought, plays an important role in healthy, dynamic grasslands. Grasslands within the Grazing Areas are highly altered from their native condition, as is true throughout California, principally by the establishment and dominance of many non-native grassland species introduced from Europe and Asia over the past two centuries. This dramatic, permanent change in grassland species composition, has significantly altered their ecological functioning by the addition of many highly competitive annual species that produce large volumes of biomass. Because of this, our present day grasslands require ongoing management to keep these non-native, mostly annual, competitive species in check. As described in the Sycamore Grove and Veterans Regional Park Resource Management Plan (the RMP) (Sycamore Associates 2002), fire can play an important role in managing excessive grassland biomass, but on an ongoing basis, livestock grazing is a more practical tool, because it provides more consistent biomass management and is generally less problematic to implement.

Grazing, trampling, and other disturbance regimes work together to create and maintain a patchwork of conditions that provide for a wider variety of species. They are important in grassland systems to provide openings in vegetation that expose mineral soil and allow light penetration so that small-statured plants can germinate and grow. In ungrazed grasslands, accumulated thatch—dead plant material from previous growing seasons—can hamper the germination and growth of some species.

Recent research has shown that livestock grazing can have beneficial effects on native ecosystems and is being used on numerous preserves throughout the Bay Area and other parts of California to enhance both native plant and animal biodiversity. (Ford 2002; Hayes and Holl 2003; Marty 2004).

As well as benefiting grassland plants, livestock grazing has been shown to enhance habitat conditions for two federally threatened native amphibians that are found within the Grazing Areas: the California tiger salamander (CTS) (*Ambystoma californiense*) and California red-legged frog (CRLF) (*Rana aurora draytonii*). As discussed in Sections 3.3

and 3.4, management of non-native herbaceous vegetation, primarily annual grasses, by livestock grazing can greatly benefit these species.

Existing Related Documents. Management of Brushy Peak and Sycamore Grove Park is guided by planning documents: the RMP and the Brushy Peak Regional Preserve Land Use Plan (BPP)(East Bay Regional Park District 2002). The RMP serves “as a long-term planning and operational guide for the management of the park’s many natural and cultural resources...” and states that it is ‘framed by the conservation easement of the Sycamore Grove Park Expansion, which addresses the terms and allowable uses of the upper portion Easement for “preservation and protection of the conservation values of this 370-acre property”’.

The conservation easement referred to in the RMP is a Deed of Perpetual Open Space and Parkland Conservation Easement Dedicated Pursuant to South Livermore Valley Specific Plan and held by the Tri-Valley Conservancy. The conservation easement, which effects only the upper 370 acres of Sycamore Grove park was restated in 2006, with the property’s conservation values described as “open space, natural, biological, recreational, historic, and scenic values”. Permitted activities and uses include “Uses and activities consistent with the Sycamore Grove and Veterans Regional Park Resource Management Plan as adopted by LARPD on November 13, 2002”. Because livestock grazing is recommended as a resource management tool in this plan, it is consistent with the conservation easement. The recently acquired 73-acre former Bobba Property will be subject to a similar conservation easement.

The BPP was prepared to guide the management of properties owned by both East Bay Regional Parks District (EBRPD) and LARPD. The BPP divides LARPD’s Brushy Peak lands into two management areas with the eastern portion designated as Brushy Peak Rock Outcrops Special Protection Feature.

Recommendations presented in this grazing plan are consistent with resource management goals and objectives identified in these two plans.

3.0 Goals, Objectives and Purposes of Livestock Grazing

Livestock grazing can have differing effects on natural resources depending on many variables including timing and duration, stocking rate, kind and class of animal, utilization level, and animal distribution.

To ensure that a grazing program meets the needs of a specific site and/or its owners and visitors, goals and objectives should be identified for grazing on that site. Goals represent a future desired state or condition, and are often general or idealistic. In order to actually measure the success of achieving goals, they should be paired with specific and practical objectives. As conditions change over time, new or updated goals, objectives and recommendations will eventually be warranted. LARPD has the responsibility and should maintain the flexibility to take new scientific information into account as it becomes available.

Grazing goals stated herein were developed from conversations with Mike Nicholson, LARPD Ranger/Naturalist Supervisor, the Sycamore Grove Park RMP, the BBP and observations of Grazing Area conditions. While LARPD's principle, overarching natural resources goal is to enhance overall biological diversity, this goal is too general to address through grazing practices, as grazing can have differential effects on biological resources. More specific goals that affect specific biological resources and that can be addressed through livestock grazing, are described below. This list can be added to in the future if new information becomes available that would allow LARPD staff to use grazing for enhancement of other biological resources. In addition, enhancement of biological diversity may be addressed through land management methods other than grazing.

Goals for all Grazing Areas, which relate directly to the following Sections 3.1 through 3.6:

Goal 1. Reduce medusahead areal coverage

Objective 1a. Reduce seed output of medusahead using high intensity, short duration grazing in spring as soon as the flag leaf (the last leaf to emerge before the flower head) thickens

Goal 2. Improve conditions for native grasses and wildflowers

Objective 2a. Provide seasonal grazing, allow a non-grazing period each year during which native perennial grasses can develop carbohydrate reserves and recover from grazing impacts

Objective 2b. Provide grazing during the rapid spring growth period to reduce the canopy height of, and competitive ability of, non-native annual grasses

Objective 2c. Provide grazing to prevent thatch buildup and create small openings, exposing soil for germination and growth of small-statured wildflowers

Goal 3. Improve habitat conditions for CTS

Objective 3a. Provide grazing to encourage ground squirrel colonization in non-high use public areas

Goal 4. Improve habitat conditions for CRLF

Objective 4a. Allow livestock partial access to all ponds that provide habitat or potential habitat for CRLF, to ensure a mix of emergent vegetation and open water

Goal 5. Reduce long- and short-term fire hazard

Objective 5a. Prevent brush invasion into grasslands by annual grazing

Objective 5b. Reduce fire hazard by slowing its spread, shortening flame length, and reducing fire intensity by significantly reducing herbaceous fire fuels through annual grazing

3.1 Medusahead Management

Numerous weed species are found on LARPD properties, but medusahead (*Taeniatherum caput-medusae*) has perhaps the greatest capacity to spread over large areas. It is already well-established at Sycamore Grove Park and there are moderate-sized patches at Brushy Peak. Medusahead is a particularly troublesome weed for several reasons. First, it has a high silica content, which prevents dead plant matter from decomposing quickly, resulting in dense thatch that builds up and smothers other species. Because it is adapted to germinating and growing within its own thatch whereas other species are not, it can quickly develop a monoculture and form large, self-sustaining patches. Additionally, it becomes very unpalatable to livestock and wildlife once it reaches flowering stage.

Several approaches can be employed to manage medusahead, including prescribed burning under some circumstances, carefully prescribed mowing, and intensive grazing. Recent research conducted by the University of California at Davis (UCD) under the direction of Dr. Emilio Laca, Associate Professor of Plant Sciences, has shown short duration, high intensity grazing by sheep to be effective in greatly reducing medusahead. This type of treatment may also be applied to other weed species, although the UCD research has been specific to medusahead. LARPD staff has for the past several years been attempting to manage medusahead with carefully timed mowing, which can be effective if done with a flail mower. However, medusahead is not confined to flat areas where flail mowers are able to operate. Using precision grazing in addition or in lieu of mowing should be done to decrease areal coverage of medusahead. Precision grazing for medusahead management requires careful planning and timing because medusahead phenology is not always consistent; some plants may be at stage for grazing while some may not.

UCD experiments have shown that:

- High utilization levels (i.e. severe grazing) were more successful in reducing medusahead with less post-grazing regrowth than were lower utilization plots; best results were obtained when research plots were grazed to a height of 1-2”

- Stocking densities of 2.6 to 2.8 AUs (equivalent to 13 to 14 mature sheep) per acre for 14 to 17 days were most effective
- Late vegetative stage is the best time for defoliation; this phenological stage is reached before awns from the flowerhead appear above the flag leaf (see photo on following page), when bumps can be felt within the leaf sheath, and growing points are elevated; if grazing occurs too early (before elongation of the internodes and elevation of growing points), plants will keep growing and flower heads will develop
- Follow-up seeding with annual clovers and/or squirrel tail (*Elymus elymoides*), which both have quick, deep rooting like medusahead provided competition with future years' medusahead seedlings

The following information, which provides a framework for implementing a medusahead management program, is based on four telephone conversations with Morgan Doran, Livestock and Natural Resources Advisor for the University of California Cooperative Extension (UCCE) in Napa, Solano and Yolo Counties (Morgan Doran personal communication), one telephone conversation with Sheila Barry, Bay Area Natural Resources Advisor for UCCE (S. Barry, personal communication, 2008) and attendance at a medusahead field day at UCD in July, 2007.

When this method of medusahead management is applied to LARPD properties, treatment areas should be carefully selected, as severe grazing episodes could detrimentally affect sensitive resources. Livestock numbers, location and size of treatment areas, and exact timing should be arranged annually with the livestock operator based on site conditions. Essential components of the late spring grazing required for medusahead control include critical timing, high livestock density, and use of portable infrastructure. Sheep have been used in most of the UCD trials, primarily because they were present on the main research site; cattle should be just as effective.

Pre-planning. Treatment areas should be identified a year in advance of grazing as medusahead plants are difficult to identify in their vegetative state. A global positioning system (GPS) should be used to define infested areas. In addition, treatment areas should be evaluated to ensure that they don't contain other resources that would be damaged by the intensive grazing treatment.

Critical Timing. The window of opportunity for this late-spring grazing is very small which means that careful monitoring and the ability to move an adequate number of cattle into the fenced treatment areas in a timely fashion is essential. If grazing occurs too early, the plants will re-sprout and if it occurs too late, the livestock will not graze the flower heads. The timing of this optimal phenological stage will vary depending on weather conditions but should usually occur in late April. Close monitoring of medusahead phenology will be needed during the spring, then LARPD staff will need to arrange having the medusahead herd brought to the treatment areas at the critical stage.

High Livestock Density. Grazing intensity for the late-spring grazing should be heavy, which may result in a higher proportion of bare ground than would normally be considered acceptable. Stocking density for late-spring grazing should be on the order of 5 AUMs per acre,¹ or as needed to graze herbage down to a height of one to two inches. Because grazing will be somewhat patchy, areas of bare ground will be interspersed with one- to two-inch-tall biomass.

Portable Infrastructure. Portable, solar-powered electric fencing should be used to confine livestock to treatment areas and portable water tanks and troughs should be used to water livestock within treatment areas.

Post-treatment Seeding. Seeding treated areas with annual clovers, squirrel tail, or other quick growing, deep rooted plants as has been done by UCD researchers should be done in the Fall following grazing treatment of medusahead to provide competition with new medusahead seedlings. Seeding should be done by October 15th.

Re-treatment. Grazing treatment should be repeated as needed



Recommendations for Achieving Medusahead Management Goal and Objective:

- Implement short duration, high intensity grazing in medusahead infested areas as described above.
- Record medusahead infestations using a GPS in late spring of one year, so that portable infrastructure and treatment areas can be set up in spring of the following year.
- Determine size of treatment areas based on GPS determination of infestation size; size of treatment areas may be dictated by the number of available cattle – at about 2.6 AUs per acre for two weeks, 25 AUs would be needed to treat 10 acres, 100 AUs would be needed to treat 40 acres etc.

¹ Mr. Doran's research plots have been grazed at a rate of about 162 AUdays/acre, which equals 5.4 AUMs/acre; these values were converted from 10 sheep/10m² plot for two days

3.2 Improved Conditions for Native Grasses and Forbs

Generally, perennial grasses benefit from seasonal or periodic grazing rather than continuous year-round grazing. Unlike annuals, which rely on copious seed production and germination of many new plants each season, perennials can live for many years. They normally produce less seed than annuals and are slower to germinate and grow as young plants, so the health and longevity of individual plants is much more important. When their leaf area is temporarily decreased through grazing, the plant's ability to photosynthesize and make carbohydrates is reduced, which results in root dieback. Severe, repeated grazing can weaken or kill some perennial grasses but complete absence of grazing can diminish their overall health because grazing stimulates vigorous new growth that actively photosynthesizes.

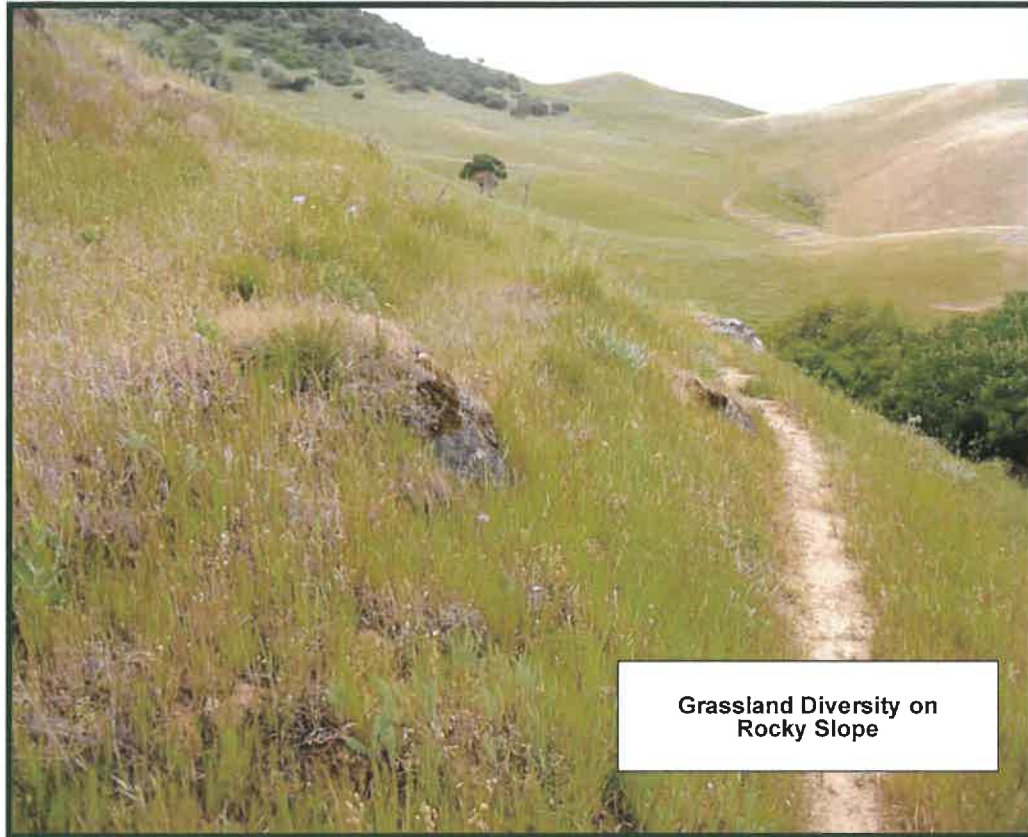
Perennial grass species vary in their responses to grazing. Low-growing species and those that spread by rhizomes or stolons, tend to be more resistant to heavy grazing than bunch grasses. Limited research seriously restricts the ability to generalize about grazing practices for enhancing or restoring native grass species (C. D'Antonio et al. 2002). This makes it difficult to plan grazing programs to favor native grass species without site-specific experience and data. There are many reasons that reliable data on enhancement or restoration of native grasses is limited. These include:

- long-term studies required to detect changes in grassland species composition, especially with native species, requires long-term time and funding commitments
- observational studies have limited value because of the difficulty in separating grazing effects from other effects; a common pitfall is the practitioner's desire to see a positive outcome
- there are many variables that affect a grazing regime and a multitude of possible combinations, yet a limited number of variables can be compared in any one study
- different species may respond differently to a particular grazing regime – what's good for purple needlegrass may not be what's good for California oatgrass
- native and exotic species within a guild may respond similarly; for example, grazing responses of California oatgrass versus Australian oatgrass or purple needlegrass versus a non-native needlegrass (*Nassella formicarum*) may be analogous

Identification of the habitat needs and responses to grazing of individual native plant species must be carried out on site-and species-specific bases. Specific native grass species have not been targeted for enhancement by LARPD, so a general strategy for native grass enhancement—seasonal grazing—will be employed.

Grazing creates open areas in the grassland canopy, exposing small areas of soil within which small-statured forbs can germinate and grow. Disturbance and removal of thatch is essential to germination and growth of some native forb species including popcornflowers (*Plagiobothrys* spp.), clovers (*Trifolium* spp.), owl's-clovers (*Castilleja* spp.), cream cups (*Platystemon californicus*), red maids (*Calandrinia ciliata*), and water

chickweed (*Montia fontana*) (G. Hayes 2006), all of which occur at Brushy peak and may occur at Sycamore Grove Park and Holdener Park.



One local example of how grazing has been used to prevent extirpation of a small native forb is at Coyote Ridge near San Jose, where atmospheric nitrogen deposition has seriously threatened the Bay checkerspot butterfly (*Euphydryas editha bayensis*) which is dependant on the native forb dwarf plantain (*Plantago erecta*). Excess nitrogen resulted in an extensive non-native grass invasion, primarily by Italian ryegrass (*Lolium multiflorum*), which eliminated many acres of dwarf plantain through competition. Grazing was re-introduced to manage the Italian ryegrass invasion and butterfly numbers rebounded.

Recommendation for Achieving Native Grasses and Forbs Goal and Objectives: Conduct seasonal spring grazing to enhance conditions for native grasses and forbs by reducing thatch and competition by non-native annual grasses. See Section 4.4 for more specific information about grazing season.

3.3 Improved Conditions for California Tiger Salamander

CTS is known to occur at Sycamore Grove Park and Brushy Peak (M. Nicholson, personal communication, 2006). CTS live in rodent burrows during summer months, and

breed in ponds during the rainy season. They emerge from their subterranean refuges with the first rains and migrate to seasonal wetlands such as stock ponds, or slow streams that hold water through May. Breeding occurs from December to early February with larvae transforming in water by late spring or early summer. Juveniles disperse from breeding sites in late spring to early summer. Limited specific information is available regarding the effects of livestock grazing on CTS, but numerous references in the Fish and Wildlife Service Determination of Threatened Status for the California Tiger Salamander (US Fish and Wildlife Service 2004) indicate possible positive effects of (sustainable) grazing on CTS. These include:

- A positive association between grazing and ground squirrel colonization
- Extension of CTS breeding pond inundation period in spring²

The Determination states:

“...sustainable grazing may benefit the California tiger salamander in several ways. Ground squirrel colonization produces burrows that are vitally important in the life cycle of the California tiger salamander, serving as shelters and aestivation sites for the terrestrial adults and juvenile salamanders (Seymour and Westphal 1994). The presence of ground squirrel burrows may be an important factor in determining whether ponds can become successful salamander breeding sites. Sustainable grazing around natural pools may also benefit the CTS by extending the inundation period (Barry, UC Davis, 2003, *in litt.*)”

Like other small animals, they are vulnerable to trampling during migration periods, and may also sensitive to excess herbaceous vegetation height (Ford and Huntsinger 2004) which could hinder their movement from November to March (adults) and March to August (juveniles). Conditions that could lead to premature drawdown of pools could degrade breeding habitat. According to Huntsinger and Ford the salamander requires access across open grasslands, thus insufficient grazing and associated grass height and shrub encroachment would reduce habitat quality.

Recommendation for Achieving CTS Goal and Objectives: Conduct cattle grazing in areas with CTS ponds, including lower Sycamore Grove Park and Brushy Peak, to encourage ground squirrel colonization, to provide burrows for CTS.

3.4 Improved Conditions for California Red-legged Frog

CRLF a federally-listed threatened species, is known to occur at Sycamore Grove Park and Brushy Peak (M. Nicholson, personal communication, 2008a). Red-legged frogs have been found in the big cattail pond at Sycamore Grove Park and in two of the five ponds at Brushy Peak. Preferred habitat consists of pools or slow water with dense overhanging vegetation. CRLFs attach their eggs to emergent vegetation and use upland grassland habitats and rodent burrows or woody litter refuges up to one mile from breeding areas during November to March (movements prior to breeding) and July to

² This may be a benefit on some sites where hydroperiod is a limiting factor for CTS; whether or not this is pertinent on LARPD lands is unknown

October (post metamorphic juvenile dispersal). During periods of movement, the frogs are vulnerable to trampling by livestock, although excess upland grass height can hinder movement during these times.

The Fish and Wildlife Service Determination of Critical Habitat for the California Red-Legged Frog (US Fish and Wildlife Service 2006) sites several reasons for conducting livestock grazing in areas with CRLF ponds:

- Ponds have been shown to silt in after being fenced off from moderate grazing.
- Grazing at low to moderate levels helps to maintain a mix of open water habitat and emergent vegetation, the type of habitat where frogs are usually found.

The Fish and Wildlife Service Recovery Plan for the Red-legged frog (U. S. Fish and Wildlife Service 2002) states:

“In such ponded habitat, grazing may help maintain habitat suitability by keeping ponds clear where they might otherwise fill in with cattails, bulrushes, and other emergent vegetation.”



Recommendation for Achieving CRLF Goal and Objective: Conduct spring grazing throughout grasslands where CRLF are known to occur, or could possibly occur, including around the cattail pond in drainage B at Upper Sycamore Grove Park, and around all other ponds. If seasonal grazing in and around ponds is not sufficient to manage cattail growth, electric fencing can be used to concentrate cattle in areas surrounding ponds for short periods until desired impact on cattails is achieved.

3.5 Fire Fuel Management

Use of seasonal livestock grazing within the Grazing Areas as a fire prevention tool is a goal of LARPD (M. Nicholson, personal communication, 2006). The influence of livestock on fire hazard is two fold. First, grazing at moderate levels has been shown to change wildfire behavior by shortening flame length, and reducing fire intensity, although it does *not* significantly reduce the risk of fire ignition (Stechman 1983).

Second, and most important for long-term fire safety, especially near urbanized areas, grazing can prevent or minimize expansion of shrublands which have much greater fuel loading and pose greater fire hazard than grasslands. High-density shrublands can be seen throughout the San Francisco Bay Area where fires have been suppressed for long periods and grazing has been reduced or removed. In particular, coyote brush (*Baccharis pilularis*), occurs over large areas of ungrazed lands. Although some coyote brush cover is desirable for wildlife habitat, and coyote brush plants provide browse protection for oak seedlings on LARPD parklands, dense shrub cover increases fuel loading. McBride (1974) found that 51 years after grazing was removed from the Berkeley hills, coyote brush density had increased dramatically. Grasslands in the Berkeley hills that are grazed are relatively free of coyote brush and other shrub species, while ungrazed grasslands in this area have been, or are rapidly being, invaded by coyote brush.

Recommendation for Achieving Fire Fuel Management Goal and Objectives: Conduct annual grazing within the Grazing Areas manage conversion of grasslands to shrublands and to control herbaceous fire fuel loads.

4.0 Grazing Guidelines for LARPD Grazing Areas

4.1 Grazing Agreement

The success of LARPD's grazing program will be largely dependent on selecting an appropriate grazing tenant and developing a good working relationship with this person. Seasonal grazing is recommended, which limits the pool of potential grazing tenants as most local cattlemen operate year around cow-calf operations. Seasonal grazing land may still be desirable, but it is often in less demand than land that is available year around. The fact that some movement of livestock, and precision grazing for medusahead management is required, adds to the responsibility incurred by the grazing tenant.

A trusting and cooperative relationship where each party understands and respects the others goals and objectives is apt to result in a positive outcome, while lack of these qualities by either party will lessen the chances for a successful grazing program. Longer-term grazing agreements (five years minimum) are more desirable to grazing tenants and encourage them to take good care of properties. Grazing fees, if charged, should be balanced with the grazing tenants on-site obligations. If fees are charged, they should be discounted in exchange for infrastructure maintenance and custom grazing. The grazing agreements should clearly spell out the obligations of both parties, grazing fees, and any other pertinent information.

A grazing tenant with the appropriate type of livestock, additional nearby land, and additional animals, thus the flexibility to adjust the grazing season and/or stocking rate based on annual forage production fluctuations is preferred.

As an alternative to LARPD entering into a grazing agreement with a livestock producer, the Alameda County Resource Conservation District (ACRCD) could potentially arrange the grazing agreement through a Memorandum of Understanding with LARPD. RCDs have successfully assisted public agencies with implementing grazing programs throughout California, as they typically have well-established relationships with local livestock producers and knowledge of ranching practices and natural resources.

If grazing fees are charged, they can be on a per-acre, per-property, or AUM basis. Charging per AUM allows the most flexibility, as stocking rates can be adjusted upward or downward depending on annual forage conditions, without resulting in under- or overcharging.

Grazing Agreement Recommendation: Contract with the ACRCD to solicit and evaluate proposals for qualified grazing tenants, select tenants, and oversee grazing agreements. Grazing fees can be used to cover RCD staff time.

4.2 Infrastructure

Certain physical improvements are needed for managing livestock grazing. Water, fencing, site access, and corrals for working and loading animals are the basic necessities.

Boundary fencing is in place at Brushy Peak, Sycamore Grove Park and Holdener Park, though some portions are in poor condition and there are gaps in fencing at Brushy Peak. The cross fence dividing Brushy Peak into two pastures is in poor condition and should be repaired or replaced. New cross fences will have to be installed at Sycamore Grove Park to separate the upper and lower portions and to delineate the Orchard Pasture and the CTS Pond Pasture if LARPD decides to have grazing in these areas. In addition, temporary electric fencing can be used as an alternative to permanent fencing for the Orchard Pasture and the CTS Pond Pasture.

Water sources are in place at Brushy Peak and Sycamore Grove Park but not at Holdener Park, meaning that Holdener Park will have to be utilized by an adjacent livestock rancher who can provide water.

Fencing. Boundary fencing is essential for keeping livestock on site; cross fencing is important for distributing and managing livestock; enclosure or exclosure fencing is used to protect resources that might be damaged by grazing or to establish controls for monitoring purposes.

Fencing should be appropriate for the species and age of livestock and site conditions; high tensile smooth-wire, barbed wire, woven wire, and electrified wire are a few of the typical types of livestock fencing. With smooth or barbed wire, strands should be spaced so that cattle cannot push their heads through, as this will cause undue pressure on the fence, shortening its life. Five or six strands of wire should be used to prevent this. Woven wire or “field fencing” is commonly used for sheep and goats as it is more effective with small animals than barbed wire. High tensile smooth wire fencing is usually electrified, and is best used on long straight runs on flat-to-gently-rolling land where few posts are needed to maximize its economy.

Boundary fencing must also be designed to meet California Food and Agricultural Code “lawful” fence requirements (see following). California law requires that livestock be kept from public roads by the person who owns or controls them:⁴

“16902. Permitting livestock on highway. A person that owns or controls the possession of any livestock shall not willfully or negligently permit any of the livestock to stray upon, or remain unaccompanied by a person in charge or control of the livestock upon, a public highway, if both sides of the highway are adjoined by property which is separated from the highway by a fence, wall, hedge, sidewalk, curb, lawn, or building.”

A livestock fence is considered “lawful” according to Chapter 7 of this same code as follows: “17121. “Lawful fence”; Wire fence; Good and substantial fence; Cattle guards. A lawful fence is any fence which is good, strong, substantial, and sufficient to prevent the ingress and egress of livestock. No wire fence is a good and substantial fence within the meaning of this article unless it has three tightly stretched barbed wires securely fastened to posts of reasonable strength, firmly set in the ground not more than one rod

⁴ California Food and Agricultural Code Division 9, Part 1, Chapter 6

apart, one of which wires shall be at least four feet above the surface of the ground. Any kind of wire or other fence of height, strength and capacity equal to or greater than the wire fence herein described is a good and substantial fence within the meaning of this article. The term "lawful fence" includes cattle guards of such width, depth, rail spacing, and construction as will effectively turn livestock." Code pertaining to electrified fencing is included in Chapter 8 of the code.

Fencing Recommendations:

- Repair and/or replace all boundary fencing with four-to five-strand barbed wire cattle fence so that it complies with California Food and Agricultural Code lawful fence requirements.
- Construct similar fencing or use temporary electric fencing to delineate the Orchard Pasture and the CTS Pond Pasture in Lower Sycamore Grove Park if these areas are grazed.
- Construct similar fencing to separate the upper and lower portions of Sycamore Grove Park.
- Repair or replace the Brushy Peak cross fence.
- Use electric ribbon fencing to keep cattle within medusahead treatment areas.

Water Sources. A livestock watering system includes the source, the distribution system, and watering locations. Water should be good quality to ensure animal health. While livestock will drink stagnant water if forced to, poor quality water can lead to health problems and can decrease water intake. Water sources should ideally be located throughout a site, as water is a livestock attractant, and well-distributed watering locations encourages even forage utilization.

The source must produce enough water, and the delivery system must be able to supply the daily needs of a herd within an hour or two because most of the animals in a pasture will seek water at the same time. Insufficient water can cause herd panic, where all livestock run to a water source at the same time for fear of not having any water left to drink. Their fears are proven out if the water source and delivery system cannot refill the trough quickly enough. With troughs that stay full all the time, animals learn to drink a few at a time, avoiding panic and the resultant quick draw down.

Livestock drinking water requirements vary with size and species of animal, and throughout the year based on air temperature and water content of forage. Ten to 12 gallons per day should be available for each animal unit (AU). Because grazing will be seasonal, livestock water sources should be able to provide adequate water through June.

Off-stream water should always be provided in pastures that include riparian areas to discourage heavy use of streams. Depending on location and type of source (well, spring, or pond) water may be gravity-fed or may require pumping through pipes to troughs. Portable water systems can be used if permanent water sources are not available on a site, although they require much more labor to set up and move, and they must be vigilantly monitored to ensure a consistent water supply.

Water Source Recommendations:

- Contract with rural water specialist or utilize services of ACRCDC and/or Natural Resources Conservation Service (NRCS) to evaluate, clean, and restore existing springs and troughs at Sycamore Grove Park and Brushy Peak. Because Holdener Park does not have an on-site water source, it should be offered as supplemental pasture to an adjacent rancher. ACRCDC/NRCS is tentatively planning on doing some water development at Sycamore Grove Park.
- If ACRCDC or a consultant determines that springs are adequate to supply additional troughs at Upper Sycamore Grove Park, establish one or two additional troughs in the southern part of this property as shown in Figure 1.
- Establish a trough on the knoll to the west of the spring that needs to be restored as shown in Figure 1.

Access and Corrals. Road access and adequate turnaround areas for livestock trucks and trailers are required for annual introduction of animals, unless an adjacent landowner becomes the grazing tenant. If livestock are trucked in, a corral and loading chute is also necessary for gathering and loading livestock. Temporary corrals can be set up, but where grazing is an ongoing practice, permanent facilities should be considered.

Access and Corral Recommendation: Once grazing tenants are selected, if livestock will be trucked in, consult with him or her about location and design of corrals, then construct appropriate facilities.

4.3 Grazing Capacity and Stocking Rate

The grazing capacity of a site, and thus the appropriate stocking rate, depend on a site's capacity to produce grassland biomass, as well as the landowner's goals for the property, which help determine how intensive grazing should be. Initial stocking rates must be estimated when grazing is newly introduced to a site or reintroduced after a long period without grazing. Monitoring over a several year period should reveal whether or not initial stocking rates are achieving the goals and objectives for the grazing program and should be adjusted as needed.

Additionally, because grassland biomass production can fluctuate tremendously between years within California's annual grasslands, average stocking rates may need to be adjusted upward or downward in years with particularly high or low grassland biomass production.

Generally, a moderate level of grazing should be maintained unless specific resources call for more or less intensive use. Rangeland researchers have defined and quantified moderate grazing. Clawson, McDougald and Duncan (1982) found that too much RDM results in a thatch, which inhibits early response of new forage growth, and that maintaining the abundance of some annual forbs⁵ requires adequate but lower amounts of RDM than grasses. They linked the idea of using broad categories to describe grazing

⁵ This indicates that excessive RDM can have a negative effect on some forb species

impact on landscape appearance and stubble height: light grazing leaves three or more inches; moderate grazing leaves two inches; and heavy grazing leaves less than two inches with areas of bare soil visible from 20 feet away, similar to the conditions resulting from the medusahead management grazing.

Grazing capacity and stocking rate can be estimated by several different methods including: use of forage production estimates for range sites identified in the USDA Soil Surveys or on-line Soil Data Mart; direct measurement methods that involve clipping and weighing of vegetation; and knowledge of present or historical stocking rates on the site, or on a similar nearby site. Specific stocking rate recommendations for Brushy Peak, Sycamore Grove Park, and the Holdener Property are included in property-specific sections of this plan.

Grazing Capacity and Stocking Rate Recommendations:

- Stock Grazing Areas at a rate that results in “moderate” grazing as described above, except in medusahead treatment areas where “heavy” grazing is desired.
- Maintain RDM in the range of approximately 850 (on flat ground) to 1,450 (on steep slopes) pounds per acre, or use a general average of 1,000 pounds per acre.
- Monitor initial stocking rates for several years to determine their suitability to each of the sites within the Grazing Areas.
- Adjust stocking rates at the beginning of each grazing season, based on yearly weather conditions and expected forage crop; make additional adjustments during the grazing season in extreme drought or high production years.
- Identify a process for adjusting stocking rates within grazing agreements.

4.4 Grazing Season

Winter and spring grazing is recommended for all three sites within the Grazing Areas in order to:

- Provide a non-grazing period during the year for native perennial grasses to recharge carbohydrate reserves.
- Minimize time that livestock are on site, so that park user interactions with livestock are minimized.
- Minimize livestock loafing in riparian areas during summer when they are most attractive.

Grazing should begin in winter and extend through late spring, until herbaceous vegetation is dry enough to prevent regrowth. Beginning grazing well before the rapid spring growth period is important so that livestock can keep up with forage production and so that grazing can effectively reduce competition by non-native annual grasses during the growing season. The exact start and end dates for grazing should be flexible, and will depend on annual weather conditions and vegetation status, but beginning in late December to early February should allow annual plants to germinate and become well-established before animals are brought on-site. Ending the grazing season after vegetation has dried sufficiently to prevent regrowth is important for effective fire fuel reduction.

Grazing for medusahead management should take place over a 10-day to two-week period in April as described in Section 3.1, Medusahead Management.

The recommended winter and spring grazing season will constrain production for either cow-calf or stocker operators, but will provide forage during the peak season for a grazing tenant that is able to operate within these seasonal limitations.

Grazing Season Recommendations:

- Graze main livestock herds from winter through late spring when uplands are dry enough to prevent re-growth, but before livestock are attracted to late season green forage in riparian areas.
- Graze medusahead herds at Sycamore Grove Park and Brushy Peak for 10 days to two weeks at the proper morphological stage (usually in April) as described in Section 3.1, Medusahead Management.

4.5 Livestock Species

Factors that determine the livestock species and class⁶ best suited to the LARPD Grazing Areas include local availability, predation potential, infrastructure needs, as well as site management goals and objectives. Management goals and objectives are important in selecting animal species and class, because different grazing animals prefer, and select for, different types of vegetation. Cattle are generally more appropriate for the Grazing Areas because there are many more local cattle ranchers than sheep ranchers, cattle are less vulnerable to coyote and wildcat predation than sheep, and existing boundary fencing is mostly barbed wire, which would not contain sheep.

Cattle of any class are appropriate for vegetation management. Although it is unusual, bulls can become aggressive and can pose a danger to humans, though dairy bulls such as Holsteins and Jerseys tend to be much more aggressive than beef breeds. Additionally, mother cows with young calves are protective and can be threatening, especially when dogs or humans approach their calves. LARPD should make a determination as to whether bulls and/or mother cows, classes associated with cow-calf operations, will be allowed in Grazing Areas.

Local stocker operators or cow-calf operators who can utilize extra spring forage would be appropriate grazing tenants.

Livestock Species Recommendation:

- Cattle are the recommended type of livestock for general grazing in the Grazing Areas and for medusahead management.

⁶ Livestock class refers to age and reproductive status, i.e. heifers, which are young female cattle that have not yet calved, are considered a class

4.6 Animal Distribution

Animal behavior, forage quality, watering locations, other livestock attractants such as mineral licks and scratching posts, and fencing influence how livestock are distributed within a site. Fairly even distribution is desirable so that some areas aren't overutilized, leaving some areas ungrazed: However, some degree of landscape patchiness is desirable.

Water developments, although they are limited by location and production of springs and ponds, should be the primary tool used to distribute livestock within Sycamore Grove Park and Brushy Peak; there is no on-site water at Holdener Park.

Animal Distribution Recommendations:

- Repair and/or develop livestock watering locations in outlying areas to encourage even livestock distribution.
- Evaluate livestock use patterns and distribution annually and place attractants in underutilized areas as needed.

4.7 Monitoring and Evaluation

Grazing monitoring is important for two general reasons: 1) to discover if grazing is being carried out according to a grazing agreement and/or a grazing plan (compliance monitoring); and 2) to determine if grazing treatments are effective in achieving desired results (effectiveness monitoring).

Compliance Monitoring. Compliance monitoring should be done to ensure that the grazing operation is being conducted consistent with grazing agreements, which should reflect recommendations in this plan, while allowing for a reasonable amount of flexibility for the grazing tenant and to accommodate changing conditions. Monitoring actual grazing uses to ensure that stocking rate, grazing season, RDM levels and other stipulations of the grazing agreements are met. Records of actual stocking rates and grazing periods should be kept so that resource responses to grazing levels can be accurately tracked.

Effectiveness Monitoring. Effectiveness monitoring should be done to ensure that grazing is achieving the desired goals and objectives.

Monitoring Plan and Methodology. A monitoring plan should be developed that details methodology for monitoring variables listed in Table 2 and Table 3. These tables provide very general information about the types of data that would be collected and analyzed if LARPD has the resources to develop a monitoring program. Monitoring results should be used to periodically review and update this Grazing Management Plan as new information becomes available. Information gathered through monitoring should be used to evaluate goals and implementation methods, and to modify the plan to improve future results.

Helpful resources for developing a monitoring plan include:

- *Monitoring Plant and Animal Populations* by Elzinga, Salzer, Willoughby, and Gibbs, published by Blackwell Science
- *California Guidelines for Residual Dry Matter (RDM) Management on Coastal and Foothill Annual Rangelands* by J. W. Bartolome, W. E. Frost, N. K. McDougald, and M. Connor, Rangeland Monitoring Series Publication 8092 University of California Division of Agriculture and Natural Resources
- *Managing Annual Grassland Residual Dry Matter* by K. Gunther and G. Hayes, available from www.wildlandsolutions.com

Table 1. Compliance monitoring for grazing agreement

Purpose	Monitoring Variables	Data Collection Methods	Success Criteria
Determine amount of RDM monitoring at end of grazing season	Biomass weight per unit area	Clip and weigh sample quadrats; visually estimate; map by weight categories as low, medium, and high	Retention of an average of 1,000 pounds per acre
Determine grazing season	Documentation of beginning and ending dates of actual grazing season	Not applicable. Simply record these dates for general grazing and medusahead management.	Is prescribed grazing season being adhered to?
Determine if stocking rate is being adhered to	Animal numbers and weights	Count animals when they are brought on-site; estimate cattle weight	Is the prescribed stocking rate being followed?

Table 2. Effectiveness monitoring variables for evaluating achievement of goals and objectives

Goals	Objectives	Monitoring Variables	Data Collection Methods	Success Criteria
Reduce areal coverage of medusahead	Reduce seed output of medusahead by using high intensity, short duration grazing	Cover of medusahead	Record areal extent of medusahead infestations with GPS each year in late spring To be determined.	Is areal coverage decreasing? Work with California Native Plant Society or other appropriate group to develop success criteria and a volunteer monitoring program.
Improve conditions for native grasses and wildflowers	Provide seasonal grazing, allow a non-grazing period each year during which native perennial grasses can develop carbohydrate reserves and recover from grazing impacts	To be determined.	Visual assessment of grass canopy height	Is seasonal grazing keeping grass canopy height at about 3 inches or less?
	Provide grazing during the rapid spring growth period to reduce the canopy height of (keeping it to about 3 inches or less), and competitive ability of, non-native annual grasses	Grass height	Visual observations absent thatch and more open grassland canopy	Is thatch absent? Do more bare areas exist within grassland canopy
Improve habitat conditions for CTS	Provide grazing to prevent thatch buildup and create small openings, exposing soil for germination and growth of small-statured wildflowers	Presence of thatch	NA – LARPD does not have resources to perform this monitoring	NA – LARPD does not have resources to perform this monitoring
Improve habitat conditions for CRLF	Provide grazing to encourage ground squirrel colonization	Ground squirrel density	Visual observation	Are both types of habitat present?
Reduce long- and short-term fire hazard	Provide partial livestock access to all ponds to provide a mix of emergent vegetation and open water Prevent brush invasion into grasslands by annual grazing	Presence of open water and emergent vegetation Cover of brush	Visual observation or cover measurements taken from aerial photos over time	Is brush invasion being prevented
	Reduce fire hazard by slowing its spread, shortening flame length, and reducing fire intensity by significantly reducing herbaceous fire fuels through annual grazing	Biomass weight per unit area (use RDM as proxy)	Same as RDM	Reduction of fire hazard not measurable, assume that reduced biomass has desired effect

Table 3. Monitoring schedule

Purpose	Monitoring Variable	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
RDM monitoring	RDM biomass weight per unit area	X											X
Document grazing season	Beginning and end dates of grazing	X			X	X			X				
Determine if stocking rate is adhered to	Animal numbers and weights				X				X				
Determine if areal cover of medusahead has decreased	Cover of medusahead							X or	X				
Determine if grass height is being kept low	Grass height				X	X	X	X	X				
Determine presence and amount of thatch	Observation							X	X				X
Determine presence of open water and emergent vegetation at CRLF ponds	Qualitative observation	X						X					
Determine brush cover for long-term fire safety	Visual observation	X											

5.0 Sycamore Grove Park

5.1 Background

Sycamore Grove Park is located in east-central unincorporated Alameda County, but within the planning area of the City of Livermore. Most of this site has not been grazed since 2001, with the most recent grazing by a herd of stockers⁷ that varied in size from about 35 to 75 head, with a grazing season of May to October (M. Nicholson, personal communication, 2007). The recently acquired former Bobba Property has been grazed within the past two years.

This 815-acre park is functionally divided into roughly equally sized upper (southern) and lower (northern) sections, with the lower section (Lower Sycamore Grove Park) receiving most of the visitor usage. Lower Sycamore Grove Park, most of which was acquired in 1974, includes Arroyo del Valle, the western sycamore (*Platanus racemosa*) grove for which the park is named, paved and unpaved trails, benches, and other visitor-serving improvements; the 73-acre Bobba Property will be added to Sycamore Grove Park in the near future. Approximately three quarters of Lower Sycamore Grove Park is wooded, with open-canopy sycamore and riparian woodland, remnant almond orchards, oaks (*Quercus douglasii*, *Q. lobata* and *Q. agrifolia*) and non-native trees including eucalyptus (*Eucalyptus* spp.). On the southwest side of the main paved trail, there are several open, grassy areas where tree cover is sparse or nonexistent.

The upper portion (Upper Sycamore Grove Park), acquired in 1998, consists of open grassland with several partially wooded drainages. The main improvements on this upper part of Sycamore Grove Park are unpaved roads, three ponds, signage, benches and perimeter fencing.

5.2 Natural Resources

The natural resources of Sycamore Grove Park are described in detail in the RMP. Natural resources that are most apt to benefit from grazing include grasslands and the federally-listed threatened CRLF and CTS as described in Section 3.0.

Livestock can damage riparian corridors by trampling stream banks and excessively grazing and browsing riparian vegetation, especially in summer when upland grasslands are dry and riparian grasslands are still green. Confining the grazing season to winter and spring, thus avoiding the time when livestock are most drawn to riparian areas, will minimize this type of damage.

5.2.1 Vegetation. Vegetation in Upper Sycamore Grove Park is open grassland with scattered woodland in drainages and isolated patches of coastal scrub. Grassland is dominated by non-native annual species, although significant stands of native grasses occur in some areas. The native forb component is depauperate, presumably due to extreme competition from non-native annual grasses. Non-native annual grass taxa that I

⁷ Stockers are young beef cattle that are generally purchased by a rancher for fattening on spring forage

identified during spring 2007 sites visits (April 18, 2007 and April 20, 2007), and that dominate grasslands in Upper Sycamore Grove Park include ripgut grass (*Bromus diandrus*), wild oat (*Avena* spp.), soft chess (*Bromus hordeaceus*), vulpia (*Vulpia* spp.), medusahead, and Italian ryegrass (*Lolium multiflorum*). These species have produced very thick thatch throughout the grassland, resulting in low plant diversity in many areas: In areas where thatch is especially thick, there is little live vegetative cover. The steepest, rockiest areas that have thin, poor soils support the greatest diversity of native forbs and grasses. In these lower nutrient areas, the annual non-native grasses are not as productive, and thus don't smother the generally less competitive native species.

Native grasses that were observed during site visits include creeping wildrye (*Leymus triticoides*), California brome (*Bromus carinatus*), purple needlegrass (*Nassella pulchra*), melic (*Melica* spp.), one-sided bluegrass (*Poa secunda* ssp. *secunda*), squirreltail (*Elymus elymoides*), and seeded in meadow barley (*Hordeum brachyantherum*). Creeping wildrye is probably the most abundant native grass here, and is found in fairly large patches, even on deep, productive soils. Some of the creeping wildrye patches appeared very chlorotic, with a burrow pattern in the foliage.

Very few native forbs were observed in Upper Sycamore Grove Park; only Ithural's spear (*Triteleia laxa*) and mule's ears (*Wyethia* sp.) were noted during the April site visits. Non-native, weedy forbs are abundant, including large patches of black mustard (*Brassica nigra*) and poison hemlock (*Conium maculatum*); various thistles including Italian thistle (*Carduus pycnocephalus*), slender flower thistle (*Carduus tenuiflorus*),



milk thistle (*Silybum marianum*) and bull thistle (*Cirsium vulgare*).

The RMP's *Table 1.1: Resources Assessment Summary – Values and Conditions of Sycamore Grove Park Resources* lists the following issues related to the grassland condition:

“Non-native annual grassland:

- Thatch buildup and overgrowth of grasses creating high-risk for wildfire
- Excessive growth reducing foraging ability for raptors and burrowing owl; impairs habitat value native plants
- Habitat value can be improved and fire risk reduced through prescribed burns, mowing, and/or managed grazing

Valley needlegrass grassland⁸

- Appears to be healthy, and may be benefiting from lack of grazing
- Native grasslands threatened by unmanaged growth of non-native grassland species
- Vegetation management to control non-natives through prescribed burns could help extend now limited range of native grasslands within park”

Field observations are consistent with this assessment, except for the assessment statements for valley needlegrass grassland. The statement that these grasslands are threatened by unmanaged growth of non-native species indicates that, as a vegetation type, it is not “healthy”.

5.2.2 Soils. Soil maps in the Soil Survey Alameda Area, California (U.S.D.A. Soil Conservation Service 1966) show Sycamore Grove Park soils to be in the Azule, Diablo, Linne, Millsholm, Positas and Shedd soil series. The 11 soil map units that comprise the site's soils are briefly described in Table 4.

⁸ The RMP documents less than three acres of this vegetation type

Table 4. Sycamore Grove soils

Soil Map Unit	General Characteristics
Upper Sycamore Grove	
AzD – Azule clay loam, 3 to 30% slopes	Well-drained clay with slowly permeable subsoil. Moderate water holding capacity and moderately deep root penetration. Moderate fertility and slight to moderate erosion hazard under cultivation.
DbD – Diablo clay, 15 to 30% slopes, eroded	Same as above, but with deep root penetration, high fertility and moderate erosion hazard under cultivation.
DbE2 – Diablo clay, 30 to 45% slopes, eroded	Except for steeper slopes, similar to above. Erosion hazard is severe.
LaE2 – Linne clay loam, 30 to 45% slopes, eroded	Well-drained with moderate permeability, moderate water holding capacity, high fertility and moderate erosion hazard under cultivation.
LcF2 – Linne clay loam, shallow, 45 to 75% slopes, eroded	Similar to above but shallower, with bedrock reaching the surface in some areas and low water holding capacity. Small areas are severely eroded and the erosion hazard is very severe.
MhE2 – Millsholm silt loam, 30 to 45% slopes, eroded	Well-drained loam with moderate permeability and low available water holding capacity, low fertility and severe erosion hazard. Root penetration is shallow.
PoF2 – Positas gravelly loam, 20 to 40% slopes, eroded	Well- to somewhat excessively drained, with slowly permeable subsoil, low available water holding capacity, low fertility and shallow root penetration. Erosion hazard is very severe.
PtB2 – Positas gravelly loam, thick surface, 2 to 10% slopes, eroded	Similar to PoF2 but with deeper root penetration, and slight to moderate erosion hazard.
SdF3 – Shedd silt loam, 45 to 75% slopes, severely eroded	Somewhat excessively drained with low water holding capacity and fertility and moderately deep to shallow root penetration. Erosion hazard is very severe.
Lower Sycamore Grove	
DaA – Danville silty clay loam, 0 to 3% slopes	Well-drained with slow permeability. Root penetration is deep, and available water holding capacity is moderate. Fertility is high and erosion hazard is moderate
Lg – Livermore gravelly loam	This unit is 20 to 40% gravel, is somewhat excessively drained, has low water holding capacity and moderate fertility. Erosion hazard is slight when cultivated.
Lm – Livermore very gravelly coarse sandy loam	Very gravelly and sandy with stones and cobbles throughout.
Rh - Riverwash	Very gravelly or stony, occurring within the riparian zone of Arroyo Valle.

5.2.3 Aquatic Features and Associated Threatened Amphibians. Aquatic features that could be effected by grazing include five drainages, referred to as A through E in the RMP; three seasonal ponds that were created to provide CTS habitat; a perennial pond in drainage B, that supports CRLF (J. Charbonneau 2008); and several seeps and springs.

While the RMP does not directly address potential grazing effects on aquatic resources, CRLF or CTS, its *Table 1.1: Resources Assessment Summary – Values and Conditions of Sycamore Grove Park Resources* states, “Breeding habitat [for CTS] is compromised by build-up of thatch in grasslands around pond...and the invasion of weedy species within the seasonal ponds, thus reducing breeding area”.

As described previously, Fish and Wildlife Service documents indicate positive responses of both CTS and CRLF habitat to livestock grazing. The Fish and Wildlife Service Determination of Threatened Status for the California Tiger Salamander (US Fish and Wildlife Service 2004) point out that grazing may beneficially affect CTS by encouraging ground squirrel colonization. The Fish and Wildlife Service Determination of Critical Habitat for the California Red-Legged Frog (US Fish and Wildlife Service 2006) documents that grazing at low to moderate levels helps to maintain a mix of open water habitat and emergent vegetation, the type of habitat where frogs are usually found: The Fish and Wildlife Service Recovery Plan for the Red-legged frog (U. S. Fish and Wildlife Service 2002) indicates benefits of grazing in helping to maintain habitat suitability by keeping ponds clear where they might otherwise fill in emergent vegetation.

Jackie Charbonneau, Ecologist for the USDA Natural Resources Conservation Service has observed that currently, cattails (*Thypha* sp.) in the perennial pond, where CRLF has been found, are very thick and may make it difficult for frogs and other animals to get in and out of the pond. A restoration project planned by LARPD and ACRCDC will remove a large quantity of the cattails in the shallower areas, leaving the deep end of the pond as a refuge for the frogs; she recommends leaving the pond accessible to livestock so they can control cattails in shallow water (J. Charbonneau 2008).

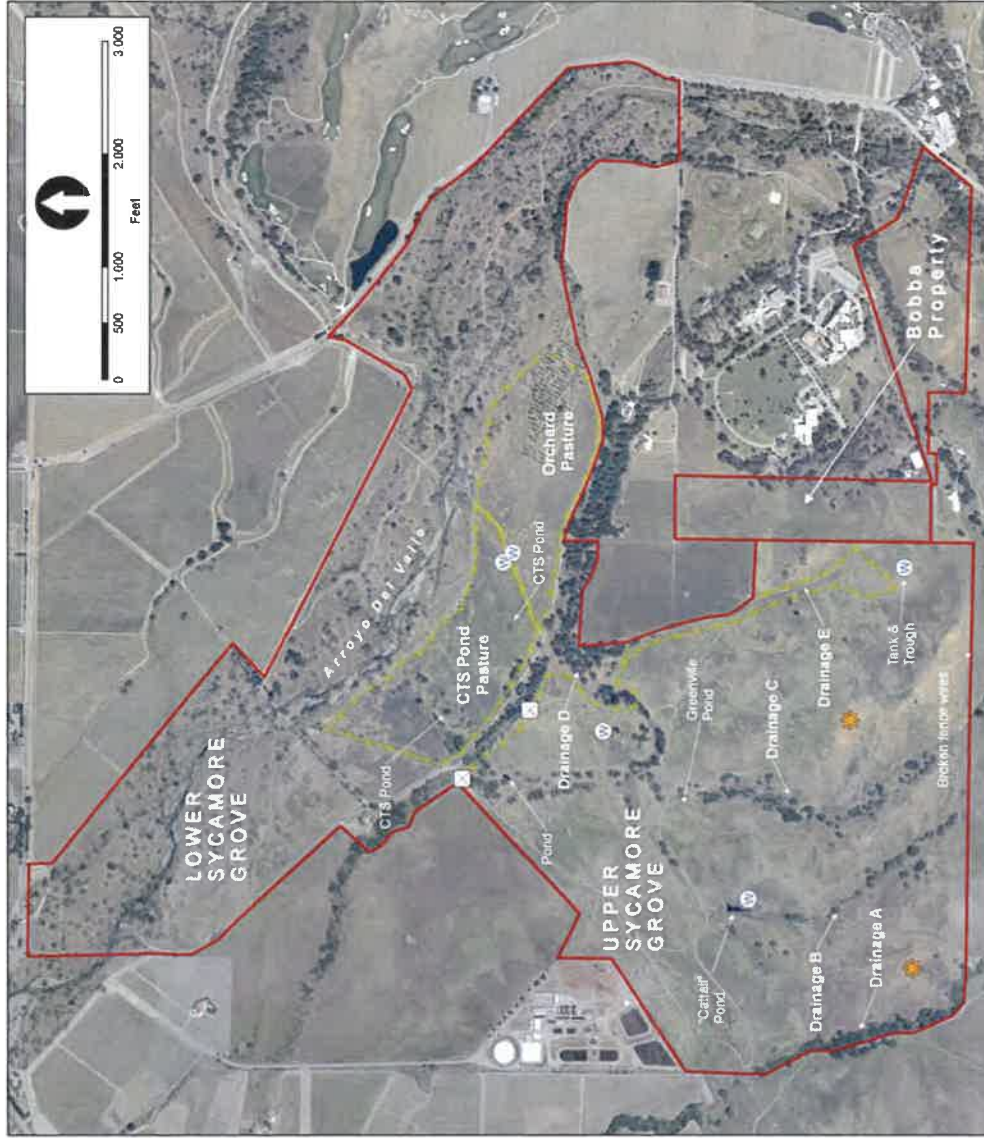
5.3 Sycamore Grove Park Grazing Recommendations

5.3.1 Infrastructure Needs for Sycamore Grove Park. As explained in Section 4.2 the following improvements should be made prior to bringing cattle on site:

- Upper Sycamore Grove Park Boundary Fencing. Repair and/or replace cattle fencing along western, eastern, and southern boundaries with six strands of barbed wire. The approximately 38-acre western section of the Bobba Property should be incorporated into the larger Lower Sycamore Grove Park pasture by removal of the fencing that separates these areas. Boundary fencing surrounding the 38-acre parcel is in functional conditions, but may need minor maintenance.
- Fencing to Divide Upper Sycamore Grove Park and Lower Sycamore Grove Park. Install new five-strand barbed wire cross fence to divide Upper and Lower Sycamore Grove Park.

- Fence Orchard Pasture and CTS Pond Pasture in Lower Sycamore Grove Park. Install five-strand barbed wire fencing or temporary electric fencing around Orchard Pasture and CTS Pond Pasture in Lower Sycamore Grove Park. Alternatively, this area can be managed by regular mowing.
- Restore Lower Spring. Restore spring near lower part of Drainage C with assistance from ACRC/D/NRCS; use spring to feeds troughs in Orchard Pasture and CTS Pond Pasture, and on hill across dirt road from spring location as shown in Figure 1.
- Install Pipeline and Troughs in Southern Part of Upper Sycamore Grove Park. If the ACRC/D/NRCS and/or a rural water specialist can locate a suitable water source, a pipeline from the source and two troughs should be installed as shown in Figure 1.
- Provide Access. If cattle are trucked in, access should be via SG100 through a staging area identified by the park manager. From there, animals can be driven to grazing areas by horseback or ATV. If an adjacent landowner becomes the grazing tenant, gates should be installed as needed to transfer livestock between properties.





- Corrals. Corrals will be needed for loading and unloading if livestock are trucked in. Once a grazing tenant is selected, permanent or temporary corrals can be constructed in an appropriate location.

5.3.2 Grazing Capacity Estimate and Stocking Rate Recommendations for Sycamore Grove Park. The grazing capacity of Upper Sycamore Grove Park was estimated using forage production values from the Soil Survey Alameda Area, California (U.S.D.A Soil Conservation Service 1966) and the NRCS On-line Soil Data Mart for Alameda County as other methods were either impractical or impossible to apply. These sources do not provide forage production estimates for Danville silty clay loam, 0 to 3% slopes (DaD) or Livermore gravelly loam (Lg), both of which occur on flat land in Lower Sycamore Grove Park.

Forage production for Livermore gravelly loam and Danville silty clay loam in Alameda County are not available, so production for Livermore gravelly loam was estimated using production values for Livermore gravelly loam in Colusa County, and adjusted upwards based on comparisons of production values for other map units in both counties. No production information is available for Danville silty clay loam, which was assumed to be similar to Livermore gravelly loam

The NRCS Soil Data Mart for Alameda County provides estimates of dryland pasture production for many soil types and range sites. Although very general and conservative⁹ these estimates summarized in Table 7 below, provide a starting point for stocking the grazable areas of Sycamore Grove Park. The Soil Data Mart provides production estimates for favorable, normal, and unfavorable years, with favorable year estimates often being twice that of unfavorable years and normal years being an average of the two extremes.

⁹ According to Leonard Jolley of the Natural Resources Conservation Service (NRCS) Resource Inventory and Assessment Division in Beltsville Maryland “[Forage] production has often been described as very conservative, in part not to mislead the producers, particularly in your volatile climate”

Table 5. Soil Survey Alameda Area and NRCS on-line Soil Data Mart range site forage production estimates for Upper Sycamore Grove Park

Soil Map Unit	Approx. Acreage ¹⁰	Normal year production in lbs./acre	Avail. forage ¹¹ in pounds/acre	Total AUMs available for site
Upper Sycamore Grove				
AzD – Azure clay loam, 3 to 30% slopes	42	2,600+	1,600	67
DbD – Diablo clay, 15 to 30% slopes, eroded	92	3,200+	2,200	202
DbE2 – Diablo clay, 30 to 45% slopes, eroded	57	3,200	2,200	126
LaE2 – Linne clay loam, 30 to 45% slopes, eroded	29	3,000	2,000	58
LcF2 – Linne clay loam, shallow, 45 to 75% slopes, eroded	8	1,000	0	0
MhE2 – Millsholm silt loam, 30 to 45% slopes, eroded	38	2,000	1,000	38
PoF2 – Positas gravelly loam, 20 to 40% slopes, eroded	48	2,500	1,500	72
PtB2 – Positas gravelly loam, thick surface, 2 to 10% slopes, eroded	84	2,500+	1,500	126
SdF3 – Shedd silt loam, 45 to 75% slopes, severely eroded	2	2,000	1,000	2
TOTAL	400	NA	NA	691

Table 6. Forage production estimates for Lower Sycamore Grove Park

Soil Map Unit	Approx. Acreage	Estimated production in lbs./acre	Avail. forage ¹² in pounds/acre	Total AUMs available for site
Lower Sycamore Grove Orchard Pasture				
Lg – Livermore gravelly loam	36	2,500	1,500	54
Lower Sycamore Grove CTS Pond Pasture				
DaA – Danville silty clay loam, 0 to 3% slopes	27	2,500	1,500	40
Lg – Livermore gravelly loam	15	2,500	1,500	22
TOTAL	78	NA	NA	116

Recommended Stocking Rate for Upper Sycamore Grove Park.

Forage production estimates based on this method project a total grazing capacity of 691AUMs¹³ for Upper Sycamore Grove Park, allowing for 1,000 pounds per acre of

¹⁰ This excludes the approximately 33-acre eastern portion of the former Bobba Property which will not be grazed

¹¹ Available forage is total production minus RDM of 1,000 pounds/acre

¹² Ibid

residual dry matter (RDM).¹⁴ This would allow 138 AUs to graze for five months. The site would support a larger number of young animals; conversions can be done using animal unit equivalents in Table 8.

Recommended Stocking Rate for Lower Sycamore Grove.

Forage production estimates based for the Orchard Pasture and the CTS Pond Pasture project a total grazing capacity of 116 AUMs, allowing for 1,000 pounds per acre of RDM. This would allow 23 AUs to graze for five months. These pastures would support a larger number of young animals; conversions can be done using animal unit equivalents in Table 4.

Carrying Capacity and Stocking Rate for Upper and Lower Sycamore Grove Park.

Combined carrying capacity for both Upper and Lower Sycamore Grove Parks is 807 AUMs, or 161 AUs for five months.

Stocking Rate Adjustments. If initial stocking rate estimates prove to be too high or too low to achieve RDM in the range of 1,000 pounds per acre and meet other desired site conditions, or if weather conditions significantly decrease or increase forage production, the stocking rate may need to be adjusted. In the case of a multi-year drought, cattle may need to be moved off of the property if RDM levels cannot be maintained. If forage production is above average for one or more years, additional cattle can be moved on-site. Stocking rate adjustments should be made in consultation with the grazing tenant at the beginning of and midway through each grazing season.

5.3.3 Grazing Season Recommendations for Sycamore Grove Park. Grazing should begin in winter, continuing through May, or until soils and grassland vegetation have dried to the point that regrowth will not occur.

5.3.4 Livestock Species Recommendations for Sycamore Grove Park. As stated in Section 4.5, cattle are the recommended species for grazing.

5.3.5 Animal Distribution Recommendations for Sycamore Grove Park. Upper Sycamore Grove Park consists of one large pasture of about 400 acres, including the western portion of the former Bobba Property, with only two cattle watering locations. An additional three water troughs are recommended, although it is not yet know if on-site sources are adequate to supply water to all of these. Supplement pots, salt licks, and scratching posts should be placed in outlying, underutilized areas, far from water sources as shown in Figure 1.

¹³ An AUM is the amount of forage consumed by one AU in a month. It can be thought of as 1,000 pounds of forage

¹⁴ I use 1,000 pounds RDM for the purpose of estimating as it is midway between recommended high and low levels

5.3.6 Recommendations for Achieving Grazing Goals and Objectives at Sycamore Grove Park

Goals and objectives and accompanying recommendations for LARPD's Grazing Areas described in Section 3.0 are all applicable to Sycamore Grove Park. In summary, these recommendations are:

Recommendations for Achieving Medusahead Management Goal and Objective:

- Implement short duration, high intensity grazing in medusahead infested areas as described above.
- Record medusahead infestations using a GPS in late spring of one year, so that portable infrastructure and treatment areas can be set up in spring of the following year.
- Determine size of treatment areas based on GPS determination of infestation size; size of treatment areas may be dictated by the number of available cattle—at about 2.6 AUs per acre for two weeks, 25 AUs would be needed to treat 10 acres, 100 AUs would be needed to treat 40 acres etc.

Recommendation for Achieving Native Grasses and Forbs Goal and Objectives: Conduct seasonal spring grazing to enhance conditions for native grasses and forbs by reducing thatch and competition by non-native annual grasses.

Recommendation for Achieving CTS Goal and Objectives: Conduct spring cattle grazing in areas with CTS ponds, including lower Sycamore Grove Park, where it may help ensure an adequate hydroperiod.

Recommendation for Achieving CRLF Goal and Objective: Conduct spring grazing throughout grasslands where CRLF are known to occur, or could possibly occur, including around the cattail pond in drainage B at Upper Sycamore Grove Park, and around all other ponds. If seasonal grazing in and around ponds is not sufficient to manage cattail growth, electric fencing can be used to concentrate cattle in areas surrounding ponds for short periods until desired impact on cattails is achieved.

Recommendation for Achieving Fire Fuel Management Goal and Objectives: Conduct annual grazing within the Grazing Areas to prevent significant conversion of grasslands to shrublands and to significantly reduce herbaceous fire fuels.

5.4 Monitoring and Evaluation

As outlined in Section 4.7, monitoring should be done to ensure that the grazing agreement is being followed (compliance monitoring) and that the grazing prescription is effective in meeting goals and objective (effectiveness monitoring).

5.5 Summary of Grazing Recommendations for Sycamore Grove Park

1. Upper Sycamore Grove Park Boundary Fencing. Repair and/or replace cattle fencing along western, eastern, and southern boundaries with six strands of barbed wire. The approximately 38-acre western section of the Bobba Property should be incorporated into the larger Lower Sycamore Grove Park pasture by removal of the fencing that separates these areas. Boundary fencing surrounding the 38-acre parcel is in functional conditions, but may need minor maintenance.
2. Fencing to Divide Upper Sycamore Grove Park and Lower Sycamore Grove Park. Install new five-strand barbed wire cross fence to divide Upper and Lower Sycamore Grove Park.
3. Fence Orchard Pasture and CTS Pond Pasture in Lower Sycamore Grove Park. Install five-strand barbed wire or temporary electric fencing around Orchard Pasture and CTS Pond Pasture in Lower Sycamore Grove Park.
4. Restore Lower Spring. Restore spring near lower part of Drainage C with assistance from ACRCDD; use spring to feeds troughs in Orchard Pasture and CTS Pond Pasture, and on hill across dirt road from spring location as shown in Figure 1.
5. Install Pipeline and Troughs in Southern Part of Upper Sycamore Grove Park. If the ACRCDD and/or a rural water specialist can locate a suitable water source, a pipeline from the source and two troughs should be installed as shown in Figure 1.
6. Provide Access. If cattle are trucked in, access should be via SG100 through a staging area identified by the park manager. From there, animals can be driven to grazing areas by horseback or ATV. If an adjacent landowner becomes the grazing tenant, gates should be installed as needed to transfer livestock from their home ranch.
7. Corrals. Corrals will be needed for loading and unloading if livestock are trucked in. Once a grazing tenant is selected, permanent or temporary corrals can be constructed in an appropriate location.
8. Initial Stocking Rate. The initial stocking rate for Upper Sycamore Grove should be 691 AUMs or 138 AUs for five months; for Lower Sycamore Grove Park in the Orchard and CTS Pond Pastures, it should be 116 AUMs or 23 AUs for five months.
9. Stocking Rate Adjustments. Initial stocking rate should be evaluated and adjusted as needed based on RDM monitoring the first year. Stocking rate adjustments for

drought or high production years should be made in consultation with the grazing tenant at the beginning of and midway through each grazing season.

10. Grazing Season. Grazing should begin in winter, continuing through May, or until soils and grassland vegetation have dried to the point that regrowth will not occur. Spring grazing will enhance conditions for native grasses and forbs, for CTS and CRLF habitat, as well as helping manage fire fuels and improve grassland conditions for park visitors.
11. Livestock Species. Cattle are the recommended species for grazing in the LARPD Grazing Areas.
12. Animal Distribution. Install additional cattle watering troughs and place supplement tubs and scratching posts as shown in Figure 1.
13. Medusahead Management. Record medusahead infestations using a GPS in late spring of one year, so that portable infrastructure and treatment areas can be set up in spring of the following year.
14. Monitoring and Evaluation. Conduct monitoring as described in Section 4.7.

6.0 Brushy Peak Regional Preserve

6.1 Background

Brushy Peak is located in northern Alameda County, just south of the Contra Costa County line. LARPD's 507 acres combine with 1,529 acres owned by the East Bay Regional Park District (EBRPD) to create the 2,036-acre Brushy Peak Regional Preserve. The EBRPD's portion of the Preserve (EBRPD Brushy Peak) is publicly accessible, while the LARPD owned portion (LARPD Brushy Peak) is only open for guided tours; LARPD Brushy Peak acreage includes fragile sandstone outcrops that may be vulnerable to vandalism if freely accessible to the public. LARPD Brushy Peak was acquired from the Walker family in 1990 and was grazed year-around by cattle for many years until Fall, 2006 when livestock were removed for vegetation inventories by EBRPD. Cattle were returned to the site in 2008.

The Brushy Peak Regional Preserve Land Use Plan (the BPP) that was prepared by EBRPD for the Brushy Peak Regional Preserve (EBRPD 2002) describes conditions and resources of the Regional Preserve and proposes public uses and resource management for the entire Preserve, including livestock grazing per a Grazing Unit Management Plan (GUMP), included as Appendix A. The GUMP includes 255 acres of LARPD Brushy Peak's 507 acres; the remaining 252 acres is referred to in the BPP as "Brushy Peak Rock Outcrop Special Protection Feature" where grazing is not recommended. This grazing plan is largely consistent with and incorporates many of the GUMP's recommendations; there are a few areas that differ, such as recommended RDM levels and inclusion of the Brushy Peak Rock Outcrop Special Protection Feature in this grazing plan.

LARPD Brushy Peak includes the northern slopes and 1,702 foot peak of Brushy Peak itself. The coast live oak trees that comprise the "brush" on Brushy Peak serve as a landmark in a vast area of open, rolling hills that support numerous wind farms and cattle ranches. Access to the site is via Vasco Road.

The following resource descriptions are based on information contained in the BPP and observations made during site visits on May 2, 2006 and August 14, 2007.

6.2 Natural Resources

6.2.1 Vegetation. LARPD Brushy Peak is dominated by open grassland, with coast live oak, California bay (*Umbellularia californica*), and California buckeye (*Aesculus californica*) woodland covering the upper peak and scattered amongst the rock outcrops. Although dominated by non-native grasses and forbs, grassland vegetation includes a significant native species component, with more, and denser patches of native grasses and forbs than Sycamore Grove or Holdener Park. Non-native grassland composition is similar to that of Sycamore Grove, but with less medusahead. Non-native grassland species grow densely on level to gently rolling slopes, giving way to a more native-rich flora on steeper, rockier slopes. Native grasses that occur in moderate abundance include purple needlegrass and California brome, with lesser amounts of one-sided bluegrass,

Junegrass, and melic. Native forbs are more prevalent at this site than at Sycamore Grove or Holdener Park and include soap plant (*Chlorogalum pomeridianum*), Ithuriel’s spear, yarrow (*Achillea millefolium*), lupine (*Lupinus* sp.), and Johnny-jump-up (*Viola pedunculata*).¹⁵ Johnny-jump-up, which occurs in a fairly extensive stand on the north to east facing slopes of Brushy Peak is the larval host plant for silverspot butterfly species (*Speyeria* spp.), some of which are federally protected, although these butterflies have not been documented on this site.

Ungrazed grassland vegetation was observed to be tall and thick, but absent the thick thatch present at Sycamore Grove Park due to the fact that cattle grazing had consistently occurred on LARPD Brushy Peak for many years until Fall of 2006.

Several weed species that have the potential to severely degrade forage quality and grassland species diversity occur on the site. Of greatest concern are the patches of medusahead observed in several locations. Other weedy species that were noted include black mustard, milk thistle, Italian thistle and bull thistle.

6.2.2 Soils. Brushy Peak soils are in the Altamont, Gaviota, Los Osos, Millsholm, and Rincon soil series with rocky outcrops classified as “Rock Land.” The eight soil map units that comprise the site’s soils are briefly described in Table 7.

Table 7. LARPD Brushy Peak soils

Soil Map Unit	General Characteristics
AaC – Altamont clay, 3 to 15% slopes	Well-drained clay with slow permeability. Moderate to high water holding capacity and deep root penetration. High fertility and slight erosion hazard.
AaD – Altamont clay, 15 to 30% slopes	Same as above, but moderate erosion hazard under cultivation.
AmE2 – Altamont clay, moderately deep, 30 to 45% slopes, eroded	Similar as above but susceptible to severe erosion, due to steepness of slopes.
AmF2 – Altamont clay, moderately deep, 45 to 75% slopes, eroded	Similar as above but erosion hazard is very severe due to steepness of slopes.
GaE2 – Gaviota rocky sandy loam, 5 to 40% slopes, eroded	Somewhat excessively drained, with very low available water holding capacity. Shallow root penetration and low fertility. Slight to severe erosion, depending on degree of slope.
LuD - Los Osos and Millsholm soils, 7 to 30% slopes	Texture is generally silt loam but ranges from loam to silty clay loam. Root penetration is moderately deep, and fertility is low to moderate. Erosion hazard is moderate.
RdB – Rincon clay loam 3 to 7% slopes	Well-drained with high available water holding capacity and very deep root penetration. Fertility is moderate and erosion hazard is slight to moderate.
RoF – Rock land	This unit consists of very steep, rocky areas. It includes rock outcrops with a thin surface layer, where erosion is “critical.”

¹⁵ See Appendix B, Plant List, to *Brushy Peak Regional Preserve Land Use Plan*, East Bay Regional Park District, June 20, 2002 for an extensive list of plants found in the area

6.2.3 Aquatic Features and Associated Threatened Amphibians. Aquatic features and resources include ephemeral and seasonal drainages; five stock ponds; two springs and an old well. Biological surveys have documented that three of the ponds support CTS and two support CRLF (M. Nicholson, personal communication, 2008a). Most of the drainages consist of swales and ephemeral or seasonal channels that do not support woody riparian vegetation, although there are several clumps of woody vegetation growing in the small channel adjacent to the entrance road. The springs feed three troughs, two of which are now dry and one that appears to be functional but needs shale around the concrete apron. All should be examined and resorted, then regularly checked and maintained.

Neither the BPP or the GUMP address livestock impacts to specific aquatic features at LARPD Brushy Peak, but effects would be similar to those described for Sycamore Grove Park, including potentially beneficial effects on CTS and CRLF habitat.

The Fish and Wildlife Service documents indicate that grazing may beneficially affect CTS by encouraging ground squirrel colonization and helping to ensure an adequate hydroperiod in CTS breeding ponds (US Fish and Wildlife Service 2004). They also document that low to moderate levels of grazing helps to maintain a mix of open water and emergent vegetation, habitat that favors red-legged frogs (US Fish and Wildlife Service 2002 and 2006): This is especially important for the shallow, westernmost pond where CRLFs have been found and that was substantially filled with cattails in August of 2007.

6.2.4 Rocky Outcrops. The BPP designates the eastern 252 acres of the property as a Brushy Peak Rock Outcrops Special Protection Feature. According to the BPP,

“The Peak, with its extraordinary views, rich bird life, and shelter offered by the sandstone outcrops drew native inhabitants of these three regions. The peak and outcrops are considered sacred to modern Native Americans and are described by one Miwok as “a big basket that holds the people, a place that makes you feel secure in a vast landscape.”

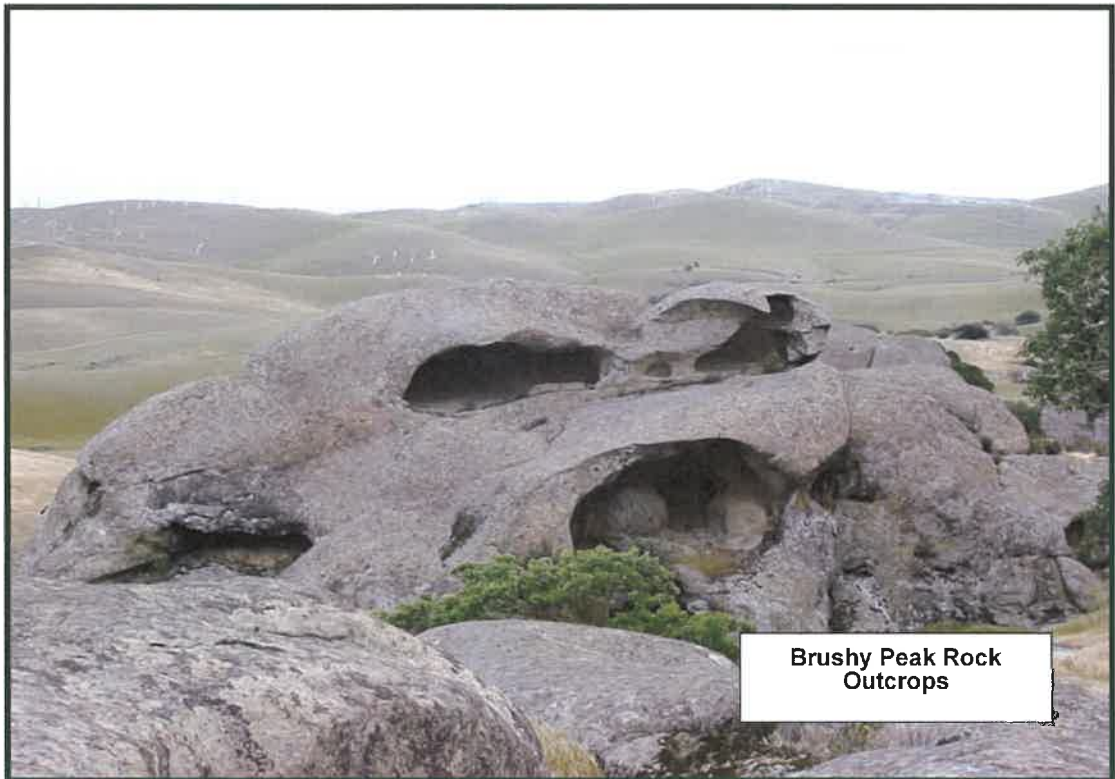
The BPP states that the sandstone outcrops provide habitat for many species of birds including nesting prairie falcons, common barn owls, ravens and rock wrens. The rocks serve as basking and escape cover for western fence lizards and are inhabited by woodrat and other rodent nests. Seasonal pools formed in the eroded surfaces of the rocks support breeding tree frogs, insects and federally endangered longhorn fairy shrimp (*Branchinecta longiantenna*). Although the outcrops may be accessible to livestock in very limited locations, evidence of cattle access to pools where shrimp live has never been seen by East Bay Regional Park District Ecological Services Coordinator Steve Bobzien, who has surveyed the outcrops numerous times (S. Bobzien, personal communication, 2008).

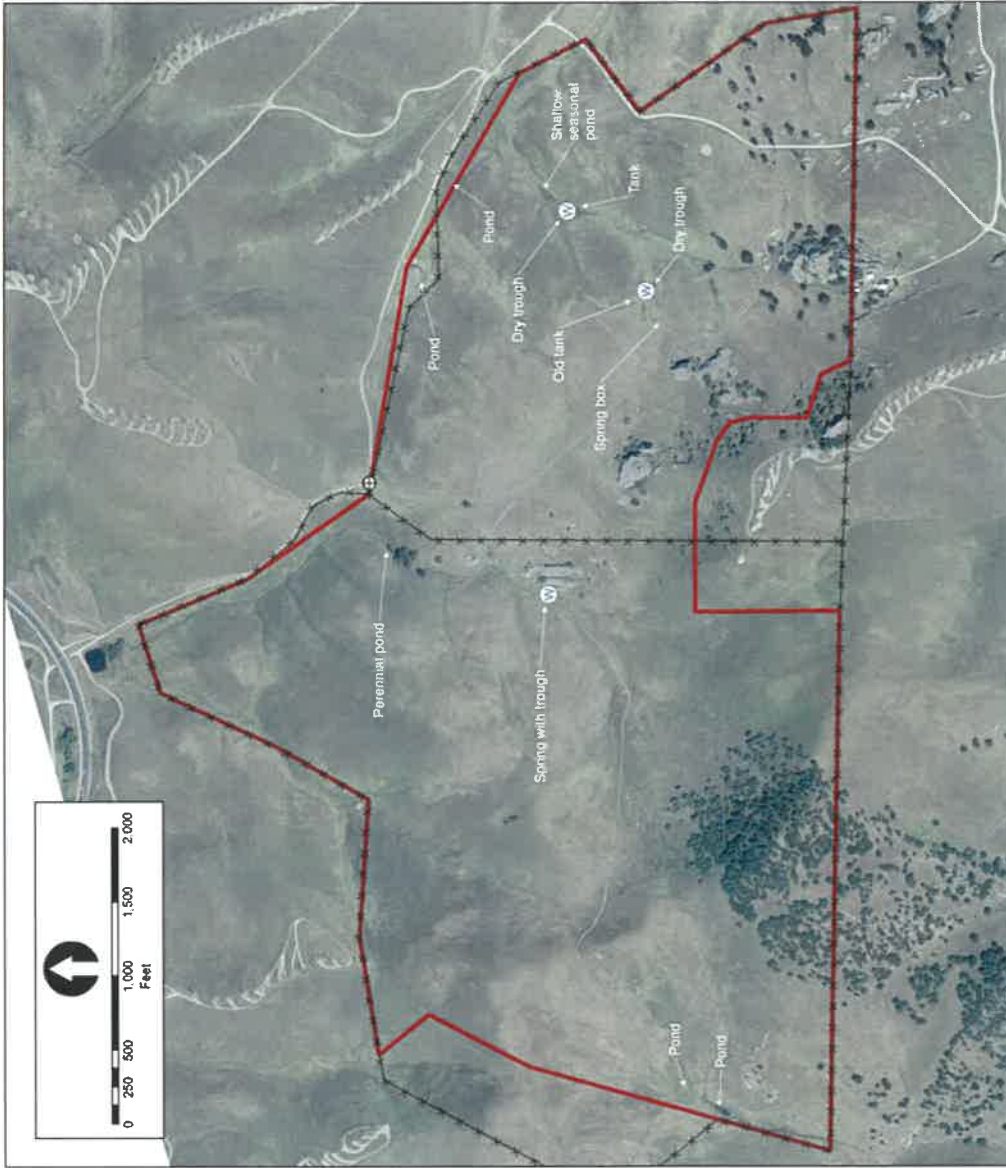
The BPP proposes that the Special Protection Feature area be open only by guided tours while the western portion would be open to the public; this implies that a fence dividing the two areas would be constructed.

6.3 Brushy Peak Grazing Recommendations

6.3.1 Infrastructure Needs for Brushy Peak. As explained in Section 4.2 the following improvements should be made prior to bringing cattle on site:

- Repair and/or Replace Brushy Peak Boundary Fencing. Repair and/or replace cattle fencing along western, eastern, northern boundaries and portions of the southern boundary of Brushy Peak. The southern boundary adjacent to EBRPD Brushy Peak is in serviceable condition but fencing is absent on a portion of the southern boundary and is in need of repair or replacement along the eastern part.
- Repair Brushy Peak Cross Fence. Repair the cross fence and gate dividing the two pastures.
- Partially Fence CRLF Ponds. Partially fence four of the five stock ponds excluding only the very shallow pond (as shown in Figure 2) to create both open water and areas of emergent vegetation for CRLF habitat.
- Install Cattle Barriers as Needed. If cattle access onto sandstone outcrops is observed, barricades similar to a sturdy split rail fence, should be constructed at specific access locations. Barriers can also be constructed to keep cattle away from archaeological resources as needed.
- Restore Springs. Restore springs and pipelines to make troughs functional.





- Rebuild Trough Apron. Rebuild concrete apron around the trough in the western part of LARPD Brushy Peak (as shown in Figure 2) or import shale and pack around apron; erosion around apron hinders cattle access to this trough.
- Provide Access. If cattle are trucked in, access should be via Vasco Road. If an adjacent landowner becomes the grazing tenant, gates should be installed as needed to transfer livestock from their home ranch.
- Corrals. Corrals will be needed for loading and unloading if livestock are trucked in. Once a grazing tenant is selected, location and corral design should be agreed on and corrals constructed.

6.3.2 Grazing Capacity Estimate and Stocking Rate Recommendations for Brushy Peak. Grazing capacity of LARPD Brushy Peak was estimated using forage production values from the Soil Survey Alameda Area, California (U.S.D.A Soil Conservation Service 1966) and the NRCS On-line Soil Data Mart for Alameda County; and known stocking rates from the adjacent EBRPD Brushy Peak.

The NRCS Soil Data Mart for Alameda County provides estimates of dryland pasture production for many soil types and range sites. Although very general and conservative, estimates summarized in Table 8 below, provide a starting point for LARPD Brushy Peak. The Soil Datamart provides production estimates for favorable, normal, and unfavorable years, with favorable year estimates often being twice that of unfavorable years and normal years being an average of the two extremes.

The most accurate grazing capacity estimation method is knowledge of actual use and evaluation of site conditions based on that use. LARPD Brushy Peak was not being grazed at the time that these grazing capacity estimates were made, so comparison of stocking rates from EBRPD Brushy Peak with Soil Survey values were used to establish an initial stocking rate.

EBRPD Brushy Peak Stocking Rates. The adjacent EBRPD Brushy Peak is grazed seasonally, from early December until mid-to late-May, depending on weather. In the 2006-07 grazing season, 339 stockers grazed on the property for 5.75 months, resulting in a stocking rate of 970 AUMs/1,080 acres. In the 2005-06 grazing season, which was a wetter year with better forage production, 1,050 AUMs were utilized (D. Amme). Averaging these two years results in a stocking rate of 1,010 AUMs/1,080 acres, or .93 AUMs/acre. Applied to Brushy Peak's 507 acres, the resultant carrying capacity is 471 AUMs.

Soil Survey Forage Production Estimates. The NRCS on-line Soil Data Mart (U.S.D.A Date) provides estimates of dryland pasture production for many soil types and range sites. Although very general and conservative these estimates summarized in Table 8 below, provide a comparison with stocking rates on EBRPD property.

Table 8. Soil Survey Alameda Area and NRCS on-line Soil Data Mart range site forage production estimates for LARPD Brushy Peak

Soil Map Unit	Approx. Acreage	Normal year production in lbs./acre	Avail. forage ¹⁶ in pounds/acre	Total AUMs available for site
AaC – Altamont clay, 3 to 15% slopes	88	3,200+	2,200	194
AaD – Altamont clay, 15 to 30% slopes	32	3,200+	2,200	70
AmE2 – Altamont clay, moderately deep, 30 to 45% slopes, eroded	24	2,200	1,200	29
AmF2 – Altamont clay, moderately deep, 45 to 75% slopes, eroded	40	2,200	1,200	48
GaE2 – Gaviota rocky sandy loam, 5 to 40% slopes, eroded	195	1,700	700	136
GaF2 – Gaviota rocky sandy loam, 40 to 75% slopes, eroded	92	1,500	500	46
LuD - Los Osos and Millsholm soils, 7 to 30% slopes	24	2,500	1,500	36
RdB – Rincon clay loam 3 to 7% slopes	4	3,000 est	2,000	8
RoF – Rock land	8	NA	0	0
TOTALS	507	NA	NA	567

Forage production values for AmE2, AmF2, GaE2 and GaF2 are based on range site production values from the Natural Resources Conservation Service on-line Soil Data Mart. Range Site classifications are not given for map units AaC, AaD, LuD and Rdb. For AaC and AaD, range site production values for Altamont clay 30 to 50 percent slopes eroded (AcF2) were used Soil Data Mart data from Solano County. This estimate may be conservative as rainfall sited for Solano County is only 10 to 14 inches. For LuD, the average production values for the Los Osos clay loam 15 to 30 percent slopes range site and the Millsholm loam 15 to 30 percent slopes range site from Contra Costa County Soil Data Mart data were used. RdB production for the approximately four acres of this map unit was estimated based on neighboring Altamont clay map units.

Recommended Stocking Rate for Brushy Peak. As shown in Table 9, the Soil Data Range Site Production Estimate is 19 percent higher than the average stocking rate on EBRPD Brushy Peak. An average of these two estimates should be used for the initial stocking rate, with adjustments made as needed. This would allow 104 AUs to graze for five months, allowing for 1,000 pounds per acre of RDM. The site would support a larger

¹⁶ Available forage is total production minus RDM of 1,000 pounds/acre

number of young animals; conversions can be done using animal unit equivalents in Table A-1.

Table 9. Comparison of grazing capacity estimation results for Brushy Peak

Method	Grazing Capacity in AUMs	Stocking Rate in AUs for 5 Months
EBRPD Brushy Peak stocking rate	471	94
Soil Data Range Site Production Estimate	567	113
Average of EBRPD and Soil Data Estimates	519	104

Stocking Rate Adjustments. If initial stocking rate estimates prove to be too high or too low to achieve RDM in the range of 1,000 pounds per acre and meet other desired site conditions, or if weather conditions significantly decrease or increase forage production, the stocking rate may need to be adjusted. In the case of a multi-year drought, cattle may need to be moved off of the property if RDM levels cannot be maintained. If forage production is above average for one or more years, additional cattle can be moved on-site. Stocking rate adjustments should be made in consultation with the grazing tenant at the beginning of and midway through each grazing season.

6.3.3 Grazing Season Recommendations for Brushy Peak. Grazing should begin in winter, continuing through May, or until soils and grassland vegetation have dried to the point that regrowth will not occur.

6.3.4 Livestock Species and Class Recommendations for Brushy Peak. As stated in Section 6, cattle are the recommended species.

6.3.5 Animal Distribution Recommendations for Brushy Peak. LARPD Brushy Peak consists of two pastures, of roughly 304 and 204 acres, each with multiple water sources. If the property is open to the public in the future, the existing cross fence should be moved to the west of the rocky outcrops as shown in the BPP. Cattle should be moved between these pastures during the grazing season, every two to three weeks, allowing regrowth in the ungrazed pasture. However, during the final grazing episode of each season, the gate should be open and the entire pasture should be grazed until vegetation and/or soils are dry enough to prevent post-grazing regrowth.

6.3.6 Recommendations for Achieving Grazing Goals and Objectives at Brushy Peak
Goals and objectives and accompanying recommendations for LARPD’s Grazing Areas described in Section 3.0 are all applicable to Brushy Peak. In summary, these recommendations are:

Recommendations for Achieving Medusahead Management Goal and Objective:

- Implement short duration, high intensity grazing in medusahead infested areas as described above.
- Record medusahead infestations using a GPS in late spring of one year, so that portable infrastructure and treatment areas can be set up in spring of the following year.

- Determine size of treatment areas based on GPS determination of infestation size; size of treatment areas may be dictated by the number of available cattle—at about 2.6 AUs per acre for two weeks, 25 AUs would be needed to treat 10 acres, 100 AUs would be needed to treat 40 acres etc.

Recommendation for Achieving Native Grasses and Forbs Goal and Objectives: Conduct seasonal spring grazing to enhance conditions for native grasses and forbs by reducing thatch and competition by non-native annual grasses.

Recommendation for Achieving CTS Goal and Objectives: Conduct spring cattle grazing in areas with CTS ponds, including Brushy Peak, where it may help ensure an adequate hydroperiod.

Recommendation for Achieving CRLF Goal and Objective: Conduct spring grazing throughout grasslands where CRLF are known to occur, or could possibly occur.

Recommendation for Achieving Fire Fuel Management Goal and Objectives: Conduct annual grazing within the Grazing Areas to prevent conversion of grasslands to shrublands and to significantly reduce herbaceous fire fuels.

6.4 Monitoring and Evaluation

As outlined in Section 4.7, monitoring should be done to ensure that the grazing agreement is being followed (compliance monitoring) and that the grazing prescription is effective in meeting goals and objective (effectiveness monitoring).

6.5 Summary of Grazing Recommendations for Brushy Peak

1. Repair and/or Replace Brushy Peak Boundary Fencing. Repair and/or replace cattle fencing along western, eastern, northern boundaries and portions of the southern boundary of Brushy Peak.
2. Repair Brushy Peak Cross Fence. Repair the cross fence and gate dividing the two pastures.
3. Partially Fence CRLF Ponds. Partially fence four of the five stock ponds excluding only the very shallow pond (as shown in Figure 2) to create both open water and areas of emergent vegetation for CRLF habitat.
4. Install Low Cattle Barriers as Needed. If cattle access onto sandstone outcrops is observed, low, log barricades, similar to a sturdy split rail fence, should be constructed at specific access locations. Barriers can also be constructed to keep cattle away from archaeological resources as needed.
5. Restore Springs. Restore springs and rebuild pipelines as needed to make troughs functional.

6. Rebuild Trough Apron. Rebuild concrete apron around trough # 1 (as shown in Figure 2) or import shale and pack around apron; erosion around apron hinders cattle access to this trough.
7. Provide Access. If cattle are trucked in, access should be via Vasco Road. If an adjacent landowner becomes the grazing tenant, gates should be installed as needed to transfer livestock from their home ranch.
8. Corrals. Corrals will be needed for loading and unloading if livestock are trucked in. Once a grazing tenant is selected, location and corral design should be agreed on and corrals constructed.
9. Initial Stocking Rate. The initial stocking rate for LARPD Brushy Peak should be 519 AUMs or 104 AUs for five months.
10. Stocking Rate Adjustments. Initial stocking rate should be evaluated and adjusted as needed based on RDM monitoring the first year. Stocking rate adjustments for drought or high production years should be made in consultation with the grazing tenant at the beginning of and midway through each grazing season.
11. Grazing Season. Grazing should begin in winter, continuing through May, or until soils and grassland vegetation have dried to the point that regrowth will not occur. Spring grazing will enhance conditions for native grasses and forbs and for CTS and CRLF habitat, as well as helping manage fire fuels.
12. Livestock Species. Cattle are the recommended species for grazing at LARPD Brushy Peak.
13. Animal Distribution. Restore spring boxes, water tanks, and piping to troughs in the eastern part of LARPD Brushy Peak as shown in Figure 2 and place supplement tubs and scratching posts in underutilized areas.
14. Medusahead Management. Record medusahead infestations using a GPS in late spring of one year, so that portable infrastructure and treatment areas can be set up in spring of the following year.
15. Monitoring and Evaluation. Conduct monitoring as described in Section 4.7.

7.0 Holdener Park

7.1 Background

Holdener Park is a 55-acre property, located within a mile north of Sycamore Grove Park in Alameda County. Holdener Park consists of open grassy hillslopes with approximately 7 acres of oak woodland abutting a steep-sided drainage in the southwest corner. There is an access road through the site that serves the California Water Service water tanks that sit within a small inholding. There is also an old road that will be used as a hiking trail; fencing at the trail's south edge will exclude livestock from the trail and from the low-gradient stream at the north end of the Park. Holdener Park is subject to a conservation easement held by the Tri-Valley Conservancy that places restrictions over this stream. The conservation easement prohibits livestock grazing within a 100-foot wide buffer from the centerline of the stream. The proposed fence will leave approximately 35 acres available for grazing, including the woodland area.

The north, east and south sides of Holdener Park adjoin lands owned by the Wente family, and the northern side abuts residential housing. Opportunities for grazing on this property are very limited as it lacks on-site water.

7.2 Natural Resources

Knowledge of Holdener Park's natural resources is limited to observations made during site visits and documentation of native forb species provided by LARPD staff member Lewis Reed (L. Reed, personal communication, 2008). Formal biological surveys have not been conducted at Holdener Park, nor has a facility master plan been prepared for this site.

7.2.1 Vegetation

Holdener park vegetation consists of non-native annual dominated grassland, similar in composition to grasslands at Sycamore Grove Park and Brushy Peak, with a 7-acre patch of woodland. In addition to non-native grasses and forbs, Lewis Reed has identified native shooting star (*Dodecatheon* sp.), larkspur (*Delphinium* sp.), and a small population of hairy gumweed (*Grindelia hirsutula*) on the steep north and west facing slopes at the North West side of Holdener Park growing among other native grassland species. Reed noted that "these have suffered from thatch accumulation following exclusion of grazing". The medusahead colony present on the was reduced by a wildfire in July 2006 (M. Nicholson, personal communication 2008b).

7.2.2 Soils. Holdener Park soils are all Positas gravelly loam in three different slope classes. Brief descriptions of these soils are presented in Table 10.

Table 10. Holdener Park soils

Soil Map Unit	General Characteristics
PoE2 – Positas gravelly loam, 20 to 40% slopes, eroded	Well- to somewhat excessively drained, with slowly permeable subsoil, low available water holding capacity, low fertility and shallow root penetration. Runoff is rapid and erosion hazard is severe.
PoF2 - Positas gravelly loam, 40 to 60% slopes, eroded	Similar to PoE2 but erosion hazard is very severe.
PtB2 – Positas gravelly loam, thick surface, 2 to 10% slopes, eroded	Similar to PoE2 and PoF2 but with deeper root penetration, and slight to moderate erosion hazard.

7.2.3 Aquatic Features. Aquatic features at Holdener Park are limited to a steep-sided wooded drainage and a lower gradient stream. There are not any currently usable ponds.

7.3 Holdener Park Grazing Recommendations

7.3.1 Infrastructure needs for Holdener Park. A cross fence should be installed as shown in Figure 3, to keep livestock within the grazing area. The grazing tenant will provide water on the adjacent ranch.

7.3.2 Grazing Capacity Estimate and Stocking Rate Recommendations for Holdener Park. Grazing capacity of Holdener Park was estimated using forage production values from the Soil Survey Alameda Area, California (U.S.D.A Soil Conservation Service 1966) and the NRCS On-line Soil Data Mart for Alameda County; and known stocking rates from the EBRPD Brushy Peak.

The NRCS Soil Data Mart for Alameda County provides estimates of dryland pasture production for many soil types and range sites. Although very general and conservative, estimates summarized in Table 11 below, provide a starting point for stocking the grazable acreage of Holdener Park. The Soil Datamart provides production estimates for favorable, normal, and unfavorable years, with favorable year estimates often being twice that of unfavorable years and normal years being an average of the two extremes.

Table 11. Alameda County Soil data range site forage production estimates for Holdener Park

Soil Map Unit	Approx. Acreage	Average production in lbs./acre	Avail. forage ¹⁷ in pounds/acre	Total AUMs available for site
PoC2 – Positas gravelly loam, 2 to 20% slopes, eroded	4	2,500+	1,500	6.5
PoE2 – Positas gravelly loam, 20 to 40% slopes, eroded	8	2,500	1,500	12
PoF2 – Positas gravelly loam, 20 to 40% slopes, eroded	23	2,500	1,500	34.5
TOTALS	35	NA	NA	53

¹⁷ Ibid

Recommended Stocking Rate for Holdener Park. As shown in Table 11, Soil Survey forage production estimates total 53 AUMs, which would allow 10 AUs to graze for five months, allowing for 1,000 pounds per acre of RDM. The site would support a larger number of young animals; conversions can be done using animal unit equivalents in Table A-1.

Stocking Rate Adjustments. If initial stocking rate estimates prove to be too high or too low to achieve RDM in the range of 1,000 pounds per acre and meet other desired site conditions, or if weather conditions significantly decrease or increase forage production, the stocking rate may need to be adjusted. In the case of a multi-year drought, cattle may need to be moved off of the property if RDM levels cannot be maintained. If forage production is above average for one or more years, additional cattle can be moved on-site. Stocking rate adjustments should be made in consultation with the grazing tenant at the beginning of and midway through each grazing season.

7.3.3 Grazing Season Recommendations for Holdener Park. Grazing should begin in winter, continuing through May, or until soils and grassland vegetation have dried to the point that regrowth will not occur.

7.3.4 Livestock Species Recommendations for Holdener Park. As stated in Section 6, cattle are the recommended species.

7.3.5 Animal Distribution Recommendations for Holdener Park. Water is a strong attractant, so livestock will tend to spend more time grazing near the neighboring ranch where water will be available. Salt licks or mineral tubs should be placed in several locations within Holdener Park that are farthest from the neighboring water source.

7.3.6 Recommendations for Achieving Grazing Goals and Objectives at Holdener Park Three of the goals and objectives and accompanying recommendations for LARPD's Grazing Areas described in Section 3.0 are applicable to Holdener Park and are listed below. Because CTS and CRLF habitat is not present at Holdener Park, goals and objectives related to these resources are not relevant to this site.

Recommendations for Achieving Medusahead Management Goal and Objective:

- Implement short duration, high intensity grazing in medusahead infested areas as described above.
- Record medusahead infestations using a GPS in late spring of one year, so that portable infrastructure and treatment areas can be set up in spring of the following year.
- Determine size of treatment areas based on GPS determination of infestation size; size of treatment areas may be dictated by the number of available cattle—at about 2.6 AUs per acre for two weeks, 25 AUs would be needed to treat 10 acres, 100 AUs would be needed to treat 40 acres etc.

Recommendation for Achieving Native Grasses and Forbs Goal and Objectives: Conduct seasonal spring grazing to enhance conditions for native grasses and forbs by reducing thatch and competition by non-native annual grasses.

Recommendation for Achieving Fire Fuel Management Goal and Objectives: Conduct annual grazing within the Grazing Areas to prevent conversion of grasslands to shrublands and to significantly reduce herbaceous fire fuels.

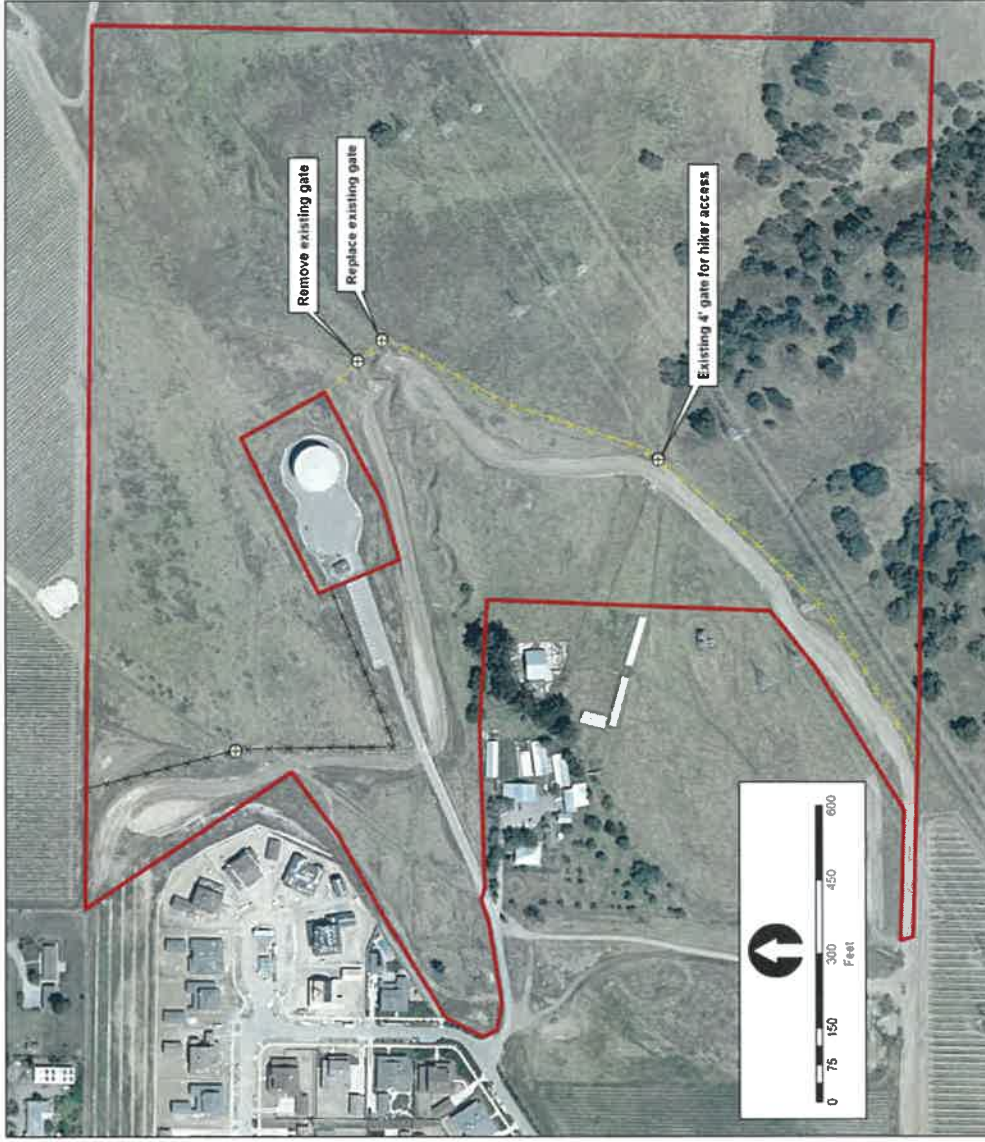


Figure 3
Holdener Park Grazing Plan Map

- ⊕ Existing Gate
- Boundary Fencing
- ▬ Existing Cross Fencing
- ⊗ Existing Cross Fencing
- ⊕ Existing Cross Fencing to be Replaced

Data Source:
City of Livermore, California
Engineering Division
Community Development Department

Note: This map is for illustrative purposes only and is not intended to be a definitive property description.

Prepared for:
Lisa Bush, CRM #18

Prepared by:
West Coast Watershed, Inc.

7.4 Monitoring and Evaluation

As outlined in Section 4.7, monitoring should be done to ensure that the grazing agreement is being followed (compliance monitoring) and that the grazing prescription is effective in meeting goals and objectives (effectiveness monitoring).

7.5 Summary of Grazing Recommendations for Holdener Park

1. Contact Adjacent Landowner. Contact the adjacent cattle rancher to inquire about their interest in grazing Holdener Park. If an agreement is reached, proceed with other recommendations.
2. Infrastructure. Construct cross fencing as shown in Figure 3 to keep livestock within the grazing area.
3. Initial Stocking Rate. The initial stocking rate for Holdener Park should be 53 AUMs or 10 AUs for five months.
4. Stocking Rate Adjustments. Initial stocking rate should be evaluated and adjusted as needed based on RDM monitoring the first year. Stocking rate adjustments for drought or high production years should be made in consultation with the grazing tenant at the beginning of and midway through each grazing season.
5. Grazing Season. Grazing should begin in winter, continuing through May, or until soils and grassland vegetation have dried to the point that regrowth will not occur. Spring grazing will enhance conditions for native grasses and forbs as well as helping manage fire fuels and improve grassland conditions for park visitors.
6. Livestock Species. Cattle are the recommended species for grazing at Holdener Park.
7. Animal Distribution. Install supplement tubs and scratching posts as far away as possible from water source on neighboring property.
8. Monitoring and Evaluation. Conduct monitoring as described in Section 4.7.

Literature Cited

- Amme, David. Written communication with author, 15 August 2007.
- Hickman, J.C. (ed.). 1993. *The Jepson Manual; Higher Plants of California*. University of California Press, Berkeley, California. 1,400 p.
- Bartolome, J.W., W.E. Frost, N.K. McDougald, and M. Connor. 2002. *California Guidelines for Residual Dry Matter (RDM) Management on Coastal and Foothill Annual Rangelands*. University of California Division of Agriculture and Natural Resources Publication 8092.
- Clawson, W., N. McDougald, and D. Duncan. 1982. *Guidelines for Residue Management on Annual Range*. University of California Division of Agricultural Science Leaflet 21327.
- C. D'Antonio et al., UC Berkeley Department of Environmental Science, Policy, and Management, "Ecology and Restoration of California Grasslands with Special Emphasis on the Influence of Fire and Grazing on Native Grassland Species," Unpublished report for David and Lucille Packard Foundation (2002)
- East Bay Regional Park District. 2002. *Brushy Peak Regional Preserve Land Use Plan*. 49 p. + appendices.
- Ford, Lawrence. 2002. *Grazing Management Plan Byron Conservation Bank*. 23pp.
- L. D. Ford and L.H. Huntsinger. 2004. "Draft Report of Science Advisors: Supplement on Rangeland Management. Solano County Habitat Conservation Plan and Natural Community Conservation Plan," page numbers.
- Hayes, G., and K. D. Holl. 2003. Cattle grazing impacts on annual forbs and vegetation composition of mesic grasslands in California. *Conservation Biology* 17:1694 - 1702.
- Marty, Jaymee. 2004. Vernal pools are home on the range. *National Wetlands Newsletter* 26(4).
- McBride, J. "Plant Succession in the Berkeley Hills, California," *Madroño* 22:3 (1974): 317-329.
- NRCS On-line Soil Datamart for Alameda County.
<http://soildatamart.nrcs.usda.gov/County>
- Stechman, J. V. 1983. Fire hazard reduction practices for annual-type grassland. *Rangelands* 5(2).
- Stechman, J. V. 1983. Fire Hazard Reduction Practices for Annual-type Grassland. *Rangelands* 5(2).

Sycamore Associates LLC. 2002. Sycamore Grove and Veterans Regional Park Resource Management Plan. 328 p. + appendices.

U. S. Fish and Wildlife Service. April 13, 2006. Part II. Endangered and Threatened Wildlife and Plants; Designation of Critical habitat for the California Red-Legged Frog, and Special Rule Exemption Associated With Final Listing for Existing Routine Ranching Activities; Final Rule. U.S. Fish and Wildlife Service, Sacramento, CA. 104 pp.

U. S. Fish and Wildlife Service. August 4, 2004. Part II. Endangered and Threatened Wildlife and Plants; Designation of Critical habitat for the California Tiger Salamander, and Special Rule Exemption Associated With Final Listing for Existing Routine Ranching Activities; Final Rule. U.S. Fish and Wildlife Service, Sacramento, CA. 38 pp.

U. S. Fish and Wildlife Service, "Recovery Plan for the California Red-legged frog (*Rana aurora draytonii*)," (Portland: U.S. Fish and Wildlife Service, 2002), page numbers.

U.S.D.A. Soil Conservation Service. 1966. Soil Survey Alameda Area, California. Washington, DC, superintendent of Documents, U.S. Government Printing Office. 95p. plus maps.

Personal Communications

Barry, Sheila. 2008. Telephone conversation between Sheila Barry, University of California Cooperative Extension, and Lisa Bush on January 22.

Bobzien. Steven. Telephone conversation between Steven Bobzien, East Bay Regional Parks District, and Lisa Bush n January 16, 2008.

Charbonnaeu, Jackie. 2008. Electronic mail correspondence from Jackie Charbonneau, Natural Resources Conservation Service, to Lisa Bush on January 10.

Doran, Morgan. 2004. Telephone conversations between Morgan Doran, University of California Cooperative Extension Range and Livestock Advisor for Napa, Solano and Yolo Counties, and Lisa Bush, 17, 21, 22 September, and 6 October 2004.

Hayes, Grey. 2006. Telephone conversation between Grey Hayes, Elkhorn Slough Foundation, and Lisa Bush on February 9.

Nicholson, Mike. 2008a. Telephone conversation between Mike Nicholson, Livermore Area Recreational and Park District, and Lisa Bush on January 16.

Nicholson, Mike. 2008b. Telephone conversation between Mike Nicholson, Livermore Area Recreational and Park District, and Lisa Bush on September 18..

Nicholson, Mike. 2007. Conversation between Mike Nicholson, Livermore Area Recreational and Park District, and Lisa Bush on April 18.

Nicholson, Mike. 2006. Conversation between Mike Nicholson, Livermore Area Recreational and Park District, and Lisa Bush on May 2.

Reed, Lewis. 2008. Electronic mail correspondence from Lewis Reed, LARPD to Lisa Bush on January 15.

Smith, Colin. 2008. Telephone conversation between Colin Smith, Point Reyes National Seashore and Lisa Bush on January 24.

Appendix A

Grazing Capacity and Stocking Rate Calculations

Grazing capacity is expressed in pounds or tons of forage produced, often described in animal unit months (AUMs). Stocking rate is expressed as animal units (AUs) per time period. Therefore, one AU can graze a pasture that produces 12 AUMs of available forage for one year or two AUMs can graze the same pasture for six months.

Available forage is the forage produced minus the amount of residual dry matter or RDM desired. On a 100-acre site that produces 3,500 pounds per acre of total forage per year, total forage production for the site would be 3,500 lbs./acre x 100 acres = 350,000 lbs. of forage or 350 AUMs (350,000 /1,000 lbs./AUM). The available forage would be the total minus RDM retained; allowing for an average of 1,000 lbs./acre of RDM, these values would be 2,500 lbs./acre x 100 acres = 250,000 lbs. of available forage for the site or 250 AUMs (250,000 /1,000 lbs./AUM).

Table A-1 provides animal unit equivalents (AUEs) for common domestic livestock, which can be used to compute stocking rates for different classes of cattle. AUs for the Grazing Areas can be calculated following these examples:

3 mature bulls=4 AUs (3 x 1.35)

35 one year old cattle=21 AUs (35 x .60)

If stockers are used, their weight gain should be factored in their AU equivalents will increase over the grazing season. Six hundred-pound animals (.4 AU) brought on site January 1st and grazing through May should weight about 840 pounds by the end of May with an average weight gain of two pounds per day per animal.

Table A-1. Animal unit equivalents (Adapted from *National Range and Pasture Handbook*, USDA Natural Resources Conservation Service Grazing Lands Technology Institute, 2003)

Animal kind and class	Animal Unit Equivalent	Monthly Forage Consumption
Cow, dry	.92	727
Cow, with calf	1.00	790
Bull, mature	1.35	1,067
Cattle, one- year-old	.60	474
Cattle, two-year-old	.80	632
Sheep, mature	.20	158
Lamb, 1 year old	.15	118