

# **DRAFT – APPENDIX J-4 RMV GRAZING MANAGEMENT PLAN**

## **CHAPTER 1**

### **1.1 Background**

This Grazing Management Plan (GMP) has been prepared to guide the management of grazing on Rancho Mission Viejo (RMV), located in southern Orange County, California. RMV has grazed cattle on its lands since 1882 and intends to continue to do so in the long term on lands which may, as part of approval of the GPA/ZC application, become dedicated as open space (RMV Open Space). As discussed later, this GMP is an integral part of the Adaptive Management Program for the proposed RMV Open Space and further implements certain key NCCP/HCP and SAMP/MSAA policies.

RMV is surrounded by the planned community of Ladera Ranch and the cities of Mission Viejo, San Juan Capistrano and San Clemente on the west. The City of Rancho Santa Margarita bounds the northern edge of RMV; the southern edge is bounded by Marine Corps Base (MCB) Camp Pendleton in San Diego County. Caspers Wilderness Park and the Cleveland National Forest bound the property on its eastern edge.

#### **1.1.1 Relationship to Southern Subregion NCCP/HCP**

As noted above, the Grazing Management Plan is a key component of the Adaptive Management Plan for the RMV Open Space and is intended to be complementary to any NCCP/HCP program completed in the future for the Southern Subregion. Implementation of an Adaptive Management Program is one of the three fundamental conservation planning principles set forth under the NCCP Conservation Guidelines. As stated in the NCCP Conservation Guidelines "...a status quo strategy of 'benign neglect' management will likely result in substantial further loss of CSS diversity..." The Guidelines concluded that habitat reserves ... should be managed in ways responsive to new information as it accrues." Although the Conservation Guidelines were directed towards coastal sage scrub (CSS) in a habitat reserve context, the same adaptive management principles apply to the diversity of vegetation communities and habitat types in protected open space such as the RMV Open Space.

**a. Draft Southern NCCP/HCP Planning Guidelines**

Section 3.3 of the Draft EIR discusses the project history including the development of Draft Southern NCCP/HCP Planning Guidelines by the NCCP/SAMP Working Group. Using the broader NCCP Tenets as a framework and starting point, the Draft Southern NCCP/HCP Planning Guidelines provide guidance for decision-makers that are keyed to local biologic, hydrologic and geomorphic conditions. Although considered a “work in progress” the guidelines represent the most current thinking regarding protection, restoration and management priorities for the resources within the study area and for this reason are discussed here. These guidelines address resources at both the landscape (watershed) and more detailed hydrologic/geomorphic sub-basin levels. For each sub-basin planning unit, the guidelines identify the important biological resources and key hydrologic/geomorphic processes. Protection, restoration and management recommendations for each sub-basin also are included.

The Draft Southern NCCP/HCP Planning Guidelines are comprised of three primary components:

- 1) NCCP Tenets outlined in the 1993 NCCP Conservation Guidelines;
- 2) Reserve Design Principles prepared by the panel of NCCP Science Advisors convened by The Nature Conservancy; and
- 3) A set of draft sub-basin specific planning recommendations prepared by the NCCP/SAMP working group.

In addition to these components the Draft Southern NCCP/HCP Planning Guidelines also set forth general policies for resource protection, management and restorations that apply at the planning (landscape) area scale. General Policy 6 of the guidelines addresses grazing management as follows:

- Cattle grazing shall be permitted within the Rancho Mission Viejo portion of the Habitat Reserve provided that grazing activities are consistent with a “grazing management plan” approved as part of the certified NCCP/HCP
- The grazing management plan (GMP) approved as part of the NCCP/HCP shall identify suitable grazing areas and allowable grazing practices that are consistent with certified NCCP/HCP policies and the aquatic resource management program. The GMP will address grazing practices following approval of the NCCP/HCP and prior to transfer of lands to the Habitat Reserve.
- The GMP will incorporate grazing management techniques designed to address the needs of species and habitat identified for protection, promote perennial grasses including native grasses, allow for continued cattle grazing sufficient to

support cattle operations and, where appropriate, reduce fuel loads for fire. (Page 3-11, Draft Southern NCCP/HCP Planning Guidelines)

The following specific grazing management recommendation is made for the Cristianitos Sub-basin and the upper and middle sub-units of the Gabino sub-basin:

- Pursuant to the GMP, implement grazing management techniques to help protect listed and other selected species and habitat, promote perennial grasses including native grasses, allow for continued cattle grazing sufficient to support cattle ranching operations, and, where appropriate reduce fuel loads for fire.

In addition, management of grazing is to be factored into the management program for sensitive plant locations in the Chiquita sub-basin, Gobernadora sub-basin, Central San Juan/Trampas sub-basin, Cristianitos sub-basin and the Gabino sub-basin as follows:

- Implement a management program for protected sensitive plant locations in the sub-basin, including control of non-native invasive species, management of grazing as part of the adaptive management program, and prevention of human disturbance

### **1.1.2 Relationship to San Juan Creek Watershed and Western San Mateo Creek Watershed SAMP/MSAA**

The Adaptive Management Program and this Grazing Management Plan are intended to be complimentary to any SAMP/MSAA program that is completed in the future, and, as such, have been structured to comply with the goals, objectives, and Tenets and Principles of the SAMP/MSAA.

#### **b. SAMP/MSAA Planning Principles Management Recommendations**

Section 3.3 of the Draft EIR discusses the project history including the development of Draft Watershed and Sub-basin Planning Principles ("Draft Watershed Planning Principles") by the NCCP/SAMP Working Group. The Draft Watershed Planning Principles provide a link between the broader SAMP/MSAA Tenets for protecting and conserving aquatic and riparian resources and known, key physical and biological resources and processes. Although considered a "work in progress" the principles represent the most current thinking regarding protection, restoration and management priorities for the resources within the study area and for this reason are discussed here.

The planning principles provide specific grazing management recommendations for Gabino sub-basin as follows:

- Protect headwaters through restoration of existing gullies using a combination of slope stabilization, grazing management, and native grassland and/or scrub restoration. To the extent feasible, restore native grasses to reduce sediment generation and promote infiltration of stormwater.
- Modify grazing management in the upper portion of the sub-basin to support restoration and vegetation management in the headwater areas.

## **1.2 Purpose of the Grazing Management Plan**

Grazing management policies are under review in numerous government agencies. A common thread in the review of policies and ongoing discussion about grazing management is the recognition of its importance to the ecology of our grasslands. According to Menke (1996), herbivory and fire are natural and necessary processes, which remove litter, recycle nutrients, stimulate tillering and reduce seedbanks of competitive annual plants. Recognition that grazing is important to the evolved ecology of grasslands, however, as Edwards (1992) notes, is not license to use it indiscriminately; nor is understanding that grazing is not always needed license to eliminate it in advance of analyzing site-specific needs.

The purposes of this GMP are to: (1) demonstrate consistency with the Draft Southern NCCP/HCP Planning Guidelines and the Draft Watershed Planning Principles regarding grazing management (see above); and (2) contribute an important element of the long term Adaptive Management Program (AMP) goals of enhancement/restoration of native habitats. The GMP will address grazing practices following approval of the Southern NCCP/HCP and prior to transfer of lands to the Habitat Reserve and practices following transfer of lands into the Habitat Reserve.

## **1.3 Participants in the Grazing Management Plan**

Participants in the development of this plan included Rancho Mission Viejo, USFWS, CDFG, USACE and the County of Orange. Consultant support was provided by Rod Meade NCCP/SAMP consultant, Bill Boyd Esq., Phil Behrends of Dudek & Associates, Inc., and Huitt Zollars.



## **CHAPTER 2: EXISTING CONDITIONS**

The following descriptions of the existing setting are provided to familiarize the reader with the climate, geomorphology and vegetation communities of RMV. An understanding of the factors which influence where, when and how grazing is conducted is vital to the development of a successful grazing management plan.

### **2.1 Biological Setting**

RMV is located within the San Juan Creek watershed and the western portion of the San Mateo Watershed.

#### **2.1.1 Climate**

The Mediterranean Climate in Southern California is characterized by brief, intense storms between November and March. It is not unusual for a majority of the annual precipitation to fall during a few storms in close proximity to each other. Average annual rainfall on Rancho Mission Viejo resulting from this Mediterranean precipitation pattern is 12 to 16 inches. The higher elevation portion of the watershed (typically the headwater areas) typically receive significantly greater precipitation due to orographic effects. In addition, rainfall patterns are subject to extreme variations from year to year and longer term wet and dry cycles. The combination of steep, short watersheds; brief intense storms; and extreme temporal variability result in "flashy" systems where stream discharge can vary by several orders of magnitude over very short periods of time.

Wet and dry cycles, typically lasting up to 15 to 20 years, are characteristic of southern California. The region presently appears to be emerging from a wetter-than-normal cycle of years beginning in 1993. Previously, five consecutive years of sub-normal rainfall and runoff occurred in 1987 through 1991.

Prior droughts of recent note include the brief, 'hard' drought of 1976 and 1977, and 1946 to 1951. Previous notable wet periods of the recent past were observed in 1937 to 1944 and 1978 to 1983. An unusually protracted sequence of generally dry years began in 1945 and continued through 1977. During this period, rainfall was approximately 25 percent below the average for the prior 70 years (Reichard, 1979; Lang et al., 1998). Both recharge and (especially) sediment transport were diminished to even greater degrees during this period. Although wet years did occur during this period, dry conditions were sufficiently persistent to lower groundwater levels and contract the extent of riparian corridors.

## **2.1.2 Geomorphology**

### **a. Regional Geology**

The San Juan and San Mateo creek watersheds are located on the western slopes of the Santa Ana Mountains, which are part of the Peninsular Ranges that extend from the tip of Baja California northward to the Palos Verdes Peninsula and Santa Catalina Island. The geology of the region is complex and has been dominated by alternating periods of depression and uplift, mass wasting, and sediment deposition. Within the watersheds, the Santa Ana Mountains are composed of igneous, metavolcanic, and metasedimentary rocks of Jurassic age and younger. The exposed rocks in the mountainous areas are slightly metamorphosed volcanics, which have been intruded by granitic rocks of Cretaceous age, principally granites, gabbros, and tonalites. Overlying these rocks are several thousand stratigraphic feet of younger sandstones, siltstones, and conglomerates of upper Cretaceous age, composed largely of material eroded from the older igneous and metavolcanic rocks now underlying the Santa Ana Mountains.

Younger sedimentary rocks comprise the bedrock between the Santa Ana Mountains, their foothills, and the Pacific Ocean. Most of the study area is underlain by these marine and non-marine sandstones, limestones, siltstones, mudstones, shales, and conglomerates, many of which weather, erode, and/or hold groundwater in characteristic ways. Overlying them are Quaternary stream terrace deposits and Holocene stream channel deposits. During the past two million years or longer, at least three processes that fundamentally affect structure and process along the major stream channels have affected the two watersheds:

1. Continuing uplift, typically 400 feet or more, which has left at least four major stream terrace levels along the major streams.
2. Downcutting of the main canyons to sea levels, which have fluctuated widely during the global glaciations. The flat valley floors were deposited as sea level rose, leaving often-sharp slope breaks at the base of the existing hillsides and tributary valleys. These materials are geologically young, soft, and prone to incision under certain conditions.
3. Soils formed under climates both warmer/colder and drier/wetter than at present, which led to development of hardpans that have been eroded to form mesas. These hardpan mesas have minimal infiltration and presently channel flows into headwater streams.

## **b. Terrains**

Terrain designations are largely based on soils, geology and topography, as these provide many of the fundamental factors that influence the hydrology and geomorphology characteristic of each terrain. Bedrock is the raw material from which soils are weathered, and, as such, it determines the size and types of particles that will comprise the soil. The resistance of different kinds of bedrock to weathering and erosion also controls the topography of the landscape within a given terrain and, therefore, influences the hydrology of the watersheds and morphology of the drainage networks. Watershed hydrology is also strongly influenced by the climatic patterns typical of Southern California.

There are three major geomorphic terrains found within the San Juan Creek and San Mateo Creek watersheds: (1) sandy and silty-sandy; (2) clayey; and (3) crystalline. These terrains are manifested primarily as roughly north-south oriented bands of different soil types. The soils and bedrock that comprise the western portions of the San Juan Creek watershed (*i.e.*, Oso Creek, Arroyo Trabuco, and the lower third of San Juan Creek) contain a high percentage of clays in the soils. The soils typical of the clayey terrain include the Alo and Bosanko clays on upland slopes and the Sorrento and Mocho loams in floodplain areas. In contrast, the middle portion of the San Juan basin, (*i.e.*, Cañada Chiquita, Bell Canyon, and the middle reaches of San Juan Creek) is a region characterized by silty-sandy substrate that features the Cieneba, Anaheim, and Soper loams on the hill slopes and the Metz and San Emigdio loams on the floodplains. The upstream portions the San Juan Creek watershed, which comprise the headwaters of San Juan Creek, Lucas Canyon Creek, Bell Creek, and Trabuco Creek, may be characterized as a “crystalline” terrain because the bedrock underlying this mountainous region is composed of igneous and metamorphic rocks. Here, slopes are covered by the Friant, Exchequer, and Cieneba soils, while stream valleys contain deposits of rock and cobbly sand. The upland slopes east of both Chiquita and Gobernadora canyons are unique in that they contain somewhat of a hybrid terrain. Although underlain by deep sandy substrates, these areas are locally overlain by between 2 and 6 feet of exhumed hardpan.

### **2.1.3 Vegetation Community Description**

The following descriptions of vegetation communities are taken from the NCCP vegetation database. *Appendix A* contains a general description of the vegetation communities discussed more specifically here for RMV. The reader is also referred to the Draft EIR for a full description of the NCCP vegetation database, its sources and the history of its development.

## **a. Grasslands on Rancho Mission Viejo**

The NCCP/HCP vegetation database for RMV does not distinguish between annual and native grasslands. However, several individual mapping efforts have been conducted in various areas of RMV, which allows for a general characterization of the annual and native grasslands.

### **1. Annual Grasslands**

Annual grasslands on RMV are dominated by bromes (*Bromus madritensis*, *Bromus diandrus*, *Bromus hordaceus*), wild oats (*Avena barbata*, *Avena fatua*), rat-tail fescue, barleys (*Hordeum* spp.) and Italian ryegrass (e.g., Gray and Bramlet 1992; MBA 1996; Dudek 2001). Annual forbs common to non-native grasslands in the RMV include Indian milkweed (*Asclepias eriocarpa*), tocalote, common fiddleneck (*Amsinckia menziesii*), popcornflower (*Plagiobothrys* spp.), black mustard (*Brassica nigra*), field mustard (*Brassica rapa*), common catchfly, stickwort (*Spergularia arvensis*), miniature lupine (*Lupinus bicolor*), white-whorl lupine (*Lupinus densiflorus* var. *austocollum*), burclover (*Medicago polymorpha*), bristled clover (*Trifolium hirtum*), red-stemmed filaree, white-stemmed filaree (*Erodium moschatum*), and fluellin (*Kickia spurria*) (MBA 1996). Tarweeds and doveweed become dominant in later summer and fall (MBA 1996). Cardoon also occurs in portions of the grasslands on RMV. .

Gray and Bramlet (1992) also describe a ruderal grassland that consists of early successional grassland dominated by pioneering herbaceous species of several genera such as *Centaurea*, *Brassica*, *Malva*, *Salsola*, *Eremocarpus*, *Amaranthus* and *Atriplex*.

### **2. Native Grasslands**

Native grasslands on RMV are designated as Valley needlegrass grassland (called southern coastal needlegrass grassland by Gray and Bramlet). Gray and Bramlet define needlegrass grassland as a grassland with more than 10 percent cover of purple needlegrass (*Nassella pulchra*). It is associated with the annual grasses listed above, leafy bentgrass (*Agrostis pallens*), junegrass (*Koeleria macrantha*), cane bluestem (*Bothriochloa barbiodis*), coast range melic (*Melica imperfecta*) and annual forbs such as common goldenstar (*Bloomeria crocea*), blue dicks, Cleveland's goldenstar (*Dodecatheon clevelandii*), smooth cat's-ear (*Hypochaeris glabra*), lilac mariposa lily (*Calochortus splendens*), many-stemmed dudleya (*Dudleya multicaulis*), blue-eyed grass (*Sisyrinchium bellum*) and rosin weed (*Calycadenia truncata*) (Gray and Bramlet 1992; Dudek 2001; MBA 1996).

### **3. Distribution of Grasslands on Rancho Mission Viejo**

Grasslands are scattered throughout the lower elevations of the Ranch, with the largest, contiguous concentration in the south Ranch. Other areas supporting large patches of grassland include Chiquita Ridge, Ladera Open Space, Cristianitos Canyon, the TRW lease area, and upper Gabino Canyon.

Although annual and native grasslands are not differentiated in the NCCP vegetation database, some survey work was done on RMV by St. John in 1989 (St. John 1990) and later mapping in specific areas has been completed by Dudek (1997, 2001) and MBA (1996). Generally, native grasslands are patchy north of Highway 74, with patches occurring in Ladera Open Space east of Arroyo Trabuco (Dudek 2001) and Chiquita Canyon (St. John 1990; Dudek 1997; MBA 1996). Much of the native grassland on RMV is located in the southern San Juan and San Mateo watersheds in upper Gabino Canyon (St. John 1990; Dudek 2001), Verdugo Canyon (St. John 1990), and Cristianitos Canyon (St. John 1990; MBA 1996; Dudek 1990). St. John made a preliminary estimate of approximately 3,300 to 4,000 acres of native grassland on RMV property, but based on the Dudek's refined mapping of native grasslands, the total appears to be closer to 1,100 acres. Major areas of native grassland include Cristianitos Canyon (~405 acres) and upper Gabino Canyon (276 acres), with smaller areas of native grassland in Blind Canyon (102 acres) and middle and lower Chiquita Canyon (76 acres). There are likely to be several smaller patches of unmapped native grassland scattered throughout the RMV, but individual patches are unlikely to be more than a few 10s of acres in size. The cumulative total of these unmapped areas is likely to be no more than a few hundred acres.

#### **b. Coastal Sage Scrub Communities on Rancho Mission Viejo**

Coastal sage scrub is dominated by a characteristic suite of low-statured, aromatic, drought-deciduous shrubs and subshrub species. Composition varies substantially depending on physical circumstances and the successional status of the habitat. Characteristic species include California sagebrush (*Artemisia californica*), California buckwheat (*Eriogonum fasciculatum*), laurel sumac (*Malosma laurina*), California encelia (*Encelia californica*), and several species of sage (e.g., *Salvia mellifera*, *Salvia apiana*) (Holland 1986; Sawyer and Keeler-Wolf 1995). Other common species include brittlebush (*Encelia farinosa*), lemonadeberry (*Rhus integrifolia*), sugarbush (*Rhus ovata*), yellow bush penstemon (*Keckiella antirrhinoides*), Mexican elderberry (*Sambucus mexicana*), sweetbush (*Bebbia juncea*), boxthorn (*Lycium* spp.), prickly-pear (*Opuntia littoralis*), coastal cholla (*Opuntia prolifer*), tall prickly-pear (*Opuntia oricola*), and several species of *Dudleya*. Sage scrub often is patchily distributed throughout its range (O'Leary 1990). Over a scale of several miles, it can be found in diverse habitat mosaics with other plant communities, particularly grassland and chaparral, and oak/riparian woodland in more mesic areas. Coastal sage scrub may convert to chaparral or grassland, depending on slope, aspect, climate, fire

history, and other physical factors and biological phenomena. Conversely, chaparral or grassland areas may convert to coastal sage scrub (Axelrod 1978; White 1995; O'Leary 1995; Allen *et al.* 1999).

Coastal sage scrub typically is found on xeric sites, notably steep, south-facing slopes with thin and/or rocky soils. It also is found on exposed sea bluffs, coastal and river terraces composed of coarse alluvial outwash, and coastal dunes (Axelrod 1978). The more open nature of the canopy permits persistence of a diverse herbaceous component of forbs, grasses, and succulents in mature stands than usually is associated with chaparral. It often is mixed with chaparral and grassland communities and the distinct boundaries between each can sometimes be difficult to delineate.

Gray and Bramlet (1992) proposed a complex and highly detailed classification system, modified from Holland (1986), for use in mapping vegetation types in Orange County, California. Within "scrub" habitats, Gray and Bramlet (1992) identified eight major subtypes: (1) southern coastal bluff scrub; (2) maritime succulent scrub; (3) Venturan-Diegan transitional coastal sage scrub; (4) southern cactus scrub; (5) Riversidean coastal sage scrub; (6) floodplain sage scrub; (7) chenopod scrub; and (8) sage scrub-grassland ecotone. Within the Venturan-Diegan transitional coastal sage scrub subtype, 12 distinct subassociations were identified based on the dominant species. Within the sage scrub-grassland ecotone subtype, five distinct subassociations were identified based on the same criterion. For a description of these subassociations the reader is referred to the Southern NCCP/HCP.

"Scrub" as defined for RMV, roughly corresponds to Holland's (1986) descriptions of Venturan-Diegan coastal sage scrub (a transitional community containing elements of two major types described by Holland), southern coastal bluff scrub, and Riversidean coastal sage scrub. In RMV, scrub is a more or less open community composed of low, drought deciduous shrubs, with a sparse understory of annual and perennial grasses and forbs.

### **c. Riparian Vegetation on Rancho Mission Viejo**

Eight distinct associations of riparian vegetation are included in the vegetation database for the RMV study area (*Table 2*).<sup>1</sup> In order of their prevalence in the study area, they are coast live oak riparian forest, willow riparian scrub (southern willow scrub), sycamore riparian woodland, southern arroyo willow riparian forest, herbaceous riparian, mule fat scrub, white alder riparian,

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<sup>1</sup> The riparian and wetland habitat acreages are based on the 1993 NCCP vegetation database and provide a general characterization of the study area. This original mapping was based on aerial photo interpretation and field checking, but was not performed using the USACE and CDFG formal criteria for jurisdictional waters of the U.S./State, including wetlands. Formal USACE/CDFG delineations have been performed by GLA and confirmed by the USACE and CDFG [pending?]. The location and acreage information for riparian and wetland habitats based on this refined work is used to assess impacts, make significance findings, and identify appropriate mitigation.

and cottonwood-willow riparian forest. The descriptions of these riparian communities primarily are based on Gray and Bramlet (1992) and MBA (1996).

Riparian communities typically consist of one or more deciduous tree species with an assorted understory of shrubs and herbs (Holland and Keil 1995). The transition between riparian habitats and adjacent non-riparian habitats often is abrupt (Grenfell 1988). Vegetation height can vary from three to ten feet in scrub habitats to 100 feet in riparian forest habitats (Grenfell 1988). Riparian habitats generally occur among mid- to large-order streams below about 4,000 feet above msl, primarily within the foothills and valleys (Stephenson and Calcarone 1999). Riparian communities are not restricted to specific climates or soil types, but are primarily dependent on a permanent supply of water. In southern California, most streams have very low flow during the summer, and in many cases surface flow may dry up (Stephenson and Calcarone 1999).

Riparian communities are dynamic systems. The stream channels may be swept clean of vegetation during floods as sediments are shifted during erosion flood events. Some have deep root systems that anchor them against the floodwaters and some have flexible stems that bend with floodwaters.

In addition to riparian communities, RMV supports several distinct wetland communities, including open water, freshwater marsh, water courses, and vernal pools, which support their own unique plants and wildlife and contribute additional biodiversity and ecological functions.

#### **d. Woodlands and Forest on Rancho Mission Viejo**

Oak woodlands consist of multilayered vegetation with a canopy that is 20 to 80 percent tree cover (Gray and Bramlet 1992). Oak woodlands occur throughout the lower elevations of western California, generally from sea level to 4,900 feet (Holland and Keil 1995). Oak forests are similar to oak woodlands, but have 80 percent or more canopy cover (Gray and Bramlet 1992).

Thorne (1976) distinguishes between northern, foothill, southern, and island oak communities in California. Southern and coastal woodlands, including coast live oak woodland found in the RMV, extend from eastern Mendocino County at 40° N latitude through the North Coast, Central Coast, and Transverse ranges on north-facing and coast-facing slopes and in canyons below 3,900 feet (Barbour and Minnich 2000). The range continues through the interior valleys and foothill slopes of the Peninsular ranges, mainly between 500 and 4,600 feet, and south to the Sierra San Pedro Martir at 30° N latitude in Baja California, Mexico (Barbour and Minnich 2000). According to Munz and Keck (1949), the southern oak woodlands are found in the valleys of southern California between Los Angeles and San Diego counties east to about 5,000 feet in the San Jacinto Mountains of western Riverside County. According to Holland and Keil (1995), coast live oak woodlands range from Sonoma County to Baja California, generally in mesic areas including canyon bottoms and north-facing slopes, whereas southern oak woodlands extend

from Ventura County southward. This roughly corresponds with Griffin (1977) who distinguishes oak woodlands from the Santa Ynez Mountains of Santa Barbara County southward as southern oak woodland.

Generally, oak woodlands are open where moisture is limited in drier more exposed aspects, and densest in moist areas (Holland and Keil 1995). North-facing slope occurrences are also denser than south-facing slope occurrences (Holland and Keil 1995). Average annual rainfall of areas supporting oak woodlands is between 15 and 25 inches. Runoff tends to be rapid. The growing season is seven to 10 months (Munz and Keck 1949). Oak trees, in general, require 60 to 80 years to mature (Holland 1988).

Common soils that support coast live oak include sandstone and shale-derived soils (Sawyer and Keeler-Wolf 1995). Coast live oak typically occupies slopes with deep soils, alluvial terraces, and the recent alluvium of canyon bottoms (Griffin 1977; Brown 1982). Open woodlands form when soils are shallow (Holland and Keil 1995).

Canyon live oak forest is similar in composition to coast live oak forest, but is dominated by canyon live oak.

Many understory shrubs in woodlands and forest are shade tolerant and include scrub oak (*Quercus berberidifolia*), California blackberry, snowberry (*Symphoricarpos mollis*), California walnut (*Juglans californica*), California-lilac (*Ceanothus* spp.), laurel sumac, gooseberry, toyon, California laurel, manzanita (*Arctostaphylos* spp.), poison-oak, Mexican elderberry, mountain-mahogany, sugarbush (*Rhus ovata*), big-leaf maple and white alder. Herbaceous understory species include California goldenrod (*Solidago californica*), western wild rye (*Elymus glaucus*), giant ryegrass, *Melica* spp., *Stellaria* spp., *Claytonia* spp., ripgut grass, wild cucumber, nightshade, *Phacelia* spp., and common eucrypta (*Eucrypta chrysanthemifolia*) (Gray and Bramlet 1992).

Live oak forest primarily occurs on the Donna O'Neill Land Conservancy, at the head of Cristianitos Creek, on the northern slopes of Blind Canyon, and in small patches in lower Chiquita Canyon and east of Cañada Gobernadora.

#### **e. Chaparral Communities on Rancho Mission Viejo**

Gray and Bramlet (1992) identify several scrub-chaparral ecotone/sere and chaparral subassociations in the Orange County. These subassociations generally are self-descriptive by their titles. The scrub-chaparral ecotone/sere subassociations are characterized gradations between scrub and chaparral vegetation communities. Two scrub-chaparral ecotone/sere subassociations known from the RMV are chamise-sage scrub and maritime chaparral-



sagebrush, the former dominated by chamise and California sagebrush and the latter dominated by lemonadeberry, laurel sumac, and toyon. Chaparral subassociations known from the RMV include southern mixed chaparral, chamise chaparral, scrub oak chaparral, toyon-sumac chaparral, snowball ceanothus chaparral, and manzanita chaparral.

**TABLE 1**  
**VEGETATION COMMUNITIES/LAND COVERS**  
**IN THE STUDY AREA**

<b>Vegetation Community/Land Cover<sup>1</sup></b>	<b>Acres</b>
<b><i>Natural Habitats</i></b>	
Grassland	5,040.9
Coastal Sage Scrub	7,682.0
Riparian <sup>2</sup>	1,919.7
Open Water	135.7
Freshwater Marsh	25.2
Slope Wetland	2.2
Watercourses	13.2
Vernal Pools	19.9
Woodland	275.9
Forest	311.9
Chaparral	3,792.9
Cliff and Rock	6.2
<b>Subtotal – Natural Habitats</b>	<b>1,9225.7</b>
<b><i>Non-habitat Land Covers</i></b>	
Developed	534.7
Disturbed	501.2
Agriculture	2554.8
<b>Sub-total – Non-Habitat Land Covers</b>	<b>3,590.7</b>
<b>TOTAL</b>	<b>22,816.4</b>
<sup>1</sup> Source: Southern NCCP/HCP Vegetation Database (1993), as revised by Dudek in 2004 (file date 3/24/04).	
<sup>2</sup> See Table 2 for a breakdown of specific riparian vegetation communities.	

**TABLE 2**  
**RIPARIAN VEGETATION COMMUNITIES IN THE STUDY AREA**

<b>Riparian Community<sup>1</sup></b>	<b>Acres<sup>2</sup></b>
Herbaceous Riparian	17.2
Willow Riparian Scrub (Southern Willow Scrub)	357.5
Southern Arroyo Willow Riparian Forest	168.1
Coast Live Oak Riparian Forest	1,116.2
Cottonwood—Willow Riparian Forest	1.2
Sycamore Riparian Woodland	246.9
White Alder Riparian Forest	1.6
Mule Fat Scrub	11.0
<b>TOTAL</b>	<b>1,919.7</b>
<sup>1</sup> Source: Southern NCCP/HCP Vegetation Database (1993), as revised by Dudek in 2004 (file date 3/24/04).	
<sup>2</sup> Acres not representative of USACE or CDFG jurisdiction, see Tables 4.9-5 and 4.9-6 of EIR for USACE and CDFG jurisdiction.	

#### **2.1.4 Sensitive Species**

The following are summary descriptions of listed and non-listed sensitive species which may benefit from this GMP. For a complete species account for these species, the reader is referred to Biological Resources Section of the EIR.

##### **a. Listed Species**

##### ***California Gnatcatcher***

The California gnatcatcher (*Poliophtila californica*) is federally listed as threatened. It is a small, long-tailed member of the thrush family (Muscicapidae). The gnatcatcher typically occurs in or near coastal sage scrub, which is a broad category of vegetation that includes the following plant communities as classified by Holland (1986): Venturan coastal sage scrub, Diegan coastal sage scrub, maritime succulent scrub, Riversidean sage scrub, Riversidean alluvial fan sage scrub, southern coastal bluff scrub, and coastal sage-chaparral scrub. Coastal sage scrub is composed of relatively low-growing, dry-season deciduous, and succulent plants. As described above,

characteristic plants of this community include coastal sagebrush, various species of sage (*Salvia* sp.), California buckwheat, lemonadeberry, California encelia and *Opuntia* spp. Ninety-nine percent of all gnatcatcher locality records occur at or below an elevation of 300 meters (m) (984 feet [ft]) (Atwood 1990). Gnatcatchers on RMV are concentrated in two locations, namely Chiquita and Gobernadora Canyons, and in more scattered locations in Cristianitos and Trampas Canyons.

### ***Arroyo Toad***

The arroyo toad (*Bufo californicus*) is federally-listed as endangered. It is found in foothill canyons and inter-mountain valleys where rivers are bordered by low hills and the stream gradients are low (Miller and Miller 1936; Sweet 1992). The arroyo toad uses riparian environments for breeding and adjacent uplands for foraging and estivation. Arroyo toads are known to either breed, forage, and/or aestivate in aquatic habitats, riparian, coastal sage scrub, oak, and chaparral habitats. The species is restricted to medium- to large-sized, slow-moving streams. The majority of arroyo toad population studies occur within third and fourth order drainages that are characterized by decomposed granite bedrock. However, toad populations have been found in a wide range of stream orders, including lower, second order, and higher, fifth and sixth order coastal streams characterized by sedimentary rock (PCR 2002). According to USFWS, streams supporting arroyo toads range from first to sixth order in the central part of the species' range (Orange, Riverside and San Diego counties) (USFWS 1999). Within RMV, the arroyo toad is associated with riparian, streamcourses with sandy benches along streams in both the San Juan Creek and San Mateo Creek watersheds, specifically San Juan Creek from about the mouth of Chiquita Canyon upstream to the RMV boundary and beyond to about Hot Springs Creek and in lower Bell Canyon. In the San Mateo Watershed the toad occurs in Talega, lower Gabino and lower Cristianitos creeks.

### ***Least Bell's Vireo***

The least Bell's vireo (*Vireo belli pusillus*) is state and federally listed as endangered. It occupies a more restricted nesting habitat than the other subspecies of Bell's vireo, as summarized in USFWS (1986). Least Bell's vireos primarily occupy riverine riparian habitats that typically feature dense cover within one to two meters of the ground and a dense, stratified canopy. It inhabits low, dense riparian growth along water or along dry parts of intermittent streams. Typically it is associated with southern willow scrub, cottonwood forest, mule fat scrub, sycamore alluvial woodland, coast live oak riparian forest, arroyo willow riparian forest, wild blackberry, or mesquite in desert localities. It uses habitat that is limited to the immediate vicinity of watercourses below about 457 m (1,500 ft) elevation in the interior (USFWS 1986; Small 1994). In the coastal portions of southern California, the least Bell's vireo occurs in willows and other low, dense valley foothill riparian habitat and lower portions of canyons and

along the western edge of the deserts in desert riparian habitat. On RMV, surveys have documented nesting locations in Gobernadora Creek, middle San Juan Creek (between the Ortega Highway bridge and Casper Wilderness Park), Chiquita Creek and lower Cristianitos Creek.

### ***Southwestern Willow Flycatcher***

The southwestern willow flycatcher (*Empidonax traillii extimus*) is state and federally listed as endangered. It is restricted to riparian woodlands along streams and rivers with mature, dense stands of willows (*Salix* spp.), cottonwoods (*Populus* spp.) or smaller spring fed or boggy areas with willows or alders (*Alnus* spp.) (Sedgwick and Knopf 1992). It is an insectivore that forages within and above dense riparian vegetation, taking insects on the wing or gleaning them from foliage (USFWS 1993). This species also forages in areas adjacent to nest sites which may be more open (USFWS 1995). On RMV, the southwestern willow flycatcher is known from the Gobernadora Ecological Restoration Area (GERA) in Gobernadora Canyon.

### ***Riverside Fairy Shrimp***

The Riverside fairy shrimp (*Steptocephalus wootonii*) is federally-listed as endangered. It is restricted to deep seasonal vernal pools, vernal pool-like ephemeral ponds, and stock ponds and other human modified depressions (Eng et al. 1990; USFWS 1993, USFWS 2001). Riverside fairy shrimp prefer warm-water pools that have low to moderate dissolved solids, are less predictable, and remained filled for extended periods of time (Eriksen and Belk 1999). Basins that support Riverside fairy shrimp are typically dry a portion of the year, but usually are filled by late fall, winter or spring rains, and may persist through May (USFWS 2001). All known vernal pool habitat lies within annual grasslands, which may be interspersed through chaparral or coastal sage scrub vegetation. On RMV, the Riverside fairy shrimp in very large population in a large pool on Chiquita Ridge (this pool is within Ladera Open Space) and in two pools located along Radio Tower Road (pools 2 and 7).

### ***San Diego Fairy Shrimp***

The San Diego fairy shrimp (*Branchinecta sandiegonensis*) is state-listed as endangered and federally-listed as threatened. It occurs in small, shallow vernal pools ranging in depth from 5.1 to 30.5 cm (2 to 12 in) and in water temperatures from 10 and 14.5 degrees C (50 to 58 degrees F). Water temperature and chemistry are important factors in the species' distribution. Adults are usually observed in January-March when pools hold water from winter rains, although the breeding season may be extended in association with early winter or mid-spring rains (USFWS 2000). Eggs are either dropped to the pool bottom or remain in the brood sac until the adult female dies and sinks. The shrimp hatch and mature in seven days to two weeks, depending on

water temperature. "Resting eggs" of cysts are capable of withstanding heat, cold and prolonged drying (USFWS 2000). Because the high variability rainfall in southern California, and thus the success of any given breeding season, only a fraction of cysts may hatch in a given year and reproductive success can be spread out over several years (USFWS 2000).

The San Diego fairy shrimp occurs two locations on RMV: in the large and small vernal pools on Chiquita Ridge (vernal pools 3 and 4 ) and in three pools located along Radio Tower Road south of Ortega Highway (vernal pools 1, 2 and 7).

### ***Thread-leaved Brodiaea***

Thread-leaved brodiaea (*Brodiaea filifolia*) is state-listed as endangered and federally-listed as threatened. It is a perennial geophyte, that has a corm with a dark brown, fibrous tunic. The flowering stalk is 20.3-40.6 cm (8-16 in) high and the narrow leaves are generally shorter than the flowering stem. The flowers are dark blue to violet and have six perianth segments. There are three stamens and three staminodia (sterile stamens), which are narrow and thread-like in each flower. In Orange County, populations are known from Aliso-Woods Canyon Regional Park (several thousand), RMV (4,500 to 5,500 flowering stalks), Forster Ranch (approximately 5,000 flowering stalks associated with a restoration/relocation program), Prima Deshecha Landfill, and the Talega Development where one small population will be preserved in open space and a second population is slated for translocation.

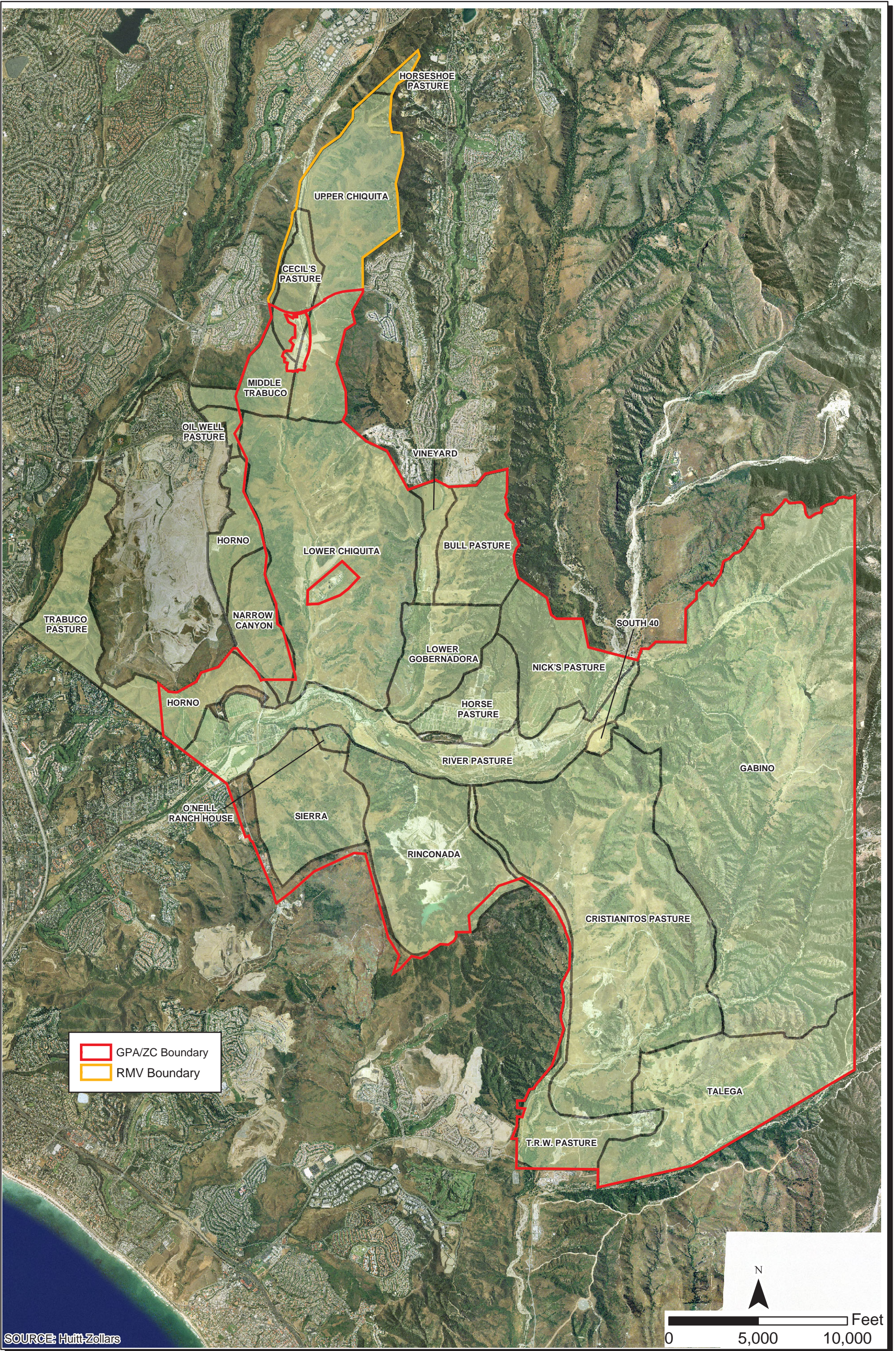
#### **b. Non-listed Species**

Several non-listed species also occur on RMV which that are likely to be affected by grazing management program either directly (e.g., species such as grasshopper sparrow that nest in grasslands with high structural diversity) or indirectly (species whose prey may be affected by grazing practices such as kite, horned lizard and whiptail). These species are: cactus wren, yellow warbler, yellow-breasted chat, grasshopper sparrow, white-tailed kite, merlin, western spadefoot toad, southwestern pond turtle, San Diego horned lizard, and orange-throated whiptail. For a complete species account for these species, the reader is referred to the Biological Resources Section of the EIR.

## **2.2 Pastures**

Figure 1 shows the general location of the historic RMV pastures within the RMV property boundary. Trabuco Pasture, Oil Well, Horno, Lower Chiquita, Middle Trabuco, Cecil's Pasture, Horseshoe Pasture, Upper Chiquita, the Vineyard, Bull Pasture, Lower Gobernadora, Horse Pasture and Nick's Pasture are located north of San Juan Creek in the San Juan Watershed. River Pasture straddles San Juan Creek. South of San Juan Creek located partially within the San Juan





RMV Grazing Management Plan  
Historic RMV Pastures on Aerial Base

FIGURE 1



Creek Watershed and partially within the San Mateo Watershed are Sierra, Rinconada, Cristianitos Pasture, Gabino, Talega and TRW Pasture. South 40 is located adjacent to Ortega Highway in the San Juan Creek watershed.

### **2.2.1 Pasture Description**

The following is an overview of the location by sub-basin, soils, vegetation community, sensitive species, fencing and water resources for each of the historic pastures listed above. The current status of the pasture is also discussed, i.e., whether it is actively grazed or not. *Figures 2, 3, and 4a-c* depict terrain types, vegetation and listed and selected sensitive species for the pastures.

#### **a. Trabuco Pasture**

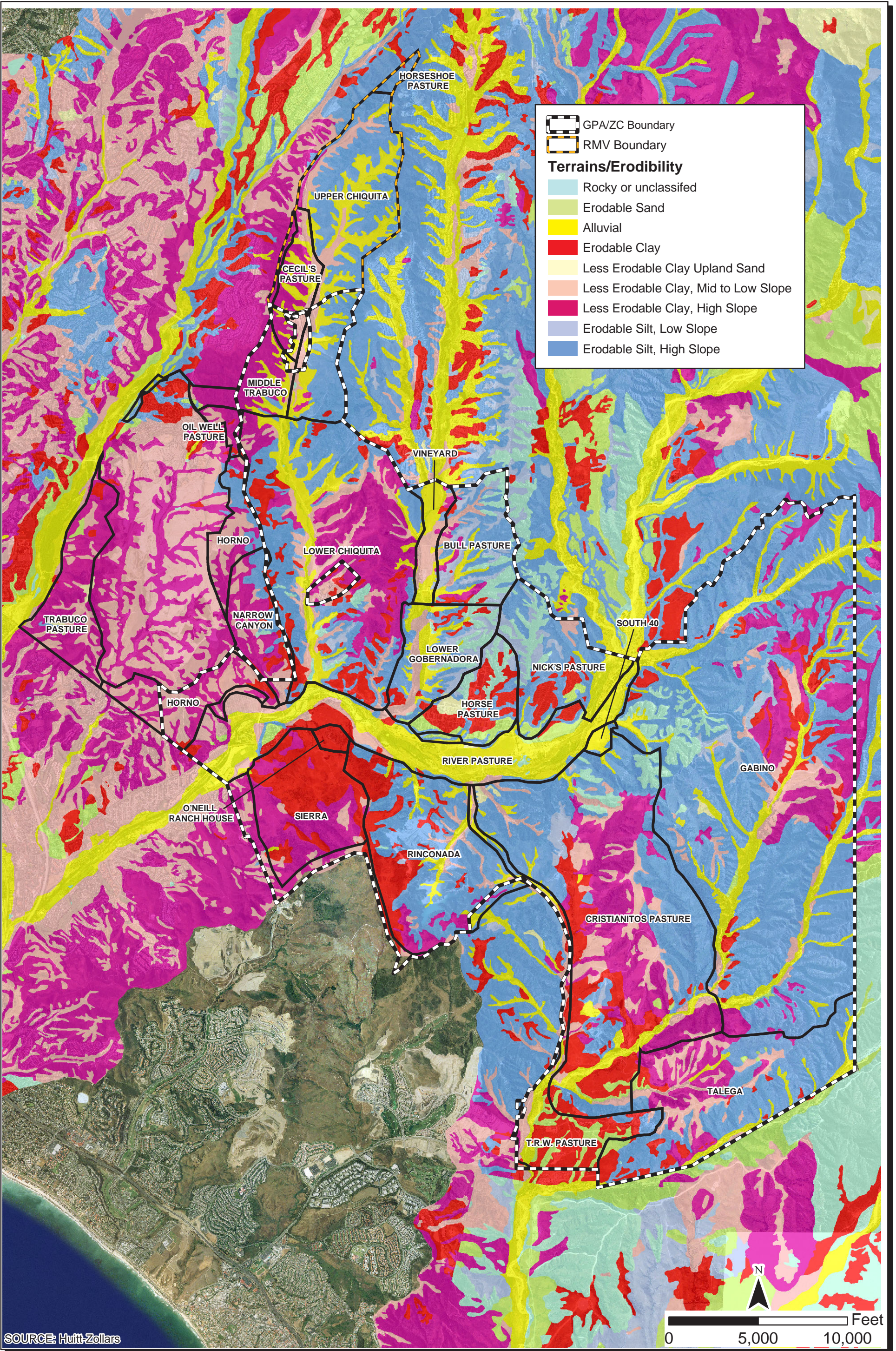
Trabuco Pasture is located in the Trabuco sub-basin. Terrains in this sub-basin are low to high slope less erodible clays (*Figure 2*). Vegetation in this pasture is dominated by grassland and coastal sage scrub (*Figure 3*). Other vegetation types occurring in the pasture to a lesser degree include riparian and chaparral. Agriculture, distributed and developed also occur in this pasture. Thread-leaved brodiaea occurs in this pasture. No other sensitive plant species occur. Eleven California gnatcatcher locations occur in this pasture (*Figure 4a*). Other species of note include American badger, Bell's sage sparrow, coastal cactus wren, grasshopper sparrow, red-tailed hawk and white-tailed kite (*Figure 4b*).

Trabuco Canyon pasture has been set aside for conservation purposes in accordance with the terms and conditions of the USACE, UFSWS and CDFG permits for Ladera Ranch and the Arroyo Trabuco Golf Course. No active grazing occurs on this pasture. In accordance with the terms and conditions of the Ladera Open Space Conservation Easement grazing is a reserved use subject to the preparation and approval of a grazing management plan by the County of Orange. A subsequent amendment to the Ladera Open Space Easement associated with approval of the Arroyo Trabuco Golf Course revised this provision of the easement to state "No grazing shall be permitted within the Conservation Easement Area without the written consent of CDFG and the Service." It is not the intent of RMV to resume grazing in the Trabuco Pasture, therefore this pasture will not be further addressed by this GMP.

#### **1. Narrow Canyon**

Narrow Canyon pasture is located in the Narrow Canyon sub-basin. This pasture is characterized by high to low slope and less erodible clays (*Figure 2*). Vegetation types in Narrow pasture include agriculture, annual and native grasslands, coastal sage scrub and minor amounts of chaparral and riparian (*Figure 3*). No sensitive plant species occur within this pasture. Recorded locations of listed species include 11 locations for California gnatcatcher (*Figure 4a*). Other



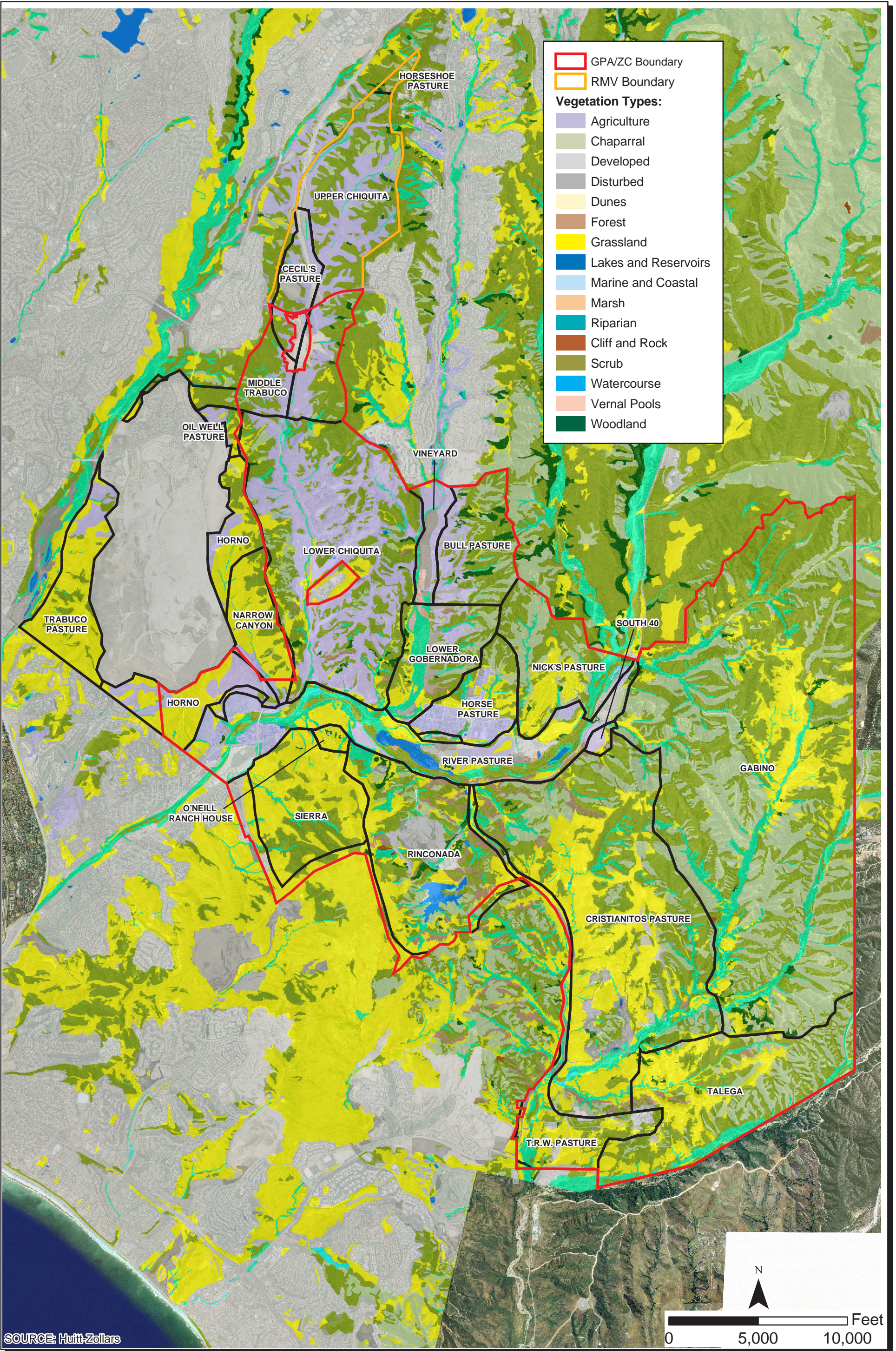


RMV Grazing Management Plan

Historic RMV Pastures on Terrains/Erodibility

FIGURE 2

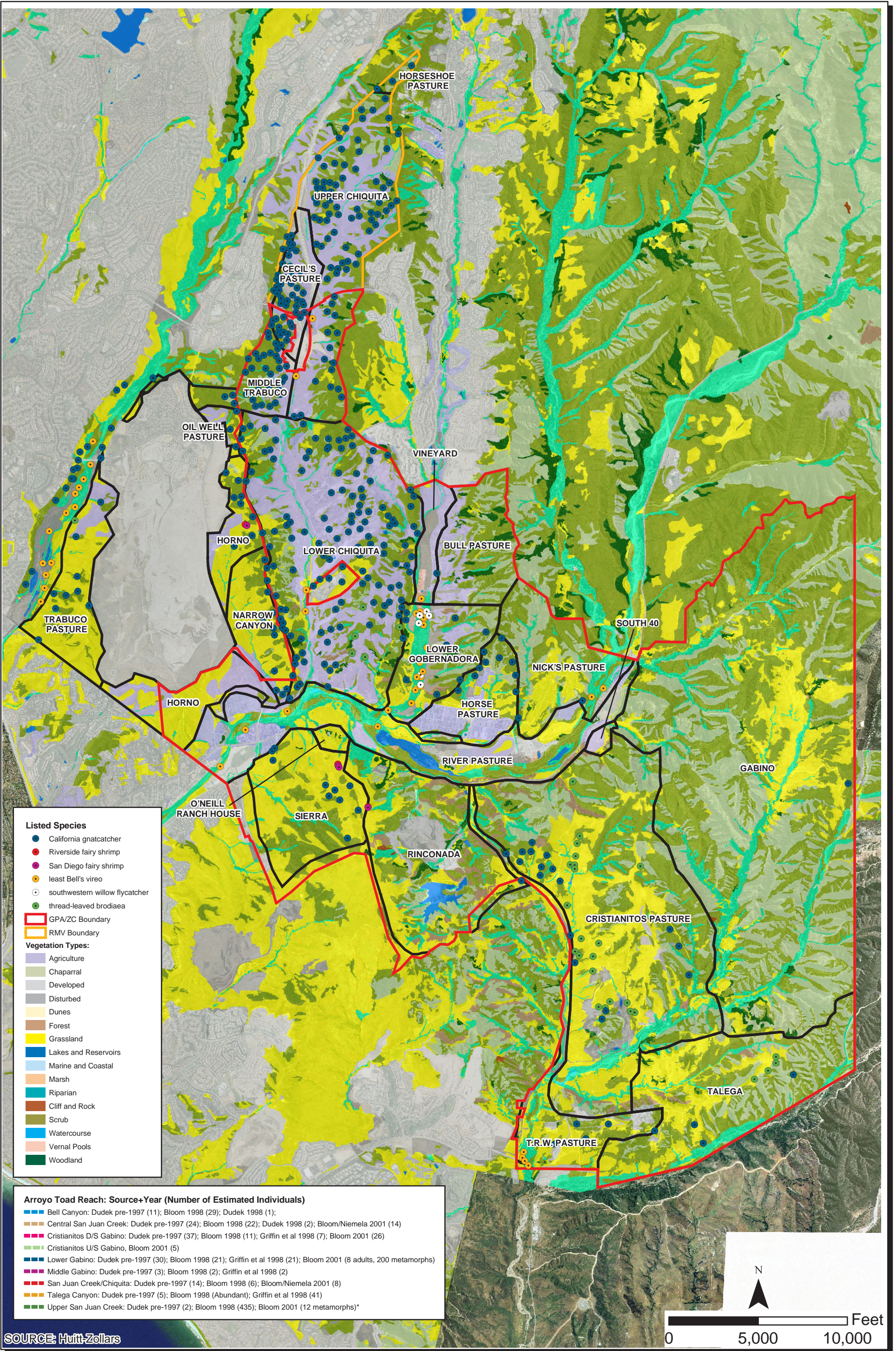




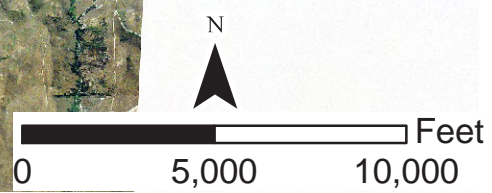
SOURCE: Huitt-Zollars

RMV Grazing Management Plan  
Historic RMV Pastures on Vegetation Base





SOURCE: Huitt-Zollars

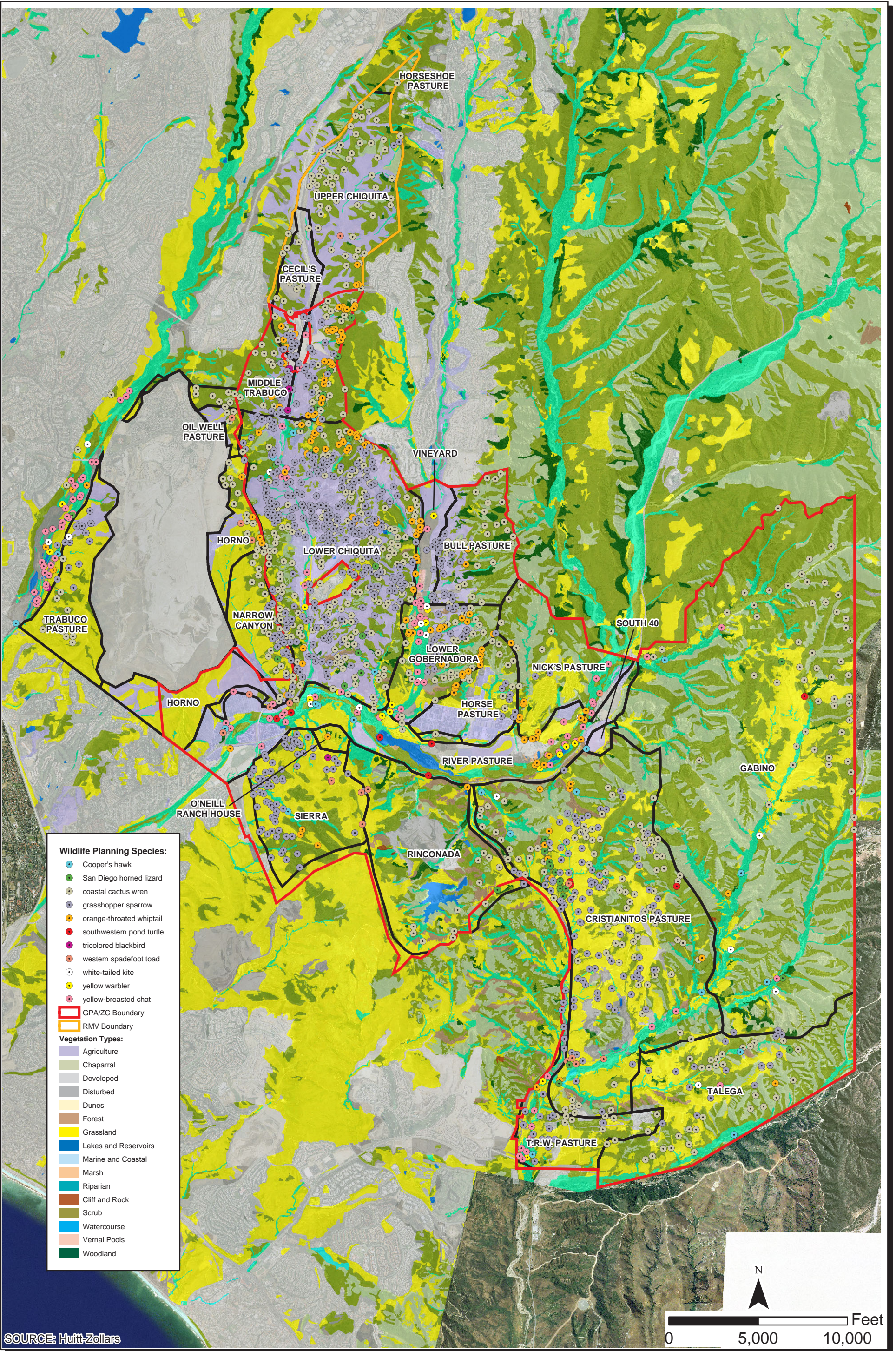


RMV Grazing Management Plan

**Listed Species within Historic RMV Pastures on Vegetation Base**

FIGURE 4a





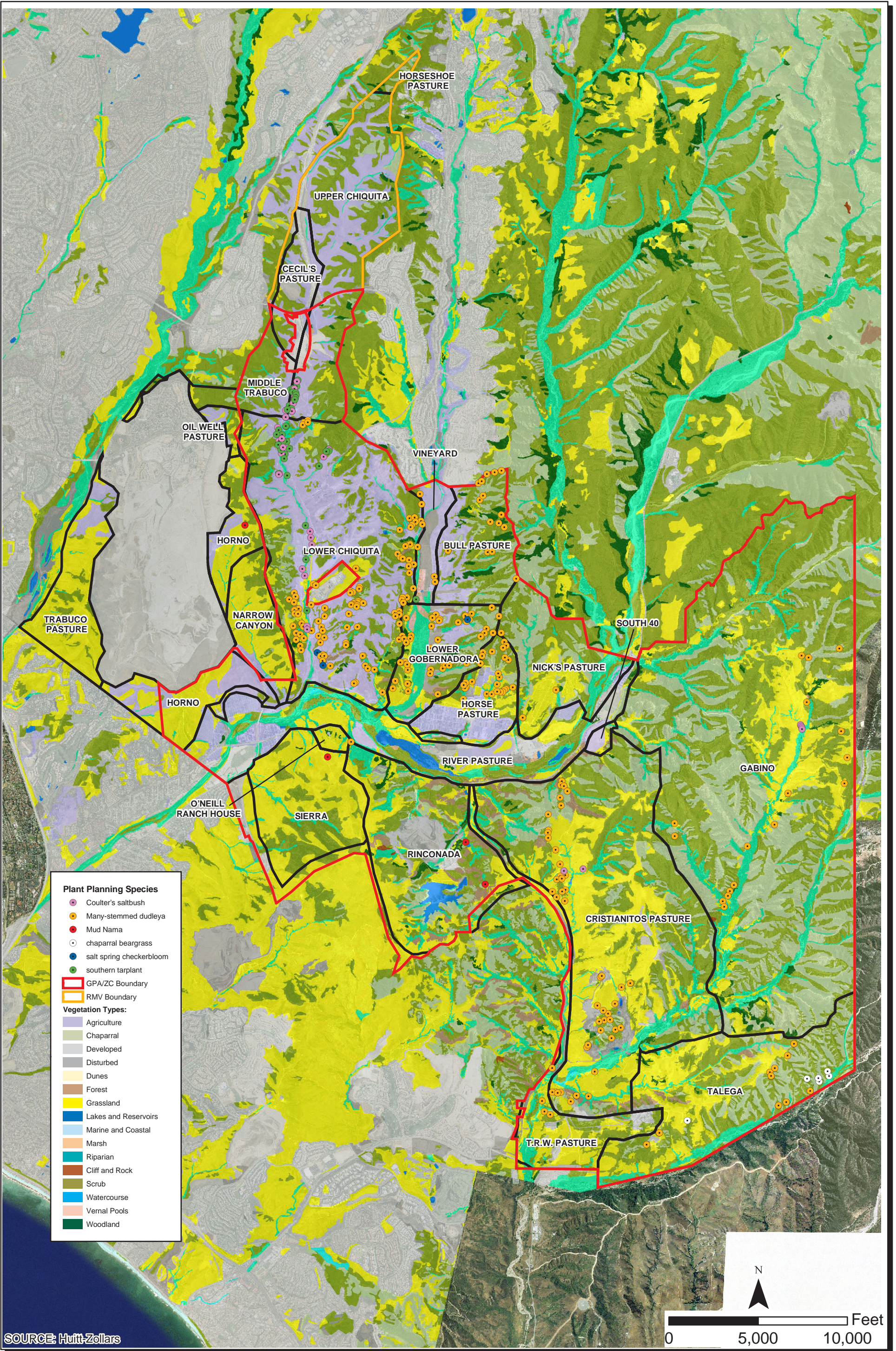
SOURCE: Huitt-Zollars

Wildlife Planning Species within Historic RMV Pastures on Vegetation Base

RMV Grazing Management Plan

FIGURE 4b





RMV Grazing Management Plan

**Plant Planning Species within Historic RMV Pastures on Vegetation Base**

**FIGURE 4C**



species of note recorded within this pasture include coastal cactus wren, grasshopper sparrow, loggerhead shrike, northern red-diamond rattlesnake, orange-throated whiptail, *rufous-crowned* sparrow, San Diego horned lizard, western spadefoot toad and western whiptail (*Figure 4b*).

Grazing is excluded from Narrow Canyon in accordance with the terms and conditions of the 404 permit issued by the USACE for Ladera Ranch and is also partially within the Ladera Open Space Conservation Easement (discussed above), therefore this pasture will not be further discussed in this GMP.

## **2. Horno**

Horno pasture straddles the Horno and Narrow/Chiquita Sub-basins as shown on *Figure 1*. This pasture is characterized by high to low slope and less erodible clays (*Figure 2*). Vegetation types in Horno pasture include agriculture, annual grasslands, coastal sage scrub and very minor amounts of native grasslands, chaparral, lakes and riparian (*Figure 3*). No sensitive plant species occur within this pasture. Recorded locations of listed species include one location for California gnatcatcher (*Figure 4a*). Other species of note recorded within this pasture include barn owl, great horned owl and western spadefoot toad (*Figure 4b*).

Horno pasture is also part of the Ladera Open Space and is subject to the Ladera Open Space Conservation Easement and its subsequent amendment. As noted above for the Trabuco Pasture, RMV does not intend to resume grazing in the Ladera Open Space Conservation Easement, therefore this pasture will not be discussed further in this GMP.

## **3. Oil Well Pasture**

Oil Well Pasture straddles the Horno and Narrow/Chiquita Sub-basins as shown on *Figure 1*. This pasture is characterized by high to low slope and less erodible clays (*Figure 2*). Vegetation types in Oil Well Pasture pasture include agriculture, annual grasslands, coastal sage scrub and minor amounts of native grassland, riparian and developed (*Figure 2*). No sensitive plant species occur within this pasture. Recorded locations of listed species include three locations for California gnatcatcher (*Figure 4a*). Other species of note recorded within this pasture include coastal cactus wren and western spadefoot toad (*Figure 4b*).

Oil Well Pasture is also part of the Ladera Open Space and is subject to the Ladera Open Space Conservation Easement and its subsequent amendment. As noted above for the Trabuco, Narrow Canyon and Horno pastures, RMV does not intend to resume grazing in the Ladera Open Space Conservation Easement, therefore this pasture will not be discussed further in this GMP.

#### **4. Lower Chiquita, Middle Trabuco, Upper Chiquita and Cecil's Pasture – "Chiquita Pastures"**

Lower Chiquita, Middle Trabuco, Upper Chiquita and Cecil's Pasture are all located within the Chiquita sub-basin and include the majority of Chiquadora ridge located in the Gobernadora sub-basin. Portions of Middle Trabuco, Cecil's Pasture, Upper and Lower Chiquita have been removed from active grazing for development purposes (Cecil's Pasture below Oso Parkway) or set aside for conservation purposes (Cecil's Pasture and Upper Chiquita above Oso Parkway, Horseshoe Pasture, Narrow Canyon and portions of Horno. The remaining portions of these pastures are grazed as one pasture today. For purposes of this overview this group of pastures will be called the "Chiquita Pastures". These pastures are characterized by sandy or silty terrains in the main and side canyons. Ridges on the east side of the valley are characterized by rock outcroppings and areas of hardpan (eroded remnants of claypans formed in the geologic past that have eroded to form mesas) and locally steep slopes (*Figure 2*).

Vegetation in the Chiquita Pastures includes coastal sage scrub, agriculture (in the form of citrus and avocado orchards and barley fields), patches of annual and native grasslands and patches of chaparral (*Figure 3*). Chiquita Creek supports herbaceous riparian, southern willow scrub, arroyo willow riparian forest and coast live oak riparian forest. Slope wetlands also occur in this pasture. Several listed and other species of note occur in the Chiquita Pastures including the federally-listed California gnatcatcher, the state/federally-listed thread leaved *Brodiaea*, the state/federally-listed least Bell's vireo, California Native Plant Society (CNPS) List 1B plants many-stemmed dudleya, southern tarplant, Coulter's saltbush and salt spring checkerbloom (*Figures 4a,c*). Other wildlife of note includes coastal cactus wren, ferruginous hawk, prairie falcon, merlin, northern harrier, wintering burrowing owls, loggerhead shrike, grasshopper sparrow, rufous-crowned sparrow, California horned lark, tricolored blackbird, (nomadic colonies), orange-throated whiptail, coastal western whiptail, San Diego horned lizard, northern-red diamond rattlesnake, mule deer and mountain lion (*Figure 4b*).

The actively grazed portion of the Chiquita Pastures is enclosed by a four-strand barbed wire fence located below Tesoro High School for the northern boundary, along Chiquita Ridge for the western boundary and the west side of Gobernadora Creek for the eastern boundary. Internal fencing to separate cattle from other uses, such as the orchards, the Chiquita wetland mitigation sites and the reclamation plant also divides the pasture. Fencing along San Juan Creek for the River Pasture forms the southern boundary of the actively grazed portion of Chiquita Pastures. Water is provided by a cattle trough in the lower part of the pasture and via Chiquita Creek.

The portion of Cecil's Pasture and Upper Chiquita north of Oso Parkway and Horseshoe Pasture have not been actively grazed since 1996 when RMV sold a conservation easement to the Transportation Corridor Agencies (TCA) as mitigation for the Oso Segment of the Foothill

Transportation Corridor-North. In accordance with the Section 7 biological opinion issued for that project by USFWS and as set forth in the TCA's management plan for that area (Upper Chiquita Canyon Conservation Easement Area Resource Management Plan), grazing is an allowed use once a grazing management plan has been reviewed and approved by USFWS and CDFG. This GMP will address grazing practices within the Upper Chiquita Canyon Conservation Easement Area.

## **5. Gobernadora Pastures**

Three separate fenced pastures collectively called the Gobernadora pastures, occur in the Gobernadora sub-basin: Vineyard, Bull Pasture and Lower Gobernadora. The terrain types, vegetation communities and listed and other species of note for the Gobernadora pastures are depicted on *Figures 2, 3 and 4a-c* respectively. Each pasture is described separately below.

### **(a) The Vineyard**

The Vineyard pasture is located within the valley floor of the Gobernadora sub-basin. The valley floor is characterized by deep alluvial deposits within interbedded clay lenses. Vegetation in this pasture is primarily composed of agriculture (barley), annual grasslands and the riparian habitats associated with Gobernadora Creek. The more rugged uplands west of Gobernadora Creek are dominated by coastal sage scrub and grasslands. Recorded locations for listed species include two for the California gnatcatcher. Southern willow scrub in the revegetated wetland mitigation area (GERA) provides nesting habitat for least Bell's vireo, yellow-breasted chat, and red-shouldered hawk. Other species of note within this pasture include California horned lark, grasshopper sparrow, orange-throated whiptail, rufous-crowned sparrow, western whiptail and yellow warbler. Tricolored blackbirds periodically forage in the grasslands of the Vineyard pasture. Two CNPS List 1B plants occur in the Vineyard pasture, one is the listed many-stemmed dudleya and the other is southern tarplant.

The Vineyard pasture is enclosed by four-strand barbed wire fence. Internal fencing excludes cattle from GERA. Water is provided by cattle troughs and via Gobernadora Creek.

### **(b) Bull Pasture**

Bull Pasture is located within the Gobernadora sub-basin, west of Gobernadora Creek. The flat to rolling terrain of this pasture exhibits areas of exhumed hardpan overlying sandy and silty substrates and exposed rock outcrops. Vegetation types in this pasture include agriculture (barley), coastal sage scrub, chaparral, oak woodlands, grassland, riparian and a small amount of disturbed area. Wildlife of note occurring in Bull pasture include barn owl, coastal cactus wren, grasshopper sparrow, great horned owl, orange-throated whiptail, red-tailed hawk, rufous-

crowned sparrow, San Diego horned lizard and western skink. Sensitive plants occurring in the pasture include many-stemmed dudleya, Catalina mariposa lily, and Palmer's grappling hook.

Bull Pasture is enclosed by four-strand barbed wire fence. The RMV property perimeter fence is its northern boundary, its eastern boundary is fenced along Gobernadora ridge, its southern boundary shares a fence with the Lower Gobernadora pasture and its western fence is shared with the Chiquita Pasture. Water is provided by a cattle trough.

### **(c) Lower Gobernadora**

The Lower Gobernadora pasture extends from Chiquadora ridge to Gobernadora ridge in an east-west direction, and from Bull Pasture and the Vineyard to the River Pasture in a north-south direction. This pasture includes the terrains of the valley floor (deep alluvial deposits with interbedded clays) and the ridges (exhumed hardpan overlying sandy and silty substrates).

Vegetation types on the east side of Lower Gobernadora pasture include agriculture, coastal sage scrub, chaparral and oak woodlands. The more rugged uplands west of Gobernadora Creek are dominated by coastal sage scrub and grasslands. The valley floor is characterized by agriculture, annual grasses and the riparian communities associated with Gobernadora Creek and GERA. Disturbed and developed land use covers also occur in this pasture. Listed species occurring in this pasture include least Bell's vireo, California gnatcatcher, southwestern willow flycatcher.. Sensitive plant species that occur within this pasture include; many-stemmed dudleya, Catalina mariposa lily, Palmer's grapplinghook, southern tarplant and paniculate tarplant. Other species of note include barn owl, coastal cactus wren, desert woodrat, grasshopper sparrow, orange-throated whiptail, red-shouldered hawk, red-tailed hawk, *rufous-crowned-sparrow*, western whiptail, white-tailed kite, yellow warbler and yellow-breasted chat.

Lower Gobernadora shares fences with Vineyard and Bull Pasture to the north, Horse Pasture and Nick's Pasture to the east along Gobernadora Ridge, River Pasture to the south and Lower Chiquita pasture to the west along Chiquadora Ridge. The wetland revegetation area, GERA, is fenced to exclude cattle. Water is provided by a cattle trough.

## **6. Horse Pasture**

Horse Pasture is located within the Central San Juan sub unit of the Central San Juan and Trampas Canyon sub-basin. Terrains in this pasture generally include erodible silts and clays. Upland vegetation types include coastal sage scrub, chaparral, oak woodlands, grassland, open water, riparian, agriculture, developed and disturbed areas (Colorspot Nursery). Listed species present in this pasture include California gnatcatcher locations north of Colorspot Nursery. Sensitive plant species include many-stemmed dudleya, Catalina mariposa lily and Palmer's



grapplinghook. Also present in this pasture are barn owl, coastal cactus wren, desert woodrat, grasshopper sparrow, orange-throated whiptail, red-tailed hawk, *rufous-crowned-sparrow*, southwestern pond turtle and western whiptail. The terrain types, vegetation communities and sensitive species for Horse Pasture are depicted on *Figures 2, 3 and 4a-c* respectively

Horse Pasture shares fences with Lower Gobernadora to the north-west, Nick's Pasture to the north-east and River Pasture to the south. No active grazing occurs in this pasture due to the extent of the Colorspot Nursery operation.

## **7. Nick's Pasture**

Nick's Pasture is also located within the Central San Juan sub unit of the Central San Juan and Trampas Canyon sub-basin. Terrains in this pasture generally include erodible silts and clays. Upland vegetation types include coastal sage scrub, chaparral, oak woodlands, grassland, riparian and agriculture (citrus orchards). A small portion of this pasture is classified as developed. Listed species locations recorded in this pasture include arroyo toad, California gnatcatcher and least Bell's vireo. Sensitive plant species in this pasture include locations of many-stemmed dudleya, Catalina mariposa lily and Palmer's grapplinghook. Other species of note with locations in this pasture include barn owl, coastal cactus wren, grasshopper sparrow, orange throated whiptail, red-tailed hawk, rufous-crowned sparrow, western spadefoot toad and western whip tail. The terrain types, vegetation communities and sensitive species for Nick's Pasture are depicted on *Figures 2, 3 and 4a-c* respectively

Fencing of Nick's Pasture includes the RMV perimeter fence along the eastern edge and Bull Pasture and Lower Gobernadora to the west. Due to the lack of fencing to separate cattle from the citrus production areas, Nick's pasture has not been grazed for the last 5-6 years. Water is available through cattle troughs.

## **8. River Pasture**

River pasture straddles San Juan Creek and is within the Central San Juan sub unit of Central San Juan and Trampas Canyon sub-basin. Terrains in this subunit generally include erodible silts and clays in the uplands north of San Juan Creek and alluvial terrace deposits in San Juan Creek itself. Vegetation types within the River Pasture include agriculture, chaparral, developed, disturbed, forest, grassland, open water, marsh, riparian, coastal sage scrub, stream and oak woodlands. Listed species locations in this pasture include the listed arroyo toad and least Bell's vireo. Other species of note include ash-throated flycatcher, barn owl, coastal cactus wren, desert woodrat, yellow-breasted chat, yellow warbler, rufous-crowned sparrow, sharp-shinned hawk, ferruginous hawk, merlin, northern red-diamond rattlesnake, orange-throated whiptail, white-tailed kite, Cooper's hawk, red-shouldered hawk, great horned owl, red-tailed hawk, great blue

heron, southwestern pond turtle, two-striped garter snake, western skink, western spadefoot toad, arroyo chub and threespine stickleback. The terrain types, vegetation communities and sensitive species for River Pasture are depicted on *Figures 2, 3 and 4a-c* respectively

River Pasture shares fences with Horno, Lower Chiquita, Lower Gobernadora and Horse Pasture to the north; and Sierra, Rinconada, Cristianitos and Gabino to the south in the San Mateo watershed. Water is provided via San Juan Creek and a water trough when the creek is dry.

## **9. South 40**

South 40 is located within the Central San Juan sub-basin, adjacent to Ortega Highway. Terrains in this pasture are erodable clays and some silts (*Figure 2*). Vegetation types in this sub-basin are disturbed (barley), annual grasses and chaparral on the steeper slopes (*Figure 3*). No sensitive plant locations occur in this pasture. Locations for barn owl, Cooper's hawk, ferruginous hawk, grasshopper sparrow, loggerhead shrike, night snake, northern red-diamond rattlesnake, orange throated whiptail, racer, red-tailed hawk, rufous-crowned sparrow, tricolored blackbird, western skink and western spadefoot toad occur in this pasture (*Figure 4b*).

South 40 is fenced along Ortega highway. Water is provided via water trough.

## **10. Sierra Pasture**

The Sierra Pasture is located partially within the Chiquita sub-basin and partially within an unnamed sub-basin that is located south of the Prima Deschecha sub-basin. Terrains in this pasture are erodable clays and less erodable clays of low to high slope (*Figure 2*). Vegetation types in this pasture are predominately grassland and coastal sage scrub, with some riparian and minor amounts of forest and oak woodland (*Figure 3*). Agriculture and developed land uses also occur in very small amounts. No sensitive plant locations occur in this pasture. However, several California gnatcatcher locations occur, as do locations for barn owl, Cooper's hawk, ferruginous hawk, grasshopper sparrow, loggerhead shrike, night snake, northern red-diamond rattlesnake, orange throated whiptail, racer, red-tailed hawk, rufous-crowned sparrow, tricolored blackbird, western skink and western spadefoot toad (*Figure 4a,b*). Both the federally-listed San Diego and Riverside fairy shrimp occur within vernal pools located along Radio Tower Road within this pasture.

Sierra pasture is fenced along Prima Deschecha Landfill, La Pata Avenue, Ortega Highway and shares fencing at the ridgeline with Rinconada pasture. Cattle are also excluded from the Ranch House by fencing. Water is provided via water trough.

## 11. Rinconada Pasture

Rinconada pasture is located within the Trampas and Cristianitos sub-basins. Terrains in this pasture are erodable silts and clays of low to high slope (*Figure 2*). Vegetation types in this pasture are predominately coastal sage scrub, grassland, chaparral and riparian, with oak forest and smaller amounts of oak woodland (*Figure 3*). Disturbed and developed land uses also occur in this pasture, namely the Oglebay Norton Industrial Sands (ONIS) mining operation. Trampas Canyon Dam is associated with this use. The Donna O'Neill Land Conservancy also lies within the historic boundary of this pasture, although grazing no longer occurs within the Conservancy. The state-and federally-listed thread-leaved brodiaea occurs within this pasture, as do several other sensitive plant locations including many-stemmed dudleya, Palmer's grappling hook and Catalina mariposa lily (*Figure 4a,c*). Of the other listed species, one California gnatcatcher location, one Riverside and one San Diego fairy shrimp pool occur in this pasture (*Figure 4a*). Both fairy shrimp occur within vernal pools located along Radio Tower Road within this pasture. Locations for barn owl, coastal cactus wren, great horned owl, Cooper's hawk, osprey (using open water), grasshopper sparrow, loggerhead shrike, night snake, northern red-diamond rattlesnake, orange throated whiptail, racer, red-shouldered hawk, red-tailed hawk, rufous-crowned sparrow, San Diego horned lizard, turkey vulture, western spadefoot toad and white-tailed kite also occur in this pasture (*Figure 4b*).

Rinconada pasture is fenced along Ortega Highway, Cristianitos Road, the boundary with Prima Deshecha Landfill and Sierra Pasture. The Donna O'Neill Conservancy boundary is fenced to exclude cattle. Water is provided via water troughs and the mining pond associated with the ONIS operation. Although cattle are not specifically excluded from the ONIS operation, the lack of available forage in the active mine area acts as a deterrent to wandering cattle.

## 12. Cristianitos Pasture

Cristianitos Pasture is located partially within the Cristianitos sub-basin and partially within the Gabino sub-basin. Terrains in these portions of the sub-basins are erodable to less erodable clays and are subject to erosion under intensive grazing pressure (*Figure 2*). Grassland, including native grasslands and coastal sage scrub are the dominant vegetation types in this pasture (*Figure 3*). Chaparral, forest and riparian also occur in lesser amounts, as do open water, stream, woodland and rock. Developed, disturbed and agriculture also occur in this pasture. The listed thread leaved brodiaea occurs within this pasture, as do several other sensitive plant locations including many-stemmed dudleya, Palmer's grapplinghook, Coulter's saltbush, mesa brodiaea, small-flower microseris, upright burhead and western dichondra (*Figure 4a,c*).

Arroyo toad and California gnatcatcher are the two listed wildlife species with locations in this pasture (*Figure 4a,b*). Other species of note include arboreal salamander, barn owl, California

horned lark, California whipsnake, coastal cactus wren, Cooper's hawk, desert woodrat, grasshopper sparrow, great horned owl, merlin, northern red-diamond rattlesnake, orange-throated whiptail, prairie falcon, red-shouldered hawk, red-tailed hawk, rufous-crowned sparrow, San Diego horned lizard, southwestern pond turtle, coast patchnose snake, western spadefoot toad, western whiptail, white-tailed kite and yellow-breasted chat (*Figure 4a,b*).

Cristianitos pasture is fenced along Ortega Highway, Cristianitos Road, Talega pasture and the Cristianitos/Gabino ridgeline. Citrus areas in Cristianitos are also fenced to keep cattle out. Water is provided via three defunct mining ponds and water troughs.

### **13. Gabino**

Gabino pasture is located within the Gabino and Verdugo sub-basins. Terrains in the Gabino sub-basin are divided into silty clays in the upper Gabino sub-unit and cobbly sands in the middle sub-unit. Upper Gabino is subject to erosion under intensive grazing pressure (*Figure 2*). Middle Gabino is a source of coarse sediments for Cristianitos Creek. Verdugo sub-basin terrains are cobbly sands with some silts. Verdugo Canyon is a source of coarse sediment for San Juan Creek. Coastal sage scrub and chaparral are the dominant vegetation types in this pasture. Grassland, including native grasslands, and riparian also occur in lesser amounts, as do marsh, woodland and rock (*Figure 3*). Developed and agriculture also occur in this pasture in small amounts, namely Campo Portola and citrus production. Many-stemmed dudleya, Coulter's saltbush and Fish's milkwort occur in this pasture (*Figure 4c*). Arroyo toad and California gnatcatcher are the two listed wildlife species with one location each, in this pasture (*Figure 4a*). Other species of note include: arboreal salamander, barn owl, coastal cactus wren, Cooper's hawk, grasshopper sparrow, great horned owl, long-eared owl, orange-throated whiptail, prairie falcon, red-shouldered hawk, red-tailed hawk, rufous-crowned sparrow, San Diego horned lizard, southwestern pond turtle, two-striped garter snake, white-tailed kite and yellow-breasted chat (*Figure 4b*).

Gabino pasture is fenced along Ortega Highway, south of Gabino Creek where it shares a common fence with the Talega pasture and at the RMV boundary with Riverside County (perimeter fence). Water is provided via Jerome's Lake, water troughs and Gabino Creek (when water is available).

### **14. Talega**

Talega pasture is located within the Talega and Blind Canyon sub-basins. Terrains in the Talega sub-basin are cobbly sands. Talega is a source of coarse sediments for Cristianitos Creek (*Figure 2*). Blind Canyon sub-basin terrains are cobbly sands. Blind Canyon is a source of coarse

sediment for Cristianitos Creek. Coastal sage scrub, chaparral and grassland including native grasslands are the dominant vegetation types in this pasture (*Figure 3*). Riparian also occurs in lesser amounts, as do oak forest and woodland. Developed also occur in this pasture in small amounts. Thread leaved brodiaea, many-stemmed dudleya and chaparral beargrass occur in this pasture (*Figure 4a,c*). Arroyo toad and California gnatcatcher are the two listed species with locations in this pasture (*Figure 4a*). Other species of note include arboreal salamander, barn owl, coastal cactus wren, Cooper's hawk, grasshopper sparrow, northern red-diamond rattlesnake, orange-throated whiptail, prairie falcon, red-tailed hawk, rufous-crowned sparrow, San Diego horned lizard, western whiptail, white-tailed kite and yellow-breasted chat (*Figure 4b*).

Talega pasture is fenced along the boundary with MCB Camp Pendleton, the RMV boundary, the TRW lease area and shares a common fence with Gabino and Cristianitos pastures. Water is provided via Talega Creek and water troughs.

## **15. TRW Pasture**

TRW pasture is located within the Talega and Cristianitos sub-basins. Terrains in the Talega sub-basin are cobbly sands. Talega Canyon is a source of coarse sediments for Cristianitos Creek. Cristianitos sub-basin is generally silty clays (*Figure 2*). Coastal sage scrub and grassland including native grasslands are the dominant vegetation types in this pasture (*Figure 3*). Riparian, chaparral and forest also occurs in lesser amounts, as do open water and woodland. Developed and disturbed also occur in this pasture, namely the Northrop-Grumman facility (formerly TRW) and associated ancillary uses. Many-stemmed dudleya, Palmer's grapplinghook, small-flower microseris, Coulter's saltbush and western dichondra occur in this pasture (*Figure 4c*).

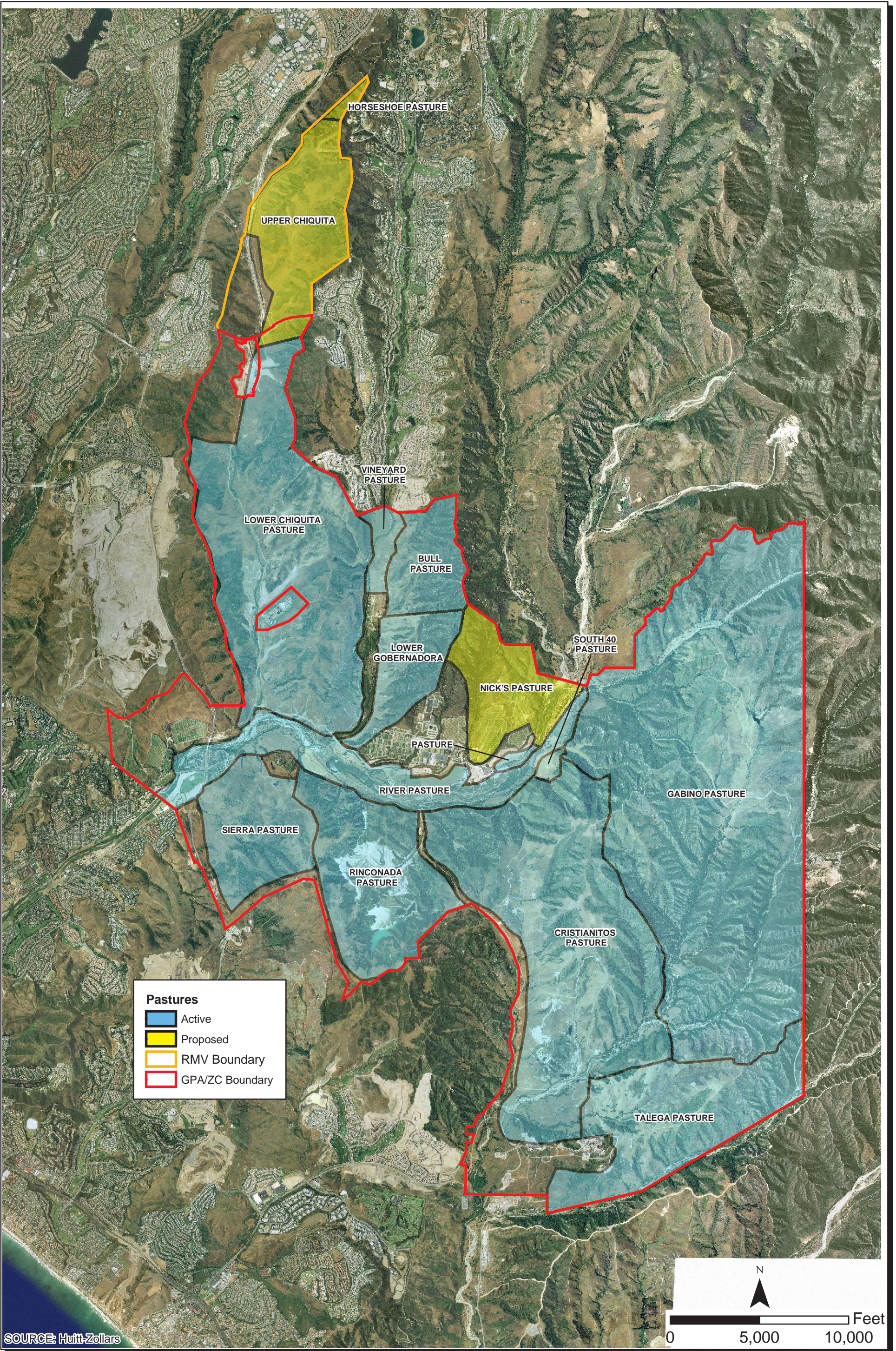
Arroyo toad, California gnatcatcher and least Bell's vireo are the three listed wildlife species with locations in this pasture (*Figure 4a*). Other species of note include: barn owl, coastal cactus wren, Cooper's hawk, grasshopper sparrow, great horned owl, long-eared owl, northern red-diamond rattlesnake, orange-throated whiptail, red-shouldered hawk, red-tailed hawk, rufous-crowned sparrow, sharp shinned hawk, western whiptail, yellow warbler and yellow-breasted chat (*Figure 4b*).

Although listed as a pasture, no active grazing occurs within the TRW pasture due to the ongoing lease operations of the Northrop-Grumman Capistrano Test Facility. No future use of this area as a grazed pasture is anticipated; therefore this GMP will not further address this area.

In summary, the following pastures are currently actively grazed; Lower Chiquita, Vineyard, Bull Pasture, Lower Gobernadora, River Pasture (to the Cow Camp crossing), South 40, Sierra,

Rinconada, Cristianitos, Gabino and Talega. Resumption of grazing is proposed for Nicks Pasture, Chiquita Canyon above Oso Parkway (including Horseshoe Pasture, but excluding Cecil's Pasture) and River Pasture north of the Cow Camp crossing. *Figure 5* shows both actively grazed pastures and pastures proposed for future grazing.





SOURCE: Huitt-Zollars

RMV Grazing Management Plan  
Active and Proposed Pastures on Aerial Base

FIGURE  
5



## **CHAPTER 3: GRAZING MANAGEMENT**

This Chapter describes the objectives of the GMP, reviews the current RMV grazing practices, including residual dry matter (RDM) goals, grazing patterns and stocking rates and makes recommendations for future grazing practices.

### **3.1 Objectives of Grazing Management**

Chapter 1 set forth the overall purposes of this GMP, namely, to contribute an important element of the long term Adaptive Management Program goals of enhancement/restoration of native habitats and to identify grazing practices that are consistent with the Draft Southern NCCP/HCP Planning Guidelines and the Draft Watershed Planning Principles.

To achieve these overall purposes, the following specific objectives of the GMP are:

1. Establish a minimum RDM per acre for active and proposed pastures, and adjust as necessary to reflect changes developed as a result of task 2 below.
2. Identify interim and long-term changes to existing and proposed pasture configurations and stocking levels to maximize use of available forage and facilitate the restoration of perennial grasses including native grasses.
3. Identify a timed rotational grazing scheme to maximize use of available forage and facilitate the restoration and/or long term management of native grasses and coastal sage scrub.
4. Identify sensitive habitat areas where cattle grazing shall be excluded seasonally or permanently.
5. Identify additional facilities required to promote better distribution of cattle within pastures as a strategy to manage geologic and abiotic resources (e.g., water sources, shade, supplemental feed/ nutritional blocks).
6. Outline methods (i.e., cattle exclosures) for monitoring forage levels in order to assess range conditions and to provide guidance on the introduction and removal of cattle.
7. Identify pastures that may be subject to prescribed fire. Identify appropriate pasture rest periods following burns to promote habitat recovery.
8. Outline procedures for re-evaluating grazing management practices every 3 to 5 years to ensure that existing practices are achieving the desired results.

### **3.2 Grazing Management**

This section describes the basic practice of grazing management on RMV, both in terms of general concepts and specific applications.



The production of grassland, whether annual or native, for forage purposes is dependant on four factors: precipitation, temperature, soil characteristics and residue. These four factors largely control forage productivity and seasonal species composition. These factors also change the timing and characteristics of the four distinct growth phases: break of season, winter growth, rapid spring growth and peak forage production. Break of season follows the first fall rains that exceed 1 inch during a 1-week period. Timing of the break dramatically affects forage production. Winter growth period occurs as the fall break season ends and is the result of cooling temperatures, shorter days, and lower light levels. Rapid spring growth begins with the onset of warming spring temperatures, longer days and higher light intensities. Peak forage production occurs at the end of rapid spring growth (UC Extension, Leaflet 21378).

While the precise dates of the four distinct growth phases are subject to the factors noted above, generally speaking on RMV, for annual grasses break of season occurs late October – early November, winter growth occurs mid-December through early February, rapid spring growth occurs between early February and mid-March and peak forage production occurs by late March. Although influenced by the same factors noted above, native grasses generally lag slightly behind annual grasses by about eight weeks on Rancho Mission Viejo (T. Bomkamp, personal communication).

#### **a. Current Grazing Practices**

RMV has grazed cattle on its property since 1882. Since that time RMV has practiced a rational grazing pattern that takes into account available water, forage productivity and a desire to maintain an average of 25% RDM for “natural” or “unimproved” pastures. Natural pastures are those not artificially improved through the planting of a forage crop, e.g., barley. Availability of water, forage productivity and the desired level of RDM in turn dictate the stocking levels of RMV pastures.

The following sections describe the existing pasture configurations, residue, stocking levels and grazing pattern on RMV lands.

#### **1. Existing Pasture Configurations & Resources**

The current configuration of active grazing pastures or future configuration of a proposed grazing area is shown on *Figure 5*. The vegetation types within each pasture (*Table 3*) is based on the current or proposed configuration, not the historic configuration shown in *Figure 1*.

### ***Active Grazing Pastures***

The following pastures are actively grazed: Lower Chiquita, Vineyard, Bull Pasture, Lower Gobernadora, River Pasture (south of the Cow Camp crossing), South 40, Sierra, Rinconada, Cristianitos, Gabino and Talega.

### ***Proposed Grazing Pastures***

Resumption of grazing is proposed for Nicks Pasture, Upper Chiquita, Horseshoe Pasture and River Pasture north of the Cow Camp crossing.

## **2. Existing Residue**

Residue or dry residual matter is the dry organic matter remaining at the end of grazing. Residue, acting as mulch, influences germinating plants and soil organic matter. Residue is therefore is major manageable factor governing productivity and composition (UC Extension, Leaflet 21378). Amounts of residue dry matter per acre vary according to geography, soil conditions and livestock use. Areas with heavy rainfall, erosive soils or steep hills need more residual dry matter than do flat, stable soils in drier climates. To maintain desired forage production, therefore, it is useful to set *minimum* residue standards. Rancho Mission Viejo has historically used an average RDM of 25% (for example, 25% of produced forage. If produced forage was 1000 lbs per acre for a pasture, the RDM would be 250 lbs per acre) as the minimum standard for pastures with natural forage, i.e., annual/native grassland. RMV also plants forage (barley) in the alluvial valleys of Lower Chiquita, Vineyard, Bull Pasture, Lower Gobernadora and South 40. RDM standards are not established for planted forage areas because these areas are replanted annually. This GMP will review the 25% RDM standard for natural forage and make recommendations for revisions as necessary.

As an example of a post peak productivity assessment of the RDM conditions on the property, existing RDM was estimated in July 2003 using the visual determination method described in UC Extension Leaflet 21327. RMV staff estimated existing residue using the following levels:

- *Light* grazing leaves little or no patchy appearance. Unused plant matter averages 3 or more inches in height and small objects are masked. The residual dry matter is more than an average of 800 pounds per acre.
- *Moderate* grazing leaves an average of 2 inches of unused plant matter, a patchy appearance and little bare soil. Small objects will not show at a distance of 20 feet or more. The residual dry matter ranges from 400 to 700 pounds per acre.

**TABLE 3**  
**VEGETATION COMMUNITIES WITHIN RANCHO MISSION VIEJO PASTURES<sup>1</sup>**

Pasture	Agriculture	Chaparral	Developed	Disturbed	Grassland	Open Water	Marsh	Riparian	Cliff & Rock	Coastal Sage Scrub	Stream-courses	Vernal Pools	Woodlands & Forest	TOTAL
Bull	126.7	103.2	0.0	0.2	5.6	0.0	0.0	6.5	0.0	235.9	0.0	0.0	57.6	535.6
Cristianitos	0.3	551.3	42.6	112.8	1,173.1	3.1	0.0	319.4	0.2	11306	6.5	0.0	118.7	3458.6
Gabino	0.9	2096.2	0.4	0.0	853.6	0.0	0.6	553.1	1.8	2841.7	0.0	0.0	70.8	6,419.0
Horseshoe	0.0	13.3	0.0	0.0	0.1	0.0	0.0	1.0	0.0	26.9	0.0	0.0	1.9	43.2
Lower Chiquita	1,363.9	129.9	78.4	13.2	274.7	0.9	2.4	117.7	0.0	1,063.1	0.0	0.0	53.7	3,098.2
Lower Gobernadora	87.5	103.1	1.5	74.5	18.1	0.0	0.0	26.7	0.0	214.0	0.0	<0.01	20.7	546.2
Nick's	13.3	206.9	16.3	0.0	75.9	0.0	0.0	88.7	0.0	246.1	0.0	0.0	5.1	652.5
Rinconada	0.0	146.6	22.8	160.7	370.1	59.3	0.0	136.9	4.1	333.9	0.0	0.0	160.4	1,394.8
River	147.8	16.8	189.6	24.7	172.2	68.8	10.8	219.3	0.0	199.5	6.6	0.0	35.6	1,091.8
Sierra	0.3	0.0	0.9	0.0	582.3	0.0	0.0	42.2	0.0	250.6	0.0	0.0	1.6	877.9
South 40	23.8	2.7	0.1	0.0	8.6	0.0	0.0	1.4	0.0	5.4	0.0	0.0	3.1	44.9
Talega		358.4	10.0	0.0	467.1	0.0	0.0	150.5	0.0	575.3	0.0	0.0	32.4	1,593.8
Upper Chiquita	445.9	67.2	33.7	2.6	6.6	0.0	0.0	21.9	0.0	458.8	0.0	0.0	12.4	1,049.3
Vineyard	90.1	0.1	0.0	48.0	2.9	0.0	0.0	7.4	0.0	4.9	0.0	0.0	0.0	153.5
<b>TOTAL</b>	<b>2,300.6</b>	<b>3,795.9</b>	<b>399.2</b>	<b>436.7</b>	<b>4,028.1</b>	<b>132.1</b>	<b>13.9</b>	<b>1,693.7</b>	<b>6.2</b>	<b>7,603.6</b>	<b>13.2</b>	<b>&lt;0.01</b>	<b>274.3</b>	<b>20,998.5</b>

<sup>1</sup> Source: Southern NCCP/HCP Vegetation Database (1993), as revised by Dudek in 2004.

- *Heavy* grazing leaves less than 2 inches of unused plant matter. Small objects and areas of bare soil are visible at 20 feet or more. Residual dry matter is less than 400 pounds per acre.

**TABLE 4**  
**ESTIMATED DRY RESIDUAL MATTER FOR**  
**RANCHO MISSION VIEJO PASTURES IN JULY 2003**

Pasture	Grazing Level	Estimated Dry Residue
Chiquita Pastures <sup>1</sup>	None	>800+ lbs/ac
Nick's Pasture	None	>800+ lbs/ac
River Pasture	Light – Moderate	>650-750 lbs/ac
Sierra	Light	>750 lbs/ac
Rinconada	Light	>750 lbs/ac
Cristianitos Pasture	Light	>700-800 lbs/ac
Gabino	Light - Moderate	>600 lbs/ac
Talega	Light	>800 lbs/ac
<sup>1</sup> Residues were estimated for Upper Chiquita. Lower Chiquita is planted with barley therefore residues are not applicable.		

To verify the visual assessment, residual dry matter weights were taken in three pastures in accordance with the method described in Leaflet 21327. Results of this verification were as follows:

- Rinconada: 1,890 lbs per acre
- Sierra: 1,038 lbs per acre
- Gabino: 1,946 lbs per acre

The assessment results (*Table 4*) and the subsequent dry weight verification show that RDM on RMV typically reflects light to moderate grazing.

### **3. Existing Grazing Patterns**

Generally cattle are grazed in the natural southern pastures (South 40, Sierra, Rinconada, Cristianitos, Gabino and Talega) from October to May to take advantage of the break of season through peak production of annual grasses. In late May or early June cattle are moved from the southern pastures to the northern pastures in the Chiquita and Gobernadora sub-basins (i.e., Lower Chiquita, Lower Gobernadora, Vineyard and Bull Pasture) and remain there until late September to take advantage of the barley stubble. From May through most of September, the

southern pastures “rest”. From October through most of May the natural areas of the northern pastures rest , while the alluvial valleys of Lower Chiquita, Bull Pasture, Lower Gobernadora and the Vineyard are re-planted with barley. Allowing a rest or fallow period is a well know agricultural concept, the benefits of which are documented in the literature. On Rancho Mission Viejo, these periods of rest are essential for the production of the next grazing seasons forage particularly in the natural southern pastures. During the transition from the southern pastures to the northern pastures in May or June, cattle are held temporarily in River Pasture, while adjustments to the herd size are made. On average the herd size is reduced by 20% during this transition time. In late September, cattle are returned to the southern pastures.

#### **4. Existing Stocking Rates**

Stocking rates on RMV vary according to the availability of water, the productivity of forage and the RMV 25% RDM standard. Generally speaking, in an average rainfall year, the Rancho Mission Viejo cattle herd averages approximately 500 head during the southern pasture grazing season (October – May ), distributed as follows: Talega 50 head, Gabino 125 head, Cristianitos 125 head, Rinconada 60 head and Sierra 100 head. As discussed above this is reduced by 20% during the transition from the southern pastures to the northern pastures, resulting in approximately 400 head being distributed in the northern pastures between June and September as follows: Chiquita Pastures 300 head and Vineyard, Bull Pasture, Lower Gobernadora 100 head (combined).

##### ***a) Future Grazing Practices***

The Draft NCCP/HCP Planning Guidelines and SAMP principles call for the GMP to address four fundamentals contained within the GMP policy statement, namely:

- address the needs of species and habitat identified for protection
- promote perennial grasses including native grasses
- allow for continued cattle grazing sufficient to support cattle operations
- where appropriate, reduce fuel loads for fire

This GMP will therefore describe adjustments to the current grazing practices necessary to implement these fundamentals and contribute to the AMP goals regarding natural habitat restoration/enhancement and comply with the Draft NCCP/HCP Planning Guidelines and the SAMP principles.

This section focuses on those portions of the policies dealing with native grasses and sufficiency of forage. Species needs are discussed in Section 3.3 of this Chapter and fire management is discussed in Section 3.4.

**b) Recommended Residual Dry Matter**

As noted above, recommended RDM for RMV pastures should account for rainfall, slope and soil type. Rainfall averages 12 to 16 inches per year, generally falling between the months of November and March. Sixteen (16) inches is considered “normal” for RMV. Wet and dry cycles, typically lasting 15 to 20 years, are characteristic of southern California. The region presently appears to be emerging from a wetter-than-normal cycle of years beginning in 1993. Previously, five consecutive years of sub-normal rainfall and runoff occurred in 1987 through 1991 (PCR, 2002). 2001 and 2002 were both below normal rainfall years (averaging 4 inches), while 2003 was above normal at 18 inches. Years with less than average rainfall result in lower productivity and can affect species composition. Slope and soil type are described in the Existing Setting section for each pasture and summarized below in *Table 5*.

*Table 5* sets forth the recommended RDM levels for RMV pastures.

**TABLE 5  
RECOMMENDED RESIDUAL DRY MATTER  
FOR RANCHO MISSION VIEJO PASTURES**

<b>Pasture</b>	<b>Slope</b>	<b>Soil Type</b>	<b>Recommended Dry Residue</b>
Chiquita Pastures	Low – Moderate	Mixed sands/silts and hardpan	750 lbs/ac
Nick’s Pasture	Low – Moderate	Clays & silts	750 lbs/ac
River Pasture	Low	Mixed silts/ clay and alluvium	725 lbs/ac
South 40	Low-Moderate	Clays	750 lbs/ac
Sierra	Moderate	Clays	750 lbs/ac
Rinconada	Low – Moderate	Silts	750 lbs/ac
Cristianitos Pasture	Low- Moderate	Clays	750 lbs/ac
Gabino	Moderate	Mixed silts/ clay and sands/silts	750 lbs/ac
Talega	Moderate	Sands	750 lbs/ac

**2. Recommended Stocking Rate**

To determine stocking rates for RMV pastures, two factors must be known, a) the total monthly forage requirement and b) the total annual forage per pasture. The following methodologies are

taken from UC Extension Leaflet 21456. The Animal Unit (AU) is the standard measurement of livestock forage requirements. One Animal Unit Month (AUM) is the amount of feed required to support one AU for one month. This value depends on the type of feed used (i.e., 1 AUM = 1,000 lb of air dry forage (e.g., stand of annual grasses) or 800 lb of hay or 533 lb of concentrate, etc.). *Table 6* shows representative AU values for cattle at different production stages using a mature cow with calf as the Standard Unit of 1.0.

*a) Total Forage Requirement*

**TABLE 6**  
**ANIMAL UNIT VALUES FOR AIR DRY FORAGE**

<b>Animal Type</b>	<b>AU</b>	<b>Monthly Forage requirement/head (lb air dry forage)<sup>1</sup></b>
Mature cow with calf	1.00	1,000
Mature bull	1.25	1,250
Weaned calf	0.6	600
Yearling 12-17 mos	0.7	700
Yearling 17-22 mos	0.75	750
<sup>1</sup> Monthly forage = AU x 1,000 air dry forage		

To determine the total monthly forage requirement, multiply the monthly forage requirement per head by the number of animals to be grazed:

$$\begin{array}{rclcl}
 \text{Monthly} & \times & \text{Number} & = & \text{Total} \\
 \text{Forage} & & \text{of} & & \text{Forage} \\
 \text{Requirement/} & & \text{Animals} & & \text{Required/} \\
 \text{Head} & & & & \text{Month}
 \end{array}$$

Using the average RMV herd of 500 head, divided as follows, 300 mature cows with calf, 20 mature bulls, 75 yearlings 12-17 mo and 75 yearlings 17-22 months, and 30 weaned calves the total forage required per month is as follows:

**TABLE 7**  
**TOTAL FORAGE REQUIRED PER MONTH**

<b>Animal Type</b>	<b>Number of Animals</b>	<b>Monthly Forage requirement/head (lb air dry forage)</b>	<b>Total Forage Required/Month (lbs/month)</b>
Mature cow with calf	300	1,000	300,000
Mature bull	20	1,250	25,000
Weaned calf	30	600	18,000
Yearling 12-17 mos	75	700	52,500
Yearling 17-22 mos	75	750	56,250
		<b>Total</b>	<b>451,750</b>

To calculate the total forage required, multiply the total forage required per month by the grazing season:

$$\begin{array}{ccccc} \text{Total} & \times & \text{Grazing} & = & \text{Total} \\ \text{Forage} & & \text{Season} & & \text{Forage} \\ \text{Required/} & & & & \text{Required} \\ \text{Month} & & & & \end{array}$$

For the 500 head of cattle RMV grazes for 8 months in the southern pastures, 3,614,000 lbs of forage would be required. For the 379 head that grazes in the northern pastures for 4 months, assuming a 25% reduction in cows, yearling and weaned calves, total forage required would be 1,377,600 lbs.

**b) Total Available Forage**

Total available forage is calculated by subtracting the desired residue level from the estimated production value and multiplying the difference by the number of grazable acres, as follows:

$$(\text{Production per Acre} - \text{Residue per Acre}) \text{ Acres} = \text{Available Forage}$$

For example, available forage on a 10 acre pasture with a recommended RDM of 750 lbs per acre with a production value of 850 lbs per acre would be  $(850-750) \times 10 = 1,000$  lbs available forage. In this example the 10 acre pasture would be capable of supporting one mature cow with calf for one month.

Because quantity and quality of available forage changes throughout the year, it is necessary to make seasonal adjustments. For example, late season or summer natural forage has limited



nutrient value (a more common sense way to think of this is “green grass is better than brown grass). *Table 8* sets forth adjustment factors.

**TABLE 8**  
**SEASONAL FORAGE AVAILABILITY ADJUSTMENT**

Season of Use	Seasonal Availability Adjustment
Year long	1.0
Winter	0.7
Spring	1.3
Summer	0.8
Fall	0.6

Total available forage is calculated by multiplying the available forage by the seasonal adjustment factor, as follows:

$$\text{Available Forage} \times \text{Seasonal Adjustment} = \text{Total Available Forage}$$

For example, using the available forage of 1,000 lbs from the previous example and adjusting for the highest production value, i.e., Spring, the total available forage would be 1,000 lbs x 1.3 = 1,300 lbs for the ten acre pasture.

*Tables 9 and 10* estimate the total available forage for each of the RMV pastures subject to this GMP. As noted above precipitation, temperature, soil characteristics and residue influence production and as such total available forage varies for year to year. For this GMP, an average production value of 1,500 lbs was used (Leaflet 21456). Recall that several pastures reviewed in Section 2 will not be grazed in the future as a result of either development or conservation of the pasture for habitat purposes (e.g., Ladera Land Conservancy). Also recall that available forage is only calculated for those pastures with RDM goals i.e., natural or unimproved pastures. As noted above, southern pastures are grazed in the winter and spring, while northern pastures are grazed in the summer and fall. *Tables 9 and 10* reflect this rotational grazing pattern.

**TABLE 9**  
**TOTAL AVAILABLE FORAGE FOR NORTHERN PASTURES**

<b>Pasture</b>	<b>Summer</b>	<b>Fall</b>
Chiquita Pastures	586,800	440,100
Nick's Pasture	259,200	194,400
River Pasture	397,200	297,900
<b>Total</b>	<b>1,243,200</b>	<b>932,400</b>

**TABLE 10**  
**TOTAL AVAILABLE FORAGE FOR SOUTHERN PASTURES**

<b>Pasture</b>	<b>Winter</b>	<b>Spring</b>
Sierra	460,425	858,075
Rinconada	610,050	1,132,950
Cristianitos	1,498,875	2,783,625
Gabino	2,268,000	4,212,000
Talega	643,125	1,194,375
<b>Total</b>	<b>5,480,475</b>	<b>10,181,025</b>

Based on the Total Available Forage set forth in *Tables 9 and 10*, and the required forage discussed above (3,614,000 lbs of forage in southern pastures for 500 head and 1,377,600 lbs of forage for northern pastures for 379 head) natural or unimproved RMV pastures produce more than sufficient forage to support the average RMV herd. It should be noted that in addition to the natural northern pastures, Vineyard, Bull, and the alluvial valleys of Lower Gobernadora and Lower Chiquita are improved via barley plantings which contribute significant additional forage value.

Based on the Total Available Forage set forth in *Tables 9 and 10* recommended maximum stocking rates, based on a mature cow (1,000 lbs AUM) for all natural northern and southern pastures are set in *Tables 11 and 12*. These stocking rates for northern pastures do not include cattle grazed on barley, therefore overall herd size in summer and fall will be higher than noted here due to the availability of barley forage. It should be noted that these stocking rates are designed to be adapted to the conditions in any given year such that the recommended residue is maintained. Changes to the stocking rates should be made according to the methods reviewed above. Other factors which influence the decision of how many cattle to stock in general (i.e., what size cattle herd to maintain) are those related to expenses. Expenses include insurance, interest, utilities (e.g., cost of water), health costs (innoculations etc), transportation, materials

(e.g., fencing costs) and labor. It is the combination of forage availability, expenses and market demand for beef that ultimately determine the herd size on RMV.

**TABLE 11**  
**RECOMMENDED MAXIMUM STOCKING RATES FOR NORTHERN PASTURES**

<b>Pasture</b>	<b>Summer</b>	<b>Fall</b>
Chiquita Pastures	146	110
Nick's Pasture	65	49
River Pasture	99	74
<b>Total</b>	<b>310</b>	<b>233</b>

**TABLE 12**  
**RECOMMENDED MAXIMUM STOCKING RATES FOR SOUTHERN PASTURES**

<b>Pasture</b>	<b>Winter</b>	<b>Spring</b>
Sierra	56	107
Rinconada	76	142
Cristianitos	187	348
Gabino	283	526
Talega	80	149
<b>Total</b>	<b>682</b>	<b>1,272</b>

### 3. Recommended Grazing Patterns in Relation to Adaptive Management Program Enhancement/ Restoration and Management Goals Following Transfer of Lands to RMV Open Space

#### a) *Role of Grazing in Restoration of Native Grasses*

Prior to discussing recommended grazing practices, it is useful to review the literature on grazing, particularly as it relates to native (valley and foothill) grasslands. The effects of grazing on valley and foothill grasslands however remain unclear. In spite of the fact that a long history of intensive grazing in California following European settlement has been cited as one of the primary reasons for the demise of native grasslands (Burcham 1957; Dasmann 1966 as cited; Keeley 1990; Bartolome and Gemmill 1981), most research has found that some intensity of grazing is beneficial to, or at least does not negatively affect, native grasses (Huntsinger *et al.* 1996). Several researchers have documented cases where native grasses have not increased in abundance on sites that have been excluded from grazing over 20 to 40-year periods (White

1967; Bartolome and Gemmill 1981; Goode 1981). Heady (1968, 1977) suggested that large native herbivores present prior to European colonization may have been an important factor in grassland formation and ecology. This assertion supports findings that some form of managed grazing may be useful as part of efforts to maintain or restore native grasses. Menke (1996) considers "Prescribed grazing to constitute the primary component of the first phase of a perennial grass restoration program." (pg. 23). Edwards (cite) notes that "bunchgrasses can benefit from grazing in a number of ways." (p.7) Grazing prevents the accumulation of dead residue within the grass bunch, increasing vigor and greater culm and seed production. Thatch reduction between bunches allows light and space for seedling recruitment. Edwards goes on to state "with proper levels of grazing at proper times, grazing can selectively reduce competition from plants lacking comparable recovery reserves such as annual grasses." The concept of timed grazing (i.e., proper levels of grazing at proper times) is central to the grazing systems described by Allan Savory in his Holistic Resource Management (HRM).

***b) Role of Grazing in Long-term Management of Coastal Sage Scrub***

As described above, the RMV practices of a north-south rotational grazing pattern can be postulated is the "proper level of grazing at the proper time" for RMV pastures. The current diversity and quality of habitat types and species on RMV would appear to support this statement. As a whole, RMV lands can be characterized as high quality upland and riparian vegetation communities that support a variety of listed and unlisted species (for a detailed description of the resources present on RMV the reader is referred to the Biological Resources Section of the GPA/ZC EIR. A specific example of this occurs in the Chiquita Pastures. The highest densities of California gnatcatchers occur in the Chiquita Pastures (particularly between Oso Parkway and San Juan Creek) which have not burned since the 1950's but are actively grazed. Based on this set of factors, one could postulate that the timed grazing used by the Ranch benefits coastal sage scrub by controlling the proliferation of annual grasses and maintaining a habitat structure suitable for the California gnatcatcher. Alternatively, one could postulate that the prevalence of gnatcatchers in the Chiquita Pastures is related to the production of barley as forage for cattle in the Chiquita Pastures - the cattle concentrate in the planted areas and do not forage extensively in the coastal sage scrub (the barley has a higher nutrient value); as a consequence the light grazing in CSS may provide a thinning function that offsets or substitutes for the absence of a major wildfire in middle Chiquita Canyon in over 50 years. In any event, it does appear that generally speaking cattle and native species have co-existed on RMV for several decades under the current grazing pattern and the current grazing practices are compatible with species persistence on the Ranch. A substantial change to the current grazing pattern, i.e., concentration of cattle in either northern or southern pastures, would eliminate the respective rest periods for these pastures, resulting in increased pressures on both forage and possibly non-forage habitats and associated species present in the pastures. The concentration of cattle in either the northern or southern pastures would also lower cattle productivity over time. This

GMP does not, therefore, recommend a substantial change to the overall RMV rotational grazing pattern following transfer of lands to the RMV Open Space. No change to the overall north-south grazing pattern described above is recommended following transfer of lands to the RMV Open Space. The exact configuration of the RMV Open Space will influence the number of cattle grazed in the north-south pattern, as available pasture will be reduced with future development of the Ranch Plan. The following pastures would be reduced by future development: Chiquita, Gobernadora, Bull, Nick's, Rinconada, Cristianitos, Gabino, and Talega. Reduction in available grazing acres and available forage will result in a smaller cattle herd being grazed on RMV over the long-term. Development within these pastures and the associated phased dedication of areas into RMV Open Space is anticipated to be phased over 20 to 25 years. As such, the overall adjustment to the herd size will also occur over a 20 to 25 year timeframe.

***c) Timed Grazing Recommendations for Specific Sub-basins***

The GMP does recommend specific changes to the manner in which cattle are grazed with a view towards increasing the productivity, health and vigor of native grasslands in specific areas. Appropriately timed grazing can have several beneficial effects on the vigor of native grasslands:

- Removal of litter and thatch
- Recycling of nutrients
- Stimulation of tillering (sprouting of new stalks)
- Removal and control of alien species
- Reduced transpiration (loss of water) by alien species making more water available for native grasses.

Consistent with the recommendations of the Draft NCCP/HCP Planning Guidelines and SAMP principles, timed grazing is one method to be used in the near-term for native grasslands enhancement in the following areas:

- Upper Gabino Canyon coastal sage scrub/valley needlegrass grassland (CSS/VGL) enhancement area
- Upper Cristianitos VGL enhancement area
- Blind Canyon VGL enhancement area

***d) Upper Gabino Canyon CSS/VGL Enhancement Area***

Section 6 of the Draft Southern NCCP/HCP Planning Guidelines describes the Upper Gabino Canyon CSS/VGL enhancement area as follows (see *Figure 6-1* of Guidelines):



Upper Gabino Canyon currently generates fine sediment due to extensive gully formation in the headwaters area. A combination of slope stabilization, grazing management and CSS/VGL restoration will reduce sediment generation and promote infiltration of stormwater which will reduce downstream impacts. This area has been identified for CSS/VGL restoration because some areas mapped as grassland in 1990 have since naturally revegetated with sparse CSS. Allowing a mixed community to regenerate may thus represent a more natural climax situation. This area has at least one area of annual grassland adjacent to the creek suitable for revegetation and several patches of low quality VGL suitable for enhancement.

The Restoration Plan prepared to support the RMV Open Space Adaptive Management Program describes the approach to slope stabilization (i.e., repair of the gullies) in Upper Gabino. In summary, repair of the gullies to stabilize the slopes involves three steps: (1) re-grading of the existing ranch road to drain in the opposite direction to the prevalent slope in the canyon, (2) re-contouring and filling in of the existing gullies and (3) stabilization of the repaired areas with straw wattles and VGL seed and plugs. For further details on this effort, the reader is referred to the Restoration Plan.

Grazing patterns in the Gabino pastures, specifically Upper Gabino, need to be managed to address two goals: (1) facilitate recovery of the repaired areas; and (2) encourage proliferation of existing VGL. Two specific adjustments are proposed to accomplish these goals. To facilitate the recovery of the repaired areas, stocking rates will be temporarily decreased to a maximum of 50 head for one to three VGL growing seasons i.e., November through April which is anticipated to provide sufficient time for establishment of VGL species in the repair areas.

In order to encourage the proliferation of existing VGL, cattle will be grazed in the upper portion of Gabino pasture identified for VGL enhancement during rapid spring growth and the peak production of annual grasses i.e., early February to late March. Grazing cattle during the rapid growth period and peak production of annual grasses will reduce annual grass seed production, reduce transpiration by the annual species, remove litter and thatch and promote the recycling of nutrients. By grazing cattle during the rapid spring growth and peak production of annual grassland species and then moving the cattle off the VGL enhancement area, native species will start their rapid spring growth and peak production after the cattle have reduced the competition from annual species.

#### *e) Upper Cristianito VGL Enhancement Area*

Section 6 of the Draft Southern NCCP/HCP Planning Guidelines describes the Upper Cristianitos VGL enhancement area as follows:

Upper Cristianitos is recommended for VGL revegetation and enhancement to reduce the generation of fine sediments from clayey terrains, promote stormwater infiltration and to enhance the value of upland habitats adjacent to Cristianitos Creek. This area includes patches of annual grassland underlain by clay soils suitable for revegetation and low quality VGL suitable for enhancement. These recommended revegetation and enhancement areas also are contiguous with existing medium quality grassland, suggesting a high likelihood of successful restoration.

Similar to the grazing pattern proposed for the portion of Upper Gabino pasture identified for CSS/VGL restoration, a small adjustment to current grazing practices is recommended for the Upper Cristianitos VGL enhancement area. As noted in the description of the existing RMV grazing patterns, the southern pastures, including Cristianitos, are grazed between October and May. In order to reduce competition from annual grasses in the VGL enhancement area, the GMP recommends that grazing in the VGL enhancement area be concentrated in early February to late March during the rapid spring growth and peak production periods for annual species and ahead of the same periods for native species beginning by late March early April.

*f) Blind Canyon VGL Enhancement Area*

Section 6 of the Draft Southern NCCP/HCP Planning Guidelines describes the Blind Canyon VGL enhancement area as follows:

Portions of Blind Canyon mesa are recommended for grassland revegetation and enhancement. This area has at least one patch of annual grassland suitable for revegetation and possibly two patches of low quality VGL suitable for enhancement. These areas are adjacent to existing medium quality VGL, suggesting a high likelihood of successful restoration. Additional fieldwork in the area may reveal additional restoration opportunities.

To promote native grasses in Blind Canyon which lay within the TRW pasture, the GMP recommends that grazing in the VGL enhancement area be concentrated in early February to late March during the rapid spring growth and peak production periods for annual species and ahead of the same periods for native species.

*g) Upper Chiquita Canyon Conservation Easement Area*

As discussed in Section 2, cattle have not been grazed in the Chiquita Pastures north of Oso Parkway since 1996. Consistent the requirements of the FTCN – Oso Section Biological Opinion and TCA's management plan for this area, the following grazing practices are recommended for Chiquita Pastures north of Oso Parkway: RDM is set at 750 lbs per acre. Based on the productivity of the Chiquita grasslands, the recommended maximum stocking rate will be 146

head in a normal rainfall year. As noted previously stocking rates are subject to change (either up or down) to maintain the recommended RDM. Chiquita is a northern pasture and as such is recommended for grazing in the summer and fall, specifically in the months of September through May.

#### **4. Recommended Configurations & Resources**

In order to implement the recommended grazing patterns described above, minimal changes to existing pasture configurations and resources are necessary. Existing fencing within the Gabino, Cristianitos & Blind pastures will allow for the movement of cattle in and out of the VGL enhancement areas.

In order to graze cattle within the Chiquita pastures north of Oso Parkway, improvement to the fencing adjacent to Oso Parkway and SR-241 will be necessary. A thorough evaluation, and improvements as necessary of all fencing in the Chiquita pastures shall be conducted prior to the re-introduction of cattle into this area.

### **3.3 Sensitive Habitat Exclusions**

Sensitive habitat exclusions (i.e., those areas where cattle should be excluded) can be broken into two categories: a) those areas from which cattle should be removed on a temporary basis (e.g., seasonally); and b) those areas where cattle should be removed permanently.

#### **a. Seasonal Exclusions**

The purpose of seasonal exclusions is to remove cattle from a specific area for a specific time period for the benefit of a specific resource or species. This GMP recommends seasonal exclusions during the breeding season of the arroyo toad that runs approximately from March to mid-June. As noted above, the current RMV grazing practice is to graze cattle in the southern pastures (Sierra, Rinconada, Cristianitos, Gabino and Talega) from October to May. In late May or early June cattle are moved from the southern pastures to the northern pastures in the Chiquita and Gobernadora sub-basins (i.e., Lower Chiquita, Lower Gobernadora, Vineyard and Bull Pasture) and remain there until late September. During the transition from the southern pastures to the northern pastures, cattle are held temporarily in River Pasture, while adjustments to the herd size are made. As noted in the description for the arroyo toad, toads occur in discrete reaches of San Juan Creek, lower Gabino Creek, lower Cristianitos Creek and Talega Creek. The potential for cattle grazing and toad breeding to overlap therefore occurs in the following pastures: Cristianitos (Gabino Creek), Talega (Talega Creek) and River (San Juan Creek) pastures (*Figure 4*). Arroyo toads do not occur in upper Gabino Creek within Gabino pasture, and Cristianitos Creek lies within the Donna O'Neill Conservancy or TRW lease area where



cattle are permanently excluded. To reduce potential toad mortality resulting from trampling of either egg masses or metamorphs by cattle, the following seasonal exclusions are recommended:

1. Cattle should be seasonally excluded from active breeding pools and adjacent sand bars and benches to the extent practical within lower Gabino Creek during arroyo toad breeding season. Temporary fencing around active breeding pools and adjacent sand bars and benches should be erected to discourage cattle from entering these areas.
2. Cattle should be seasonally excluded from active breeding pools and adjacent sand bars and benches to the extent practical within San Juan Creek during arroyo toad breeding season. Temporary fencing around active breeding pools and adjacent sand bars and benches should be erected to discourage cattle from entering these areas.

No recommendations are made for Talega pasture because Talega Creek is largely located on MCB Camp Pendleton property, outside the RMV perimeter fence.

**b. Permanent Exclusions**

The purpose of permanent exclusions is to remove cattle from a specific area for the benefit of a specific resource or species. Cattle are currently excluded from the Gobernadora Ecological Restoration Area and the Donna O'Neill Conservancy. The GMP recommends continued exclusion of cattle from these areas, with the exception for fuel modification treatment as discussed in the next section. In addition to these permanent exclusions, the GMP also recommends exclusion of cattle from the slope wetlands located in the Chiquita, Rinconada and Sierra Pastures.

### **3.4 Fire Management**

As discussed in Section 3.1, one of the objectives of this GMP is to identify pastures that may be subject to prescribed fire, and identify appropriate pasture rest periods following burns to promote habitat recovery.

An integral part of the Adaptive Management Program is the Wildland Fire Management Plan (WFMP). The WFMP is composed of five parts, (1) Fire Management Program, (2) Prescribed Fire Program, (3) Long-Term Strategic Fire Protection Plan, (4) Short-Term Tactical Fire Suppression Plan and (5) Research and Monitoring Criteria. Pertinent to this GMP is the relationship between grazing and fire. According to the WFMP, "because of the high numbers of wildfires that have burned through Rancho Mission Viejo since the late 1900's plus an active

cattle grazing program, and the late 1980's and early 1990's Vegetative Management Program (prescribed burns) the wildland vegetation is fairly uniform throughout RMV" (page 3-9). The predominate vegetation over most of the Ranch is scattered coastal sage scrub over cured grass (Fuel Model 2). Should the fire frequency be disrupted (ie. longer intervals between fires occurs) or cattle grazing be eliminated from RMV, the result would be an evolution of the vegetation into fuel models that have the potential for catastrophic fires i.e., FM 6 (chaparral fuels 6ft in height or less) and eventually FM 4 (chaparral fuels greater than 6ft). Grazing management therefore plays a positive role in the management of fire on RMV.

The WFMP identifies prescribed burns as a management tool in the following areas:

- Sulphur Canyon (CSS restoration site)
- Talega/La Paz Canyon (Oak woodland site)
- Cristianitos/Gabino (Oak woodland site)
- Chiquita/Narrow Canyon (Native grassland site)
- Canada Gobernadora (Native grassland site)

Grazing can also play a negative role in the recovery of burned areas. Burned areas, whether as a result of a prescribed burn or a "natural" wildfire, need time to recover. The re-introduction of cattle into a burned area too early can negatively affect the natural recovery process and may result in state-transition from one vegetation type to another (e.g., coastal sage scrub to grassland). The WFMP contains management hypotheses to be tested for three of the major habitat types on RMV (CSS, grassland and oak woodland). Results of the testing of these hypotheses will identify the optimal time that grazed can be re-introduced into a burned area.

The WFMP contains no management hypothesis for riparian systems as according to the WFMP "fire has no place in riparian area management". According to the WFMP most fires in riparian zones are accidental and of high severity, causing relatively high rates of top kill. Riparian areas should be kept fire free if all possible. According to the WFMP the fuel load in GERA is increasing and there is an abundance of ladder fuels that will carry wildfire into the crowns of the planted oaks, willows and sycamores. The WFMP recommends maintenance of a fire break between GERA and the surrounding native or non-native fuels. Plus the pruning of low hanging branches on the oaks and sycamore to reduce ground fire laddering. To facilitate reduction of fuel loads within GERA, this GMP propose the use of timed grazing within GERA. Once every three years, up to 30 head of bulls will be grazed in GERA between the months of June to October. Timed grazing within GERA will reduce the risk of a severe wildfire in GERA by reducing the both the grass fuel load and the ladder fuel load.

Similar to GERA, the Donna O'Neill Land Conservancy may require periodic fuel load reduction, up to 20 head of cattle for a period of 60-90 days in late summer/early fall (August-October) is recommended.



## **CHAPTER 4: MONITORING**

### **4.1 Relationship of Grazing Management Plan to Stressor Based Adaptive Management Program**

*Appendix J* is the proposed Adaptive Management Program for the RMV Open Space. The proposed Adaptive Management Program is stressor based. The underlying principle of this approach is that management and monitoring should be directed primarily towards environmental factors known or thought to be directly or indirectly responsible for ecosystem change. Over-grazing is identified as one of six general environmental stressors known or likely to be relevant to the habitat reserve. The Adaptive Management Program presents conceptual models that depict known and potential relationships between over-grazing and the vegetation community and individual species responses. Further, the Adaptive Management Program presents adaptive management issues, goals and objectives and monitoring in relation to these conceptual models. Hypotheses between the role of grazing and vegetation communities and individual species responses are set forth, and monitoring is proposed to response to these hypotheses.

It is not the function of this GMP to set forth and respond to adaptive management hypotheses. These need to be viewed from the vegetation community and individual species perspective as described in Adaptive Management Program. Rather, as described in Section 1, the purposes of the GMP are to: 1) contribute an important element of the long term Adaptive Management Program goals of enhancement/restoration of native habitats; and 2) demonstrate consistency with Draft NCCP/HCP Planning Guidelines and SAMP principles regarding grazing management. To achieve these purposes the GMP has identified grazing practices which seek to maintain and, where feasible, enhance long-term net habitat value within the subregion, promote perennial grasses, including native grasses, provide sufficient forage to support a cattle operation and where appropriate reduce fuel loads for fire. The monitoring portion of the GMP should therefore seek to answer whether these purposes are being achieved. In answering whether these objectives are being achieved, monitoring for the GMP will provide valuable input into the iterative feedback loop of the Adaptive Management Program.

### **4.2 Monitoring Objectives**

To answer the question of whether the GMP is achieving its purposes the monitoring objectives are established for each of the elements addressed by the GMP, namely, forage production, restoration of native habitats and sensitive habitat exclusions:

## 4.3 Forage Production and Residue

### *Objectives*

The following objectives are established for forage production and residue:

- Conduct monitoring of RDM levels to ensure consistency with recommended levels
- Conduct monitoring for sufficiency of forage production to support a cattle operation.

### *Monitoring*

Accurate inventory and monitoring is essential to effective management of the grazed pastures. This information together with the existing conditions data described above will provide RMV managers with the data set necessary to set and adjust AUM's, determine current pasture conditions, predict future pasture conditions, and evaluate management practices.

#### **a. Plot Location and Design**

Forage production and RDM measurements should be taken in all natural or unimproved pastures. A minimum of ten permanent sample plots should be established on a stratified basis throughout the pasture in locations indicative of representative or typical conditions. All plot locations should be located using GPS and a permanent marker to provide a continuous record. Forage production measurements should be taken at peak forage production time to record the maximum available forage. RDM should be measured before the break of season.

#### **b. Technique**

According to Leaflet 21327, RDM weights can be estimated by direct clipping and weighing, double sampling (visual estimates with clipped herbage reference points) and with experience, visual estimates. The current RMV managers have over 40 years experience in running cattle on RMV lands and have traditionally used the visual estimate method. RMV managers intend to continue using this method. To provide a verification of the visual estimate, direct clipping and weighing will also be used. The normal procedure for determining the weight of residual dry matter is to use either a square foot or 1/10 square meter frame and clip the herbage as close to the ground as possible (approximately 1/2-inch high). All litter or shattered plant material at the ground surface which can easily be picked up should be included in the sample. Grams scales are recommended for weighing samples in the field, and air-dry weights are satisfactory under most summer and early fall conditions. Wet or green forage samples should be oven dried for dry matter determination. Grams per square foot multiplied by 96 gives the pounds per acre. Example: 12 grams per square foot x 96 = 1150 pounds per acre. All species within the square

foot will be recorded, as will physical information including soils, soil moisture, slope and aspect. Weather conditions at the time of sampling will also be recorded.

**c. Permanent Photo Points**

In conjunction with the selection of plot locations and the location of same with GPS and permanent marker, a photo point will be established. Photos should be taken at the time of sampling using the same ASA film and approximately the same time of day. The photo point will provide a visual reference of the plot location, and further verify the visual estimate of the RMV managers.

**d. Reporting**

All forage production and RDM measurements will be recorded on data sheets (Exhibit A) and compiled for use in the annual report discussed in Section 4.6.

## **4.4 Restoration of Native Habitats**

Monitoring for the restoration of native habitats and their response to the application of timed grazing as a restoration technique will be accomplished as part of the Adaptive Management Program, and not as part of this GMP. The monitoring obligation of the GMP relative to restoration of native habitats is to ensure that the recommended grazing patterns are followed. In this regard monthly reports will be prepared by RMV managers documenting the location and number by pasture of cattle on the ranch. Exhibit B is a sample form that RMV managers will use to prepare the reports.

A brief summary of the Adaptive Management Program monitoring proposed for native grasslands and coastal sage scrub is provided below. The reader is referred to Adaptive Management Program (*Appendix J*) for further details.

**a. Coastal Sage Scrub**

Coastal sage scrub will be monitored at the landscape, habitat and species levels. The routine passive, long-term monitoring of coastal sage scrub and focal species will include two main tasks:

- Evaluation and update of the entire coastal sage scrub vegetation database at 5-year intervals.
- Annual on-the-ground monitoring of selected sample plots distributed across the RMV Open Space in a spatial distribution that represents the heterogeneity of the



Reserve and in key areas where environmental stressors are most likely to operate (e.g., along the Open Space-development edge).

**b. Native Grasslands**

The monitoring program for grasslands will use the same general methods described above for coastal sage scrub and the reader is directed to that section for more detail. The key points for the monitoring program are summarized here:

- Monitoring at landscape, habitat, species, and species assemblage levels.
- 5-year mapping of grassland system.
- Annual on-the-ground monitoring of selected sample plots across the physiographic gradient of grasslands in the RMV Open Space.
- Collection of regional climate, weather and air quality information

#### **4.5 Sensitive Habitat Exclusions**

Similar to Restoration of Native Habitats, the monitoring of specific habitat or species responses to cattle exclusions is a function of the Adaptive Management Program. Monitoring through the Adaptive Management Program will determine whether exclusions are a positive or negative influence through the iterative testing of hypothesis related to the conceptual models prepared for both habitat types and specific species.

The obligation of the GMP is to monitor and report on implementation of the recommended exclusions. For permanent exclusions, e.g., vernal pools, RMV managers will report quarterly on the status of the exclusion. Questions such as is the exclusionary mechanism (e.g., fencing) in place and is the mechanism effective (e.g., is it keeping cattle out) will be asked. If the mechanism is not effective, alternatives will be proposed and reviewed with the Habitat Reserve Manager.

For seasonal exclusions, e.g., arroyo toad breeding season, reporting will occur on a weekly basis for the duration of the exclusion. Similar questions will be asked for seasonal exclusions, such as whether the exclusionary mechanism (e.g., fencing) is in place and whether the mechanism is effective (i.e., is it keeping cattle out). If the mechanism is not effective, alternatives will be proposed and implemented as appropriate.

## **4.6 Annual Reporting**

RMV managers will prepare an annual report summarizing all monitoring efforts and the results thereof, and provide same to the County of Orange.

**List of Agencies and Persons Contacted**

**List of Preparers**

**Acronyms and Abbreviations**

**References**



# **DRAFT – APPENDIX J-4 RMV GRAZING MANAGEMENT PLAN**

## **CHAPTER 1**

### **1.1 Background**

This Grazing Management Plan (GMP) has been prepared to guide the management of grazing on Rancho Mission Viejo (RMV), located in southern Orange County, California. RMV has grazed cattle on its lands since 1882 and intends to continue to do so in the long term on lands which may, as part of approval of the GPA/ZC application, become dedicated as open space (RMV Open Space). As discussed later, this GMP is an integral part of the Adaptive Management Program for the proposed RMV Open Space and further implements certain key NCCP/HCP and SAMP/MSAA policies.

RMV is surrounded by the planned community of Ladera Ranch and the cities of Mission Viejo, San Juan Capistrano and San Clemente on the west. The City of Rancho Santa Margarita bounds the northern edge of RMV; the southern edge is bounded by Marine Corps Base (MCB) Camp Pendleton in San Diego County. Caspers Wilderness Park and the Cleveland National Forest bound the property on its eastern edge.

#### **1.1.1 Relationship to Southern Subregion NCCP/HCP**

As noted above, the Grazing Management Plan is a key component of the Adaptive Management Plan for the RMV Open Space and is intended to be complementary to any NCCP/HCP program completed in the future for the Southern Subregion. Implementation of an Adaptive Management Program is one of the three fundamental conservation planning principles set forth under the NCCP Conservation Guidelines. As stated in the NCCP Conservation Guidelines "...a status quo strategy of 'benign neglect' management will likely result in substantial further loss of CSS diversity..." The Guidelines concluded that habitat reserves ... should be managed in ways responsive to new information as it accrues." Although the Conservation Guidelines were directed towards coastal sage scrub (CSS) in a habitat reserve context, the same adaptive management principles apply to the diversity of vegetation communities and habitat types in protected open space such as the RMV Open Space.

**a. Draft Southern NCCP/HCP Planning Guidelines**

Section 3.3 of the Draft EIR discusses the project history including the development of Draft Southern NCCP/HCP Planning Guidelines by the NCCP/SAMP Working Group. Using the broader NCCP Tenets as a framework and starting point, the Draft Southern NCCP/HCP Planning Guidelines provide guidance for decision-makers that are keyed to local biologic, hydrologic and geomorphic conditions. Although considered a “work in progress” the guidelines represent the most current thinking regarding protection, restoration and management priorities for the resources within the study area and for this reason are discussed here. These guidelines address resources at both the landscape (watershed) and more detailed hydrologic/geomorphic sub-basin levels. For each sub-basin planning unit, the guidelines identify the important biological resources and key hydrologic/geomorphic processes. Protection, restoration and management recommendations for each sub-basin also are included.

The Draft Southern NCCP/HCP Planning Guidelines are comprised of three primary components:

- 1) NCCP Tenets outlined in the 1993 NCCP Conservation Guidelines;
- 2) Reserve Design Principles prepared by the panel of NCCP Science Advisors convened by The Nature Conservancy; and
- 3) A set of draft sub-basin specific planning recommendations prepared by the NCCP/SAMP working group.

In addition to these components the Draft Southern NCCP/HCP Planning Guidelines also set forth general policies for resource protection, management and restorations that apply at the planning (landscape) area scale. General Policy 6 of the guidelines addresses grazing management as follows:

- Cattle grazing shall be permitted within the Rancho Mission Viejo portion of the Habitat Reserve provided that grazing activities are consistent with a “grazing management plan” approved as part of the certified NCCP/HCP
- The grazing management plan (GMP) approved as part of the NCCP/HCP shall identify suitable grazing areas and allowable grazing practices that are consistent with certified NCCP/HCP policies and the aquatic resource management program. The GMP will address grazing practices following approval of the NCCP/HCP and prior to transfer of lands to the Habitat Reserve.
- The GMP will incorporate grazing management techniques designed to address the needs of species and habitat identified for protection, promote perennial grasses including native grasses, allow for continued cattle grazing sufficient to

support cattle operations and, where appropriate, reduce fuel loads for fire. (Page 3-11, Draft Southern NCCP/HCP Planning Guidelines)

The following specific grazing management recommendation is made for the Cristianitos Sub-basin and the upper and middle sub-units of the Gabino sub-basin:

- Pursuant to the GMP, implement grazing management techniques to help protect listed and other selected species and habitat, promote perennial grasses including native grasses, allow for continued cattle grazing sufficient to support cattle ranching operations, and, where appropriate reduce fuel loads for fire.

In addition, management of grazing is to be factored into the management program for sensitive plant locations in the Chiquita sub-basin, Gobernadora sub-basin, Central San Juan/Trampas sub-basin, Cristianitos sub-basin and the Gabino sub-basin as follows:

- Implement a management program for protected sensitive plant locations in the sub-basin, including control of non-native invasive species, management of grazing as part of the adaptive management program, and prevention of human disturbance

### **1.1.2 Relationship to San Juan Creek Watershed and Western San Mateo Creek Watershed SAMP/MSAA**

The Adaptive Management Program and this Grazing Management Plan are intended to be complimentary to any SAMP/MSAA program that is completed in the future, and, as such, have been structured to comply with the goals, objectives, and Tenets and Principles of the SAMP/MSAA.

#### **b. SAMP/MSAA Planning Principles Management Recommendations**

Section 3.3 of the Draft EIR discusses the project history including the development of Draft Watershed and Sub-basin Planning Principles ("Draft Watershed Planning Principles") by the NCCP/SAMP Working Group. The Draft Watershed Planning Principles provide a link between the broader SAMP/MSAA Tenets for protecting and conserving aquatic and riparian resources and known, key physical and biological resources and processes. Although considered a "work in progress" the principles represent the most current thinking regarding protection, restoration and management priorities for the resources within the study area and for this reason are discussed here.



The planning principles provide specific grazing management recommendations for Gabino sub-basin as follows:

- Protect headwaters through restoration of existing gullies using a combination of slope stabilization, grazing management, and native grassland and/or scrub restoration. To the extent feasible, restore native grasses to reduce sediment generation and promote infiltration of stormwater.
- Modify grazing management in the upper portion of the sub-basin to support restoration and vegetation management in the headwater areas.

## **1.2 Purpose of the Grazing Management Plan**

Grazing management policies are under review in numerous government agencies. A common thread in the review of policies and ongoing discussion about grazing management is the recognition of its importance to the ecology of our grasslands. According to Menke (1996), herbivory and fire are natural and necessary processes, which remove litter, recycle nutrients, stimulate tillering and reduce seedbanks of competitive annual plants. Recognition that grazing is important to the evolved ecology of grasslands, however, as Edwards (1992) notes, is not license to use it indiscriminately; nor is understanding that grazing is not always needed license to eliminate it in advance of analyzing site-specific needs.

The purposes of this GMP are to: (1) demonstrate consistency with the Draft Southern NCCP/HCP Planning Guidelines and the Draft Watershed Planning Principles regarding grazing management (see above); and (2) contribute an important element of the long term Adaptive Management Program (AMP) goals of enhancement/restoration of native habitats. The GMP will address grazing practices following approval of the Southern NCCP/HCP and prior to transfer of lands to the Habitat Reserve and practices following transfer of lands into the Habitat Reserve.

## **1.3 Participants in the Grazing Management Plan**

Participants in the development of this plan included Rancho Mission Viejo, USFWS, CDFG, USACE and the County of Orange. Consultant support was provided by Rod Meade NCCP/SAMP consultant, Bill Boyd Esq., Phil Behrends of Dudek & Associates, Inc., and Huitt Zollars.

## **CHAPTER 2: EXISTING CONDITIONS**

The following descriptions of the existing setting are provided to familiarize the reader with the climate, geomorphology and vegetation communities of RMV. An understanding of the factors which influence where, when and how grazing is conducted is vital to the development of a successful grazing management plan.

### **2.1 Biological Setting**

RMV is located within the San Juan Creek watershed and the western portion of the San Mateo Watershed.

#### **2.1.1 Climate**

The Mediterranean Climate in Southern California is characterized by brief, intense storms between November and March. It is not unusual for a majority of the annual precipitation to fall during a few storms in close proximity to each other. Average annual rainfall on Rancho Mission Viejo resulting from this Mediterranean precipitation pattern is 12 to 16 inches. The higher elevation portion of the watershed (typically the headwater areas) typically receive significantly greater precipitation due to orographic effects. In addition, rainfall patterns are subject to extreme variations from year to year and longer term wet and dry cycles. The combination of steep, short watersheds; brief intense storms; and extreme temporal variability result in “flashy” systems where stream discharge can vary by several orders of magnitude over very short periods of time.

Wet and dry cycles, typically lasting up to 15 to 20 years, are characteristic of southern California. The region presently appears to be emerging from a wetter-than-normal cycle of years beginning in 1993. Previously, five consecutive years of sub-normal rainfall and runoff occurred in 1987 through 1991.

Prior droughts of recent note include the brief, ‘hard’ drought of 1976 and 1977, and 1946 to 1951. Previous notable wet periods of the recent past were observed in 1937 to 1944 and 1978 to 1983. An unusually protracted sequence of generally dry years began in 1945 and continued through 1977. During this period, rainfall was approximately 25 percent below the average for the prior 70 years (Reichard, 1979; Lang et al., 1998). Both recharge and (especially) sediment transport were diminished to even greater degrees during this period. Although wet years did occur during this period, dry conditions were sufficiently persistent to lower groundwater levels and contract the extent of riparian corridors.

## **2.1.2 Geomorphology**

### **a. Regional Geology**

The San Juan and San Mateo creek watersheds are located on the western slopes of the Santa Ana Mountains, which are part of the Peninsular Ranges that extend from the tip of Baja California northward to the Palos Verdes Peninsula and Santa Catalina Island. The geology of the region is complex and has been dominated by alternating periods of depression and uplift, mass wasting, and sediment deposition. Within the watersheds, the Santa Ana Mountains are composed of igneous, metavolcanic, and metasedimentary rocks of Jurassic age and younger. The exposed rocks in the mountainous areas are slightly metamorphosed volcanics, which have been intruded by granitic rocks of Cretaceous age, principally granites, gabbros, and tonalites. Overlying these rocks are several thousand stratigraphic feet of younger sandstones, siltstones, and conglomerates of upper Cretaceous age, composed largely of material eroded from the older igneous and metavolcanic rocks now underlying the Santa Ana Mountains.

Younger sedimentary rocks comprise the bedrock between the Santa Ana Mountains, their foothills, and the Pacific Ocean. Most of the study area is underlain by these marine and non-marine sandstones, limestones, siltstones, mudstones, shales, and conglomerates, many of which weather, erode, and/or hold groundwater in characteristic ways. Overlying them are Quaternary stream terrace deposits and Holocene stream channel deposits. During the past two million years or longer, at least three processes that fundamentally affect structure and process along the major stream channels have affected the two watersheds:

1. Continuing uplift, typically 400 feet or more, which has left at least four major stream terrace levels along the major streams.
2. Downcutting of the main canyons to sea levels, which have fluctuated widely during the global glaciations. The flat valley floors were deposited as sea level rose, leaving often-sharp slope breaks at the base of the existing hillsides and tributary valleys. These materials are geologically young, soft, and prone to incision under certain conditions.
3. Soils formed under climates both warmer/colder and drier/wetter than at present, which led to development of hardpans that have been eroded to form mesas. These hardpan mesas have minimal infiltration and presently channel flows into headwater streams.

## **b. Terrains**

Terrain designations are largely based on soils, geology and topography, as these provide many of the fundamental factors that influence the hydrology and geomorphology characteristic of each terrain. Bedrock is the raw material from which soils are weathered, and, as such, it determines the size and types of particles that will comprise the soil. The resistance of different kinds of bedrock to weathering and erosion also controls the topography of the landscape within a given terrain and, therefore, influences the hydrology of the watersheds and morphology of the drainage networks. Watershed hydrology is also strongly influenced by the climatic patterns typical of Southern California.

There are three major geomorphic terrains found within the San Juan Creek and San Mateo Creek watersheds: (1) sandy and silty-sandy; (2) clayey; and (3) crystalline. These terrains are manifested primarily as roughly north-south oriented bands of different soil types. The soils and bedrock that comprise the western portions of the San Juan Creek watershed (*i.e.*, Oso Creek, Arroyo Trabuco, and the lower third of San Juan Creek) contain a high percentage of clays in the soils. The soils typical of the clayey terrain include the Alo and Bosanko clays on upland slopes and the Sorrento and Mocho loams in floodplain areas. In contrast, the middle portion of the San Juan basin, (*i.e.*, Cañada Chiquita, Bell Canyon, and the middle reaches of San Juan Creek) is a region characterized by silty-sandy substrate that features the Cieneba, Anaheim, and Soper loams on the hill slopes and the Metz and San Emigdio loams on the floodplains. The upstream portions the San Juan Creek watershed, which comprise the headwaters of San Juan Creek, Lucas Canyon Creek, Bell Creek, and Trabuco Creek, may be characterized as a “crystalline” terrain because the bedrock underlying this mountainous region is composed of igneous and metamorphic rocks. Here, slopes are covered by the Friant, Exchequer, and Cieneba soils, while stream valleys contain deposits of rock and cobbly sand. The upland slopes east of both Chiquita and Gobernadora canyons are unique in that they contain somewhat of a hybrid terrain. Although underlain by deep sandy substrates, these areas are locally overlain by between 2 and 6 feet of exhumed hardpan.

### **2.1.3 Vegetation Community Description**

The following descriptions of vegetation communities are taken from the NCCP vegetation database. *Appendix A* contains a general description of the vegetation communities discussed more specifically here for RMV. The reader is also referred to the Draft EIR for a full description of the NCCP vegetation database, its sources and the history of its development.



## **a. Grasslands on Rancho Mission Viejo**

The NCCP/HCP vegetation database for RMV does not distinguish between annual and native grasslands. However, several individual mapping efforts have been conducted in various areas of RMV, which allows for a general characterization of the annual and native grasslands.

### **1. Annual Grasslands**

Annual grasslands on RMV are dominated by bromes (*Bromus madritensis*, *Bromus diandrus*, *Bromus hordaceus*), wild oats (*Avena barbata*, *Avena fatua*), rat-tail fescue, barleys (*Hordeum* spp.) and Italian ryegrass (e.g., Gray and Bramlet 1992; MBA 1996; Dudek 2001). Annual forbs common to non-native grasslands in the RMV include Indian milkweed (*Asclepias eriocarpa*), tocalote, common fiddleneck (*Amsinckia menziesii*), popcornflower (*Plagiobothrys* spp.), black mustard (*Brassica nigra*), field mustard (*Brassica rapa*), common catchfly, stickwort (*Spergularia arvensis*), miniature lupine (*Lupinus bicolor*), white-whorl lupine (*Lupinus densiflorus* var. *austocollum*), burclover (*Medicago polymorpha*), bristled clover (*Trifolium hirtum*), red-stemmed filaree, white-stemmed filaree (*Erodium moschatum*), and fluellin (*Kickia spurria*) (MBA 1996). Tarweeds and doveweed become dominant in later summer and fall (MBA 1996). Cardoon also occurs in portions of the grasslands on RMV. .

Gray and Bramlet (1992) also describe a ruderal grassland that consists of early successional grassland dominated by pioneering herbaceous species of several genera such as *Centaurea*, *Brassica*, *Malva*, *Salsola*, *Eremocarpus*, *Amaranthus* and *Atriplex*.

### **2. Native Grasslands**

Native grasslands on RMV are designated as Valley needlegrass grassland (called southern coastal needlegrass grassland by Gray and Bramlet). Gray and Bramlet define needlegrass grassland as a grassland with more than 10 percent cover of purple needlegrass (*Nassella pulchra*). It is associated with the annual grasses listed above, leafy bentgrass (*Agrostis pallens*), junegrass (*Koeleria macrantha*), cane bluestem (*Bothriochloa barbiodis*), coast range melic (*Melica imperfecta*) and annual forbs such as common goldenstar (*Bloomeria crocea*), blue dicks, Cleveland's goldenstar (*Dodecatheon clevelandii*), smooth cat's-ear (*Hypochaeris glabra*), lilac mariposa lily (*Calochortus splendens*), many-stemmed dudleya (*Dudleya multicaulis*), blue-eyed grass (*Sisyrinchium bellum*) and rosin weed (*Calycadenia truncata*) (Gray and Bramlet 1992; Dudek 2001; MBA 1996).

### **3. Distribution of Grasslands on Rancho Mission Viejo**

Grasslands are scattered throughout the lower elevations of the Ranch, with the largest, contiguous concentration in the south Ranch. Other areas supporting large patches of grassland include Chiquita Ridge, Ladera Open Space, Cristianitos Canyon, the TRW lease area, and upper Gabino Canyon.

Although annual and native grasslands are not differentiated in the NCCP vegetation database, some survey work was done on RMV by St. John in 1989 (St. John 1990) and later mapping in specific areas has been completed by Dudek (1997, 2001) and MBA (1996). Generally, native grasslands are patchy north of Highway 74, with patches occurring in Ladera Open Space east of Arroyo Trabuco (Dudek 2001) and Chiquita Canyon (St. John 1990; Dudek 1997; MBA 1996). Much of the native grassland on RMV is located in the southern San Juan and San Mateo watersheds in upper Gabino Canyon (St. John 1990; Dudek 2001), Verdugo Canyon (St. John 1990), and Cristianitos Canyon (St. John 1990; MBA 1996; Dudek 1990). St. John made a preliminary estimate of approximately 3,300 to 4,000 acres of native grassland on RMV property, but based on the Dudek's refined mapping of native grasslands, the total appears to be closer to 1,100 acres. Major areas of native grassland include Cristianitos Canyon (~405 acres) and upper Gabino Canyon (276 acres), with smaller areas of native grassland in Blind Canyon (102 acres) and middle and lower Chiquita Canyon (76 acres). There are likely to be several smaller patches of unmapped native grassland scattered throughout the RMV, but individual patches are unlikely to be more than a few 10s of acres in size. The cumulative total of these unmapped areas is likely to be no more than a few hundred acres.

#### **b. Coastal Sage Scrub Communities on Rancho Mission Viejo**

Coastal sage scrub is dominated by a characteristic suite of low-statured, aromatic, drought-deciduous shrubs and subshrub species. Composition varies substantially depending on physical circumstances and the successional status of the habitat. Characteristic species include California sagebrush (*Artemisia californica*), California buckwheat (*Eriogonum fasciculatum*), laurel sumac (*Malosma laurina*), California encelia (*Encelia californica*), and several species of sage (e.g., *Salvia mellifera*, *Salvia apiana*) (Holland 1986; Sawyer and Keeler-Wolf 1995). Other common species include brittlebush (*Encelia farinosa*), lemonadeberry (*Rhus integrifolia*), sugarbush (*Rhus ovata*), yellow bush penstemon (*Keckiella antirrhinoides*), Mexican elderberry (*Sambucus mexicana*), sweetbush (*Bebbia juncea*), boxthorn (*Lycium* spp.), prickly-pear (*Opuntia littoralis*), coastal cholla (*Opuntia prolifer*), tall prickly-pear (*Opuntia oricola*), and several species of *Dudleya*. Sage scrub often is patchily distributed throughout its range (O'Leary 1990). Over a scale of several miles, it can be found in diverse habitat mosaics with other plant communities, particularly grassland and chaparral, and oak/riparian woodland in more mesic areas. Coastal sage scrub may convert to chaparral or grassland, depending on slope, aspect, climate, fire

history, and other physical factors and biological phenomena. Conversely, chaparral or grassland areas may convert to coastal sage scrub (Axelrod 1978; White 1995; O'Leary 1995; Allen *et al.* 1999).

Coastal sage scrub typically is found on xeric sites, notably steep, south-facing slopes with thin and/or rocky soils. It also is found on exposed sea bluffs, coastal and river terraces composed of coarse alluvial outwash, and coastal dunes (Axelrod 1978). The more open nature of the canopy permits persistence of a diverse herbaceous component of forbs, grasses, and succulents in mature stands than usually is associated with chaparral. It often is mixed with chaparral and grassland communities and the distinct boundaries between each can sometimes be difficult to delineate.

Gray and Bramlet (1992) proposed a complex and highly detailed classification system, modified from Holland (1986), for use in mapping vegetation types in Orange County, California. Within "scrub" habitats, Gray and Bramlet (1992) identified eight major subtypes: (1) southern coastal bluff scrub; (2) maritime succulent scrub; (3) Venturan-Diegan transitional coastal sage scrub; (4) southern cactus scrub; (5) Riversidean coastal sage scrub; (6) floodplain sage scrub; (7) chenopod scrub; and (8) sage scrub-grassland ecotone. Within the Venturan-Diegan transitional coastal sage scrub subtype, 12 distinct subassociations were identified based on the dominant species. Within the sage scrub-grassland ecotone subtype, five distinct subassociations were identified based on the same criterion. For a description of these subassociations the reader is referred to the Southern NCCP/HCP.

"Scrub" as defined for RMV, roughly corresponds to Holland's (1986) descriptions of Venturan-Diegan coastal sage scrub (a transitional community containing elements of two major types described by Holland), southern coastal bluff scrub, and Riversidean coastal sage scrub. In RMV, scrub is a more or less open community composed of low, drought deciduous shrubs, with a sparse understory of annual and perennial grasses and forbs.

### **c. Riparian Vegetation on Rancho Mission Viejo**

Eight distinct associations of riparian vegetation are included in the vegetation database for the RMV study area (*Table 2*).<sup>1</sup> In order of their prevalence in the study area, they are coast live oak riparian forest, willow riparian scrub (southern willow scrub), sycamore riparian woodland, southern arroyo willow riparian forest, herbaceous riparian, mule fat scrub, white alder riparian,

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<sup>1</sup> The riparian and wetland habitat acreages are based on the 1993 NCCP vegetation database and provide a general characterization of the study area. This original mapping was based on aerial photo interpretation and field checking, but was not performed using the USACE and CDFG formal criteria for jurisdictional waters of the U.S./State, including wetlands. Formal USACE/CDFG delineations have been performed by GLA and confirmed by the USACE and CDFG [pending?]. The location and acreage information for riparian and wetland habitats based on this refined work is used to assess impacts, make significance findings, and identify appropriate mitigation.

and cottonwood-willow riparian forest. The descriptions of these riparian communities primarily are based on Gray and Bramlet (1992) and MBA (1996).

Riparian communities typically consist of one or more deciduous tree species with an assorted understory of shrubs and herbs (Holland and Keil 1995). The transition between riparian habitats and adjacent non-riparian habitats often is abrupt (Grenfell 1988). Vegetation height can vary from three to ten feet in scrub habitats to 100 feet in riparian forest habitats (Grenfell 1988). Riparian habitats generally occur among mid- to large-order streams below about 4,000 feet above msl, primarily within the foothills and valleys (Stephenson and Calcarone 1999). Riparian communities are not restricted to specific climates or soil types, but are primarily dependent on a permanent supply of water. In southern California, most streams have very low flow during the summer, and in many cases surface flow may dry up (Stephenson and Calcarone 1999).

Riparian communities are dynamic systems. The stream channels may be swept clean of vegetation during floods as sediments are shifted during erosion flood events. Some have deep root systems that anchor them against the floodwaters and some have flexible stems that bend with floodwaters.

In addition to riparian communities, RMV supports several distinct wetland communities, including open water, freshwater marsh, water courses, and vernal pools, which support their own unique plants and wildlife and contribute additional biodiversity and ecological functions.

#### **d. Woodlands and Forest on Rancho Mission Viejo**

Oak woodlands consist of multilayered vegetation with a canopy that is 20 to 80 percent tree cover (Gray and Bramlet 1992). Oak woodlands occur throughout the lower elevations of western California, generally from sea level to 4,900 feet (Holland and Keil 1995). Oak forests are similar to oak woodlands, but have 80 percent or more canopy cover (Gray and Bramlet 1992).

Thorne (1976) distinguishes between northern, foothill, southern, and island oak communities in California. Southern and coastal woodlands, including coast live oak woodland found in the RMV, extend from eastern Mendocino County at 40° N latitude through the North Coast, Central Coast, and Transverse ranges on north-facing and coast-facing slopes and in canyons below 3,900 feet (Barbour and Minnich 2000). The range continues through the interior valleys and foothill slopes of the Peninsular ranges, mainly between 500 and 4,600 feet, and south to the Sierra San Pedro Martir at 30° N latitude in Baja California, Mexico (Barbour and Minnich 2000). According to Munz and Keck (1949), the southern oak woodlands are found in the valleys of southern California between Los Angeles and San Diego counties east to about 5,000 feet in the San Jacinto Mountains of western Riverside County. According to Holland and Keil (1995), coast live oak woodlands range from Sonoma County to Baja California, generally in mesic areas including canyon bottoms and north-facing slopes, whereas southern oak woodlands extend



from Ventura County southward. This roughly corresponds with Griffin (1977) who distinguishes oak woodlands from the Santa Ynez Mountains of Santa Barbara County southward as southern oak woodland.

Generally, oak woodlands are open where moisture is limited in drier more exposed aspects, and densest in moist areas (Holland and Keil 1995). North-facing slope occurrences are also denser than south-facing slope occurrences (Holland and Keil 1995). Average annual rainfall of areas supporting oak woodlands is between 15 and 25 inches. Runoff tends to be rapid. The growing season is seven to 10 months (Munz and Keck 1949). Oak trees, in general, require 60 to 80 years to mature (Holland 1988).

Common soils that support coast live oak include sandstone and shale-derived soils (Sawyer and Keeler-Wolf 1995). Coast live oak typically occupies slopes with deep soils, alluvial terraces, and the recent alluvium of canyon bottoms (Griffin 1977; Brown 1982). Open woodlands form when soils are shallow (Holland and Keil 1995).

Canyon live oak forest is similar in composition to coast live oak forest, but is dominated by canyon live oak.

Many understory shrubs in woodlands and forest are shade tolerant and include scrub oak (*Quercus berberidifolia*), California blackberry, snowberry (*Symphoricarpos mollis*), California walnut (*Juglans californica*), California-lilac (*Ceanothus* spp.), laurel sumac, gooseberry, toyon, California laurel, manzanita (*Arctostaphylos* spp.), poison-oak, Mexican elderberry, mountain-mahogany, sugarbush (*Rhus ovata*), big-leaf maple and white alder. Herbaceous understory species include California goldenrod (*Solidago californica*), western wild rye (*Elymus glaucus*), giant ryegrass, *Melica* spp., *Stellaria* spp., *Claytonia* spp., ripgut grass, wild cucumber, nightshade, *Phacelia* spp., and common eucrypta (*Eucrypta chrysanthemifolia*) (Gray and Bramlet 1992).

Live oak forest primarily occurs on the Donna O'Neill Land Conservancy, at the head of Cristianitos Creek, on the northern slopes of Blind Canyon, and in small patches in lower Chiquita Canyon and east of Cañada Gobernadora.

#### **e. Chaparral Communities on Rancho Mission Viejo**

Gray and Bramlet (1992) identify several scrub-chaparral ecotone/sere and chaparral subassociations in the Orange County. These subassociations generally are self-descriptive by their titles. The scrub-chaparral ecotone/sere subassociations are characterized gradations between scrub and chaparral vegetation communities. Two scrub-chaparral ecotone/sere subassociations known from the RMV are chamise-sage scrub and maritime chaparral-

sagebrush, the former dominated by chamise and California sagebrush and the latter dominated by lemonadeberry, laurel sumac, and toyon. Chaparral subassociations known from the RMV include southern mixed chaparral, chamise chaparral, scrub oak chaparral, toyon-sumac chaparral, snowball ceanothus chaparral, and manzanita chaparral.

**TABLE 1**  
**VEGETATION COMMUNITIES/LAND COVERS**  
**IN THE STUDY AREA**

<b>Vegetation Community/Land Cover<sup>1</sup></b>	<b>Acres</b>
<b><i>Natural Habitats</i></b>	
Grassland	5,040.9
Coastal Sage Scrub	7,682.0
Riparian <sup>2</sup>	1,919.7
Open Water	135.7
Freshwater Marsh	25.2
Slope Wetland	2.2
Watercourses	13.2
Vernal Pools	19.9
Woodland	275.9
Forest	311.9
Chaparral	3,792.9
Cliff and Rock	6.2
<b>Subtotal – Natural Habitats</b>	<b>1,9225.7</b>
<b><i>Non-habitat Land Covers</i></b>	
Developed	534.7
Disturbed	501.2
Agriculture	2554.8
<b>Sub-total – Non-Habitat Land Covers</b>	<b>3,590.7</b>
<b>TOTAL</b>	<b>22,816.4</b>
<sup>1</sup> Source: Southern NCCP/HCP Vegetation Database (1993), as revised by Dudek in 2004 (file date 3/24/04). <sup>2</sup> See Table 2 for a breakdown of specific riparian vegetation communities.	

**TABLE 2**  
**RIPARIAN VEGETATION COMMUNITIES IN THE STUDY AREA**

<b>Riparian Community<sup>1</sup></b>	<b>Acres<sup>2</sup></b>
Herbaceous Riparian	17.2
Willow Riparian Scrub (Southern Willow Scrub)	357.5
Southern Arroyo Willow Riparian Forest	168.1
Coast Live Oak Riparian Forest	1,116.2
Cottonwood—Willow Riparian Forest	1.2
Sycamore Riparian Woodland	246.9
White Alder Riparian Forest	1.6
Mule Fat Scrub	11.0
<b>TOTAL</b>	<b>1,919.7</b>
<sup>1</sup> Source: Southern NCCP/HCP Vegetation Database (1993), as revised by Dudek in 2004 (file date 3/24/04).	
<sup>2</sup> Acres not representative of USACE or CDFG jurisdiction, see Tables 4.9-5 and 4.9-6 of EIR for USACE and CDFG jurisdiction.	

#### **2.1.4 Sensitive Species**

The following are summary descriptions of listed and non-listed sensitive species which may benefit from this GMP. For a complete species account for these species, the reader is referred to Biological Resources Section of the EIR.

##### **a. Listed Species**

##### ***California Gnatcatcher***

The California gnatcatcher (*Polioptila californica*) is federally listed as threatened. It is a small, long-tailed member of the thrush family (Muscicapidae). The gnatcatcher typically occurs in or near coastal sage scrub, which is a broad category of vegetation that includes the following plant communities as classified by Holland (1986): Venturan coastal sage scrub, Diegan coastal sage scrub, maritime succulent scrub, Riversidean sage scrub, Riversidean alluvial fan sage scrub, southern coastal bluff scrub, and coastal sage-chaparral scrub. Coastal sage scrub is composed of relatively low-growing, dry-season deciduous, and succulent plants. As described above,

characteristic plants of this community include coastal sagebrush, various species of sage (*Salvia* sp.), California buckwheat, lemonadeberry, California encelia and *Opuntia* spp. Ninety-nine percent of all gnatcatcher locality records occur at or below an elevation of 300 meters (m) (984 feet [ft]) (Atwood 1990). Gnatcatchers on RMV are concentrated in two locations, namely Chiquita and Gobernadora Canyons, and in more scattered locations in Cristianitos and Trampas Canyons.

### ***Arroyo Toad***

The arroyo toad (*Bufo californicus*) is federally-listed as endangered. It is found in foothill canyons and inter-mountain valleys where rivers are bordered by low hills and the stream gradients are low (Miller and Miller 1936; Sweet 1992). The arroyo toad uses riparian environments for breeding and adjacent uplands for foraging and estivation. Arroyo toads are known to either breed, forage, and/or aestivate in aquatic habitats, riparian, coastal sage scrub, oak, and chaparral habitats. The species is restricted to medium- to large-sized, slow-moving streams. The majority of arroyo toad population studies occur within third and fourth order drainages that are characterized by decomposed granite bedrock. However, toad populations have been found in a wide range of stream orders, including lower, second order, and higher, fifth and sixth order coastal streams characterized by sedimentary rock (PCR 2002). According to USFWS, streams supporting arroyo toads range from first to sixth order in the central part of the species' range (Orange, Riverside and San Diego counties) (USFWS 1999). Within RMV, the arroyo toad is associated with riparian, streamcourses with sandy benches along streams in both the San Juan Creek and San Mateo Creek watersheds, specifically San Juan Creek from about the mouth of Chiquita Canyon upstream to the RMV boundary and beyond to about Hot Springs Creek and in lower Bell Canyon. In the San Mateo Watershed the toad occurs in Talega, lower Gabino and lower Cristianitos creeks.

### ***Least Bell's Vireo***

The least Bell's vireo (*Vireo belli pusillus*) is state and federally listed as endangered. It occupies a more restricted nesting habitat than the other subspecies of Bell's vireo, as summarized in USFWS (1986). Least Bell's vireos primarily occupy riverine riparian habitats that typically feature dense cover within one to two meters of the ground and a dense, stratified canopy. It inhabits low, dense riparian growth along water or along dry parts of intermittent streams. Typically it is associated with southern willow scrub, cottonwood forest, mule fat scrub, sycamore alluvial woodland, coast live oak riparian forest, arroyo willow riparian forest, wild blackberry, or mesquite in desert localities. It uses habitat that is limited to the immediate vicinity of watercourses below about 457 m (1,500 ft) elevation in the interior (USFWS 1986; Small 1994). In the coastal portions of southern California, the least Bell's vireo occurs in willows and other low, dense valley foothill riparian habitat and lower portions of canyons and



along the western edge of the deserts in desert riparian habitat. On RMV, surveys have documented nesting locations in Gobernadora Creek, middle San Juan Creek (between the Ortega Highway bridge and Casper Wilderness Park), Chiquita Creek and lower Cristianitos Creek.

### ***Southwestern Willow Flycatcher***

The southwestern willow flycatcher (*Empidonax traillii extimus*) is state and federally listed as endangered. It is restricted to riparian woodlands along streams and rivers with mature, dense stands of willows (*Salix* spp.), cottonwoods (*Populus* spp.) or smaller spring fed or boggy areas with willows or alders (*Alnus* spp.) (Sedgwick and Knopf 1992). It is an insectivore that forages within and above dense riparian vegetation, taking insects on the wing or gleaning them from foliage (USFWS 1993). This species also forages in areas adjacent to nest sites which may be more open (USFWS 1995). On RMV, the southwestern willow flycatcher is known from the Gobernadora Ecological Restoration Area (GERA) in Gobernadora Canyon.

### ***Riverside Fairy Shrimp***

The Riverside fairy shrimp (*Steptocephalus wootonii*) is federally-listed as endangered. It is restricted to deep seasonal vernal pools, vernal pool-like ephemeral ponds, and stock ponds and other human modified depressions (Eng et al. 1990; USFWS 1993, USFWS 2001). Riverside fairy shrimp prefer warm-water pools that have low to moderate dissolved solids, are less predictable, and remained filled for extended periods of time (Eriksen and Belk 1999). Basins that support Riverside fairy shrimp are typically dry a portion of the year, but usually are filled by late fall, winter or spring rains, and may persist through May (USFWS 2001). All known vernal pool habitat lies within annual grasslands, which may be interspersed through chaparral or coastal sage scrub vegetation. On RMV, the Riverside fairy shrimp in very large population in a large pool on Chiquita Ridge (this pool is within Ladera Open Space) and in two pools located along Radio Tower Road (pools 2 and 7).

### ***San Diego Fairy Shrimp***

The San Diego fairy shrimp (*Branchinecta sandiegonensis*) is state-listed as endangered and federally-listed as threatened. It occurs in small, shallow vernal pools ranging in depth from 5.1 to 30.5 cm (2 to 12 in) and in water temperatures from 10 and 14.5 degrees C (50 to 58 degrees F). Water temperature and chemistry are important factors in the species' distribution. Adults are usually observed in January-March when pools hold water from winter rains, although the breeding season may be extended in association with early winter or mid-spring rains (USFWS 2000). Eggs are either dropped to the pool bottom or remain in the brood sac until the adult female dies and sinks. The shrimp hatch and mature in seven days to two weeks, depending on

water temperature. “Resting eggs” of cysts are capable of withstanding heat, cold and prolonged drying (USFWS 2000). Because the high variability rainfall in southern California, and thus the success of any given breeding season, only a fraction of cysts may hatch in a given year and reproductive success can be spread out over several years (USFWS 2000).

The San Diego fairy shrimp occurs two locations on RMV: in the large and small vernal pools on Chiquita Ridge (vernal pools 3 and 4 ) and in three pools located along Radio Tower Road south of Ortega Highway (vernal pools 1, 2 and 7).

### ***Thread-leaved Brodiaea***

Thread-leaved brodiaea (*Brodiaea filifolia*) is state-listed as endangered and federally-listed as threatened. It is a perennial geophyte, that has a corm with a dark brown, fibrous tunic. The flowering stalk is 20.3-40.6 cm (8-16 in) high and the narrow leaves are generally shorter than the flowering stem. The flowers are dark blue to violet and have six perianth segments. There are three stamens and three staminodia (sterile stamens), which are narrow and thread-like in each flower. In Orange County, populations are known from Aliso-Woods Canyon Regional Park (several thousand), RMV (4,500 to 5,500 flowering stalks), Forster Ranch (approximately 5,000 flowering stalks associated with a restoration/relocation program), Prima Deshecha Landfill, and the Talega Development where one small population will be preserved in open space and a second population is slated for translocation.

### **b. Non-listed Species**

Several non-listed species also occur on RMV which that are likely to be affected by grazing management program either directly (e.g., species such as grasshopper sparrow that nest in grasslands with high structural diversity) or indirectly (species whose prey may be affected by grazing practices such as kite, horned lizard and whiptail). These species are: cactus wren, yellow warbler, yellow-breasted chat, grasshopper sparrow, white-tailed kite, merlin, western spadefoot toad, southwestern pond turtle, San Diego horned lizard, and orange-throated whiptail. For a complete species account for these species, the reader is referred to the Biological Resources Section of the EIR.

## **2.2 Pastures**

*Figure 1* shows the general location of the historic RMV pastures within the RMV property boundary. Trabuco Pasture, Oil Well, Horno, Lower Chiquita, Middle Trabuco, Cecil’s Pasture, Horseshoe Pasture, Upper Chiquita, the Vineyard, Bull Pasture, Lower Gobernadora, Horse Pasture and Nick’s Pasture are located north of San Juan Creek in the San Juan Watershed. River Pasture straddles San Juan Creek. South of San Juan Creek located partially within the San Juan



Figure 1

Creek Watershed and partially within the San Mateo Watershed are Sierra, Rinconada, Cristianitos Pasture, Gabino, Talega and TRW Pasture. South 40 is located adjacent to Ortega Highway in the San Juan Creek watershed.

### **2.2.1 Pasture Description**

The following is an overview of the location by sub-basin, soils, vegetation community, sensitive species, fencing and water resources for each of the historic pastures listed above. The current status of the pasture is also discussed, i.e., whether it is actively grazed or not. *Figures 2, 3, and 4a-c* depict terrain types, vegetation and listed and selected sensitive species for the pastures.

#### **a. Trabuco Pasture**

Trabuco Pasture is located in the Trabuco sub-basin. Terrains in this sub-basin are low to high slope less erodible clays (*Figure 2*). Vegetation in this pasture is dominated by grassland and coastal sage scrub (*Figure 3*). Other vegetation types occurring in the pasture to a lesser degree include riparian and chaparral. Agriculture, distributed and developed also occur in this pasture. Thread-leaved brodiaea occurs in this pasture. No other sensitive plant species occur. Eleven California gnatcatcher locations occur in this pasture (*Figure 4a*). Other species of note include American badger, Bell's sage sparrow, coastal cactus wren, grasshopper sparrow, red-tailed hawk and white-tailed kite (*Figure 4b*).

Trabuco Canyon pasture has been set aside for conservation purposes in accordance with the terms and conditions of the USACE, UFSWS and CDFG permits for Ladera Ranch and the Arroyo Trabuco Golf Course. No active grazing occurs on this pasture. In accordance with the terms and conditions of the Ladera Open Space Conservation Easement grazing is a reserved use subject to the preparation and approval of a grazing management plan by the County of Orange. A subsequent amendment to the Ladera Open Space Easement associated with approval of the Arroyo Trabuco Golf Course revised this provision of the easement to state "No grazing shall be permitted within the Conservation Easement Area without the written consent of CDFG and the Service." It is not the intent of RMV to resume grazing in the Trabuco Pasture, therefore this pasture will not be further addressed by this GMP.

#### **1. Narrow Canyon**

Narrow Canyon pasture is located in the Narrow Canyon sub-basin. This pasture is characterized by high to low slope and less erodible clays (*Figure 2*). Vegetation types in Narrow pasture include agriculture, annual and native grasslands, coastal sage scrub and minor amounts of chaparral and riparian (*Figure 3*). No sensitive plant species occur within this pasture. Recorded locations of listed species include 11 locations for California gnatcatcher (*Figure 4a*). Other

Figure 2



Figure 3

Figure 4a

Figure 4b



Figure 4c

species of note recorded within this pasture include coastal cactus wren, grasshopper sparrow, loggerhead shrike, northern red-diamond rattlesnake, orange-throated whiptail, *rufous-crowned* sparrow, San Diego horned lizard, western spadefoot toad and western whiptail (*Figure 4b*).

Grazing is excluded from Narrow Canyon in accordance with the terms and conditions of the 404 permit issued by the USACE for Ladera Ranch and is also partially within the Ladera Open Space Conservation Easement (discussed above), therefore this pasture will not be further discussed in this GMP.

## **2. Horno**

Horno pasture straddles the Horno and Narrow/Chiquita Sub-basins as shown on *Figure 1*. This pasture is characterized by high to low slope and less erodible clays (*Figure 2*). Vegetation types in Horno pasture include agriculture, annual grasslands, coastal sage scrub and very minor amounts of native grasslands, chaparral, lakes and riparian (*Figure 3*). No sensitive plant species occur within this pasture. Recorded locations of listed species include one location for California gnatcatcher (*Figure 4a*). Other species of note recorded within this pasture include barn owl, great horned owl and western spadefoot toad (*Figure 4b*).

Horno pasture is also part of the Ladera Open Space and is subject to the Ladera Open Space Conservation Easement and its subsequent amendment. As noted above for the Trabuco Pasture, RMV does not intend to resume grazing in the Ladera Open Space Conservation Easement, therefore this pasture will not be discussed further in this GMP.

## **3. Oil Well Pasture**

Oil Well Pasture straddles the Horno and Narrow/Chiquita Sub-basins as shown on *Figure 1*. This pasture is characterized by high to low slope and less erodible clays (*Figure 2*). Vegetation types in Oil Well Pasture include agriculture, annual grasslands, coastal sage scrub and minor amounts of native grassland, riparian and developed (*Figure 2*). No sensitive plant species occur within this pasture. Recorded locations of listed species include three locations for California gnatcatcher (*Figure 4a*). Other species of note recorded within this pasture include coastal cactus wren and western spadefoot toad (*Figure 4b*).

Oil Well Pasture is also part of the Ladera Open Space and is subject to the Ladera Open Space Conservation Easement and its subsequent amendment. As noted above for the Trabuco, Narrow Canyon and Horno pastures, RMV does not intend to resume grazing in the Ladera Open Space Conservation Easement, therefore this pasture will not be discussed further in this GMP.

#### **4. Lower Chiquita, Middle Trabuco, Upper Chiquita and Cecil's Pasture – "Chiquita Pastures"**

Lower Chiquita, Middle Trabuco, Upper Chiquita and Cecil's Pasture are all located within the Chiquita sub-basin and include the majority of Chiquadora ridge located in the Gobernadora sub-basin. Portions of Middle Trabuco, Cecil's Pasture, Upper and Lower Chiquita have been removed from active grazing for development purposes (Cecil's Pasture below Oso Parkway) or set aside for conservation purposes (Cecil's Pasture and Upper Chiquita above Oso Parkway, Horseshoe Pasture, Narrow Canyon and portions of Horno. The remaining portions of these pastures are grazed as one pasture today. For purposes of this overview this group of pastures will be called the "Chiquita Pastures". These pastures are characterized by sandy or silty terrains in the main and side canyons. Ridges on the east side of the valley are characterized by rock outcroppings and areas of hardpan (eroded remnants of claypans formed in the geologic past that have eroded to form mesas) and locally steep slopes (*Figure 2*).

Vegetation in the Chiquita Pastures includes coastal sage scrub, agriculture (in the form of citrus and avocado orchards and barley fields), patches of annual and native grasslands and patches of chaparral (*Figure 3*). Chiquita Creek supports herbaceous riparian, southern willow scrub, arroyo willow riparian forest and coast live oak riparian forest. Slope wetlands also occur in this pasture. Several listed and other species of note occur in the Chiquita Pastures including the federally-listed California gnatcatcher, the state/federally-listed thread leaved Brodiaea, the state/federally-listed least Bell's vireo, California Native Plant Society (CNPS) List 1B plants many-stemmed dudleya, southern tarplant, Coulter's saltbush and salt spring checkerbloom (*Figures 4a,c*). Other wildlife of note includes coastal cactus wren, ferruginous hawk, prairie falcon, merlin, northern harrier, wintering burrowing owls, loggerhead shrike, grasshopper sparrow, rufous-crowned sparrow, California horned lark, tricolored blackbird, (nomadic colonies), orange-throated whiptail, coastal western whiptail, San Diego horned lizard, northern-red diamond rattlesnake, mule deer and mountain lion (*Figure 4b*).

The actively grazed portion of the Chiquita Pastures is enclosed by a four-strand barbed wire fence located below Tesoro High School for the northern boundary, along Chiquita Ridge for the western boundary and the west side of Gobernadora Creek for the eastern boundary. Internal fencing to separate cattle from other uses, such as the orchards, the Chiquita wetland mitigation sites and the reclamation plant also divides the pasture. Fencing along San Juan Creek for the River Pasture forms the southern boundary of the actively grazed portion of Chiquita Pastures. Water is provided by a cattle trough in the lower part of the pasture and via Chiquita Creek.

The portion of Cecil's Pasture and Upper Chiquita north of Oso Parkway and Horseshoe Pasture have not been actively grazed since 1996 when RMV sold a conservation easement to the Transportation Corridor Agencies (TCA) as mitigation for the Oso Segment of the Foothill



Transportation Corridor-North. In accordance with the Section 7 biological opinion issued for that project by USFWS and as set forth in the TCA's management plan for that area (Upper Chiquita Canyon Conservation Easement Area Resource Management Plan), grazing is an allowed use once a grazing management plan has been reviewed and approved by USFWS and CDFG. This GMP will address grazing practices within the Upper Chiquita Canyon Conservation Easement Area.

## **5. Gobernadora Pastures**

Three separate fenced pastures collectively called the Gobernadora pastures, occur in the Gobernadora sub-basin: Vineyard, Bull Pasture and Lower Gobernadora. The terrain types, vegetation communities and listed and other species of note for the Gobernadora pastures are depicted on *Figures 2, 3 and 4a-c* respectively. Each pasture is described separately below.

### **(a) The Vineyard**

The Vineyard pasture is located within the valley floor of the Gobernadora sub-basin. The valley floor is characterized by deep alluvial deposits within interbedded clay lenses. Vegetation in this pasture is primarily composed of agriculture (barley), annual grasslands and the riparian habitats associated with Gobernadora Creek. The more rugged uplands west of Gobernadora Creek are dominated by coastal sage scrub and grasslands. Recorded locations for listed species include two for the California gnatcatcher. Southern willow scrub in the revegetated wetland mitigation area (GERA) provides nesting habitat for least Bell's vireo, yellow-breasted chat, and red-shouldered hawk. Other species of note within this pasture include California horned lark, grasshopper sparrow, orange-throated whiptail, rufous-crowned sparrow, western whiptail and yellow warbler. Tricolored blackbirds periodically forage in the grasslands of the Vineyard pasture. Two CNPS List 1B plants occur in the Vineyard pasture, one is the listed many-stemmed dudleya and the other is southern tarplant.

The Vineyard pasture is enclosed by four-strand barbed wire fence. Internal fencing excludes cattle from GERA. Water is provided by cattle troughs and via Gobernadora Creek.

### **(b) Bull Pasture**

Bull Pasture is located within the Gobernadora sub-basin, west of Gobernadora Creek. The flat to rolling terrain of this pasture exhibits areas of exhumed hardpan overlying sandy and silty substrates and exposed rock outcrops. Vegetation types in this pasture include agriculture (barley), coastal sage scrub, chaparral, oak woodlands, grassland, riparian and a small amount of disturbed area. Wildlife of note occurring in Bull pasture include barn owl, coastal cactus wren, grasshopper sparrow, great horned owl, orange-throated whiptail, red-tailed hawk, rufous-

crowned sparrow, San Diego horned lizard and western skink. Sensitive plants occurring in the pasture include many-stemmed dudleya, Catalina mariposa lily, and Palmer's grappling hook.

Bull Pasture is enclosed by four-strand barbed wire fence. The RMV property perimeter fence is its northern boundary, its eastern boundary is fenced along Gobernadora ridge, its southern boundary shares a fence with the Lower Gobernadora pasture and its western fence is shared with the Chiquita Pasture. Water is provided by a cattle trough.

### **(c) Lower Gobernadora**

The Lower Gobernadora pasture extends from Chiquadora ridge to Gobernadora ridge in an east-west direction, and from Bull Pasture and the Vineyard to the River Pasture in a north-south direction. This pasture includes the terrains of the valley floor (deep alluvial deposits with interbedded clays) and the ridges (exhumed hardpan overlying sandy and silty substrates).

Vegetation types on the east side of Lower Gobernadora pasture include agriculture, coastal sage scrub, chaparral and oak woodlands. The more rugged uplands west of Gobernadora Creek are dominated by coastal sage scrub and grasslands. The valley floor is characterized by agriculture, annual grasses and the riparian communities associated with Gobernadora Creek and GERA. Disturbed and developed land use covers also occur in this pasture. Listed species occurring in this pasture include least Bell's vireo, California gnatcatcher, southwestern willow flycatcher.. Sensitive plant species that occur within this pasture include; many-stemmed dudleya, Catalina mariposa lily, Palmer's grapplinghook, southern tarplant and paniculate tarplant. Other species of note include barn owl, coastal cactus wren, desert woodrat, grasshopper sparrow, orange-throated whiptail, red-shouldered hawk, red-tailed hawk, *rufous-crowned-sparrow*, western whiptail, white-tailed kite, yellow warbler and yellow-breasted chat.

Lower Gobernadora shares fences with Vineyard and Bull Pasture to the north, Horse Pasture and Nick's Pasture to the east along Gobernadora Ridge, River Pasture to the south and Lower Chiquita pasture to the west along Chiquadora Ridge. The wetland revegetation area, GERA, is fenced to exclude cattle. Water is provided by a cattle trough.

## **6. Horse Pasture**

Horse Pasture is located within the Central San Juan sub unit of the Central San Juan and Trampas Canyon sub-basin. Terrains in this pasture generally include erodible silts and clays. Upland vegetation types include coastal sage scrub, chaparral, oak woodlands, grassland, open water, riparian, agriculture, developed and disturbed areas (Colorspot Nursery). Listed species present in this pasture include California gnatcatcher locations north of Colorspot Nursery. Sensitive plant species include many-stemmed dudleya, Catalina mariposa lily and Palmer's

grapplinghook. Also present in this pasture are barn owl, coastal cactus wren, desert woodrat, grasshopper sparrow, orange-throated whiptail, red-tailed hawk, *rufous-crowned-sparrow*, southwestern pond turtle and western whiptail. The terrain types, vegetation communities and sensitive species for Horse Pasture are depicted on *Figures 2, 3 and 4a-c* respectively

Horse Pasture shares fences with Lower Gobernadora to the north-west, Nick's Pasture to the north-east and River Pasture to the south. No active grazing occurs in this pasture due to the extent of the Colorspot Nursery operation.

## **7. Nick's Pasture**

Nick's Pasture is also located within the Central San Juan sub unit of the Central San Juan and Trampas Canyon sub-basin. Terrains in this pasture generally include erodible silts and clays. Upland vegetation types include coastal sage scrub, chaparral, oak woodlands, grassland, riparian and agriculture (citrus orchards). A small portion of this pasture is classified as developed. Listed species locations recorded in this pasture include arroyo toad, California gnatcatcher and least Bell's vireo. Sensitive plant species in this pasture include locations of many-stemmed dudleya, Catalina mariposa lily and Palmer's grapplinghook. Other species of note with locations in this pasture include barn owl, coastal cactus wren, grasshopper sparrow, orange throated whiptail, red-tailed hawk, rufous-crowned sparrow, western spadefoot toad and western whip tail. The terrain types, vegetation communities and sensitive species for Nick's Pasture are depicted on *Figures 2, 3 and 4a-c* respectively

Fencing of Nick's Pasture includes the RMV perimeter fence along the eastern edge and Bull Pasture and Lower Gobernadora to the west. Due to the lack of fencing to separate cattle from the citrus production areas, Nick's pasture has not been grazed for the last 5-6 years. Water is available through cattle troughs.

## **8. River Pasture**

River pasture straddles San Juan Creek and is within the Central San Juan sub unit of Central San Juan and Trampas Canyon sub-basin. Terrains in this subunit generally include erodable silts and clays in the uplands north of San Juan Creek and alluvial terrace deposits in San Juan Creek itself. Vegetation types within the River Pasture include agriculture, chaparral, developed, disturbed, forest, grassland, open water, marsh, riparian, coastal sage scrub, stream and oak woodlands. Listed species locations in this pasture include the listed arroyo toad and least Bell's vireo. Other species of note include ash-throated flycatcher, barn owl, coastal cactus wren, desert woodrat, yellow-breasted chat, yellow warbler, rufous-crowned sparrow, sharp-shinned hawk, ferruginous hawk, merlin, northern red-diamond rattlesnake, orange-throated whiptail, white-tailed kite, Cooper's hawk, red-shouldered hawk, great horned owl, red-tailed hawk, great blue



heron, southwestern pond turtle, two-striped garter snake, western skink, western spadefoot toad, arroyo chub and threespine stickleback. The terrain types, vegetation communities and sensitive species for River Pasture are depicted on *Figures 2, 3 and 4a-c* respectively

River Pasture shares fences with Horno, Lower Chiquita, Lower Gobernadora and Horse Pasture to the north; and Sierra, Rinconada, Cristianitos and Gabino to the south in the San Mateo watershed. Water is provided via San Juan Creek and a water trough when the creek is dry.

## **9. South 40**

South 40 is located within the Central San Juan sub-basin, adjacent to Ortega Highway. Terrains in this pasture are erodable clays and some silts (*Figure 2*). Vegetation types in this sub-basin are disturbed (barley), annual grasses and chaparral on the steeper slopes (*Figure 3*). No sensitive plant locations occur in this pasture. Locations for barn owl, Cooper's hawk, ferruginous hawk, grasshopper sparrow, loggerhead shrike, night snake, northern red-diamond rattlesnake, orange throated whiptail, racer, red-tailed hawk, rufous-crowned sparrow, tricolored blackbird, western skink and western spadefoot toad occur in this pasture (*Figure 4b*).

South 40 is fenced along Ortega highway. Water is provided via water trough.

## **10. Sierra Pasture**

The Sierra Pasture is located partially within the Chiquita sub-basin and partially within an unnamed sub-basin that is located south of the Prima Deschecha sub-basin. Terrains in this pasture are erodable clays and less erodable clays of low to high slope (*Figure 2*). Vegetation types in this pasture are predominately grassland and coastal sage scrub, with some riparian and minor amounts of forest and oak woodland (*Figure 3*). Agriculture and developed land uses also occur in very small amounts. No sensitive plant locations occur in this pasture. However, several California gnatcatcher locations occur, as do locations for barn owl, Cooper's hawk, ferruginous hawk, grasshopper sparrow, loggerhead shrike, night snake, northern red-diamond rattlesnake, orange throated whiptail, racer, red-tailed hawk, rufous-crowned sparrow, tricolored blackbird, western skink and western spadefoot toad (*Figure 4a,b*). Both the federally-listed San Diego and Riverside fairy shrimp occur within vernal pools located along Radio Tower Road within this pasture.

Sierra pasture is fenced along Prima Deschecha Landfill, La Pata Avenue, Ortega Highway and shares fencing at the ridgeline with Rinconada pasture. Cattle are also excluded from the Ranch House by fencing. Water is provided via water trough.

## 11. Rinconada Pasture

Rinconada pasture is located within the Trampas and Cristianitos sub-basins. Terrains in this pasture are erodable silts and clays of low to high slope (*Figure 2*). Vegetation types in this pasture are predominately coastal sage scrub, grassland, chaparral and riparian, with oak forest and smaller amounts of oak woodland (*Figure 3*). Disturbed and developed land uses also occur in this pasture, namely the Oglebay Norton Industrial Sands (ONIS) mining operation. Trampas Canyon Dam is associated with this use. The Donna O'Neill Land Conservancy also lies within the historic boundary of this pasture, although grazing no longer occurs within the Conservancy. The state-and federally-listed thread-leaved brodiaea occurs within this pasture, as do several other sensitive plant locations including many-stemmed dudleya, Palmer's grappling hook and Catalina mariposa lily (*Figure 4a,c*). Of the other listed species, one California gnatcatcher location, one Riverside and one San Diego fairy shrimp pool occur in this pasture (*Figure 4a*). Both fairy shrimp occur within vernal pools located along Radio Tower Road within this pasture. Locations for barn owl, coastal cactus wren, great horned owl, Cooper's hawk, osprey (using open water), grasshopper sparrow, loggerhead shrike, night snake, northern red-diamond rattlesnake, orange throated whiptail, racer, red-shouldered hawk, red-tailed hawk, rufous-crowned sparrow, San Diego horned lizard, turkey vulture, western spadefoot toad and white-tailed kite also occur in this pasture (*Figure 4b*).

Rinconada pasture is fenced along Ortega Highway, Cristianitos Road, the boundary with Prima Deshecha Landfill and Sierra Pasture. The Donna O'Neill Conservancy boundary is fenced to exclude cattle. Water is provided via water troughs and the mining pond associated with the ONIS operation. Although cattle are not specifically excluded from the ONIS operation, the lack of available forage in the active mine area acts as a deterrent to wandering cattle.

## 12. Cristianitos Pasture

Cristianitos Pasture is located partially within the Cristianitos sub-basin and partially within the Gabino sub-basin. Terrains in these portions of the sub-basins are erodable to less erodable clays and are subject to erosion under intensive grazing pressure (*Figure 2*). Grassland, including native grasslands and coastal sage scrub are the dominant vegetation types in this pasture (*Figure 3*). Chaparral, forest and riparian also occur in lesser amounts, as do open water, stream, woodland and rock. Developed, disturbed and agriculture also occur in this pasture. The listed thread leaved brodiaea occurs within this pasture, as do several other sensitive plant locations including many-stemmed dudleya, Palmer's grapplinghook, Coulter's saltbush, mesa brodiaea, small-flower microseris, upright burhead and western dichondra (*Figure 4a,c*).

Arroyo toad and California gnatcatcher are the two listed wildlife species with locations in this pasture (*Figure 4a,b*). Other species of note include arboreal salamander, barn owl, California

horned lark, California whipsnake, coastal cactus wren, Cooper's hawk, desert woodrat, grasshopper sparrow, great horned owl, merlin, northern red-diamond rattlesnake, orange-throated whiptail, prairie falcon, red-shouldered hawk, red-tailed hawk, rufous-crowned sparrow, San Diego horned lizard, southwestern pond turtle, coast patchnose snake, western spadefoot toad, western whiptail, white-tailed kite and yellow-breasted chat (*Figure 4a,b*).

Cristianitos pasture is fenced along Ortega Highway, Cristianitos Road, Talega pasture and the Cristianitos/Gabino ridgeline. Citrus areas in Cristianitos are also fenced to keep cattle out. Water is provided via three defunct mining ponds and water troughs.

### **13. Gabino**

Gabino pasture is located within the Gabino and Verdugo sub-basins. Terrains in the Gabino sub-basin are divided into silty clays in the upper Gabino sub-unit and cobbly sands in the middle sub-unit. Upper Gabino is subject to erosion under intensive grazing pressure (*Figure 2*). Middle Gabino is a source of coarse sediments for Cristianitos Creek. Verdugo sub-basin terrains are cobbly sands with some silts. Verdugo Canyon is a source of coarse sediment for San Juan Creek. Coastal sage scrub and chaparral are the dominant vegetation types in this pasture. Grassland, including native grasslands, and riparian also occur in lesser amounts, as do marsh, woodland and rock (*Figure 3*). Developed and agriculture also occur in this pasture in small amounts, namely Campo Portola and citrus production. Many-stemmed dudleya, Coulter's saltbush and Fish's milkwort occur in this pasture (*Figure 4c*). Arroyo toad and California gnatcatcher are the two listed wildlife species with one location each, in this pasture (*Figure 4a*). Other species of note include: arboreal salamander, barn owl, coastal cactus wren, Cooper's hawk, grasshopper sparrow, great horned owl, long-eared owl, orange-throated whiptail, prairie falcon, red-shouldered hawk, red-tailed hawk, rufous-crowned sparrow, San Diego horned lizard, southwestern pond turtle, two-striped garter snake, white-tailed kite and yellow-breasted chat (*Figure 4b*).

Gabino pasture is fenced along Ortega Highway, south of Gabino Creek where it shares a common fence with the Talega pasture and at the RMV boundary with Riverside County (perimeter fence). Water is provided via Jerome's Lake, water troughs and Gabino Creek (when water is available).

### **14. Talega**

Talega pasture is located within the Talega and Blind Canyon sub-basins. Terrains in the Talega sub-basin are cobbly sands. Talega is a source of coarse sediments for Cristianitos Creek (*Figure 2*). Blind Canyon sub-basin terrains are cobbly sands. Blind Canyon is a source of coarse



sediment for Cristianitos Creek. Coastal sage scrub, chaparral and grassland including native grasslands are the dominant vegetation types in this pasture (*Figure 3*). Riparian also occurs in lesser amounts, as do oak forest and woodland. Developed also occur in this pasture in small amounts. Thread leaved brodiaea, many-stemmed dudleya and chaparral beargrass occur in this pasture (*Figure 4a,c*). Arroyo toad and California gnatcatcher are the two listed species with locations in this pasture (*Figure 4a*). Other species of note include arboreal salamander, barn owl, coastal cactus wren, Cooper's hawk, grasshopper sparrow, northern red-diamond rattlesnake, orange-throated whiptail, prairie falcon, red-tailed hawk, rufous-crowned sparrow, San Diego horned lizard, western whiptail, white-tailed kite and yellow-breasted chat (*Figure 4b*).

Talega pasture is fenced along the boundary with MCB Camp Pendleton, the RMV boundary, the TRW lease area and shares a common fence with Gabino and Cristianitos pastures. Water is provided via Talega Creek and water troughs.

## **15. TRW Pasture**

TRW pasture is located within the Talega and Cristianitos sub-basins. Terrains in the Talega sub-basin are cobbly sands. Talega Canyon is a source of coarse sediments for Cristianitos Creek. Cristianitos sub-basin is generally silty clays (*Figure 2*). Coastal sage scrub and grassland including native grasslands are the dominant vegetation types in this pasture (*Figure 3*). Riparian, chaparral and forest also occurs in lesser amounts, as do open water and woodland. Developed and disturbed also occur in this pasture, namely the Northrop-Grumman facility (formerly TRW) and associated ancillary uses. Many-stemmed dudleya, Palmer's grapplehook, small-flower microseris, Coulter's saltbush and western dichondra occur in this pasture (*Figure 4c*).

Arroyo toad, California gnatcatcher and least Bell's vireo are the three listed wildlife species with locations in this pasture (*Figure 4a*). Other species of note include: barn owl, coastal cactus wren, Cooper's hawk, grasshopper sparrow, great horned owl, long-eared owl, northern red-diamond rattlesnake, orange-throated whiptail, red-shouldered hawk, red-tailed hawk, rufous-crowned sparrow, sharp shinned hawk, western whiptail, yellow warbler and yellow-breasted chat (*Figure 4b*).

Although listed as a pasture, no active grazing occurs within the TRW pasture due to the ongoing lease operations of the Northrop-Grumman Capistrano Test Facility. No future use of this area as a grazed pasture is anticipated; therefore this GMP will not further address this area.

In summary, the following pastures are currently actively grazed; Lower Chiquita, Vineyard, Bull Pasture, Lower Gobernadora, River Pasture (to the Cow Camp crossing), South 40, Sierra,

Rinconada, Cristianitos, Gabino and Talega. Resumption of grazing is proposed for Nicks Pasture, Chiquita Canyon above Oso Parkway (including Horseshoe Pasture, but excluding Cecil's Pasture) and River Pasture north of the Cow Camp crossing. *Figure 5* shows both actively grazed pastures and pastures proposed for future grazing.

Figure 5



## **CHAPTER 3: GRAZING MANAGEMENT**

This Chapter describes the objectives of the GMP, reviews the current RMV grazing practices, including residual dry matter (RDM) goals, grazing patterns and stocking rates and makes recommendations for future grazing practices.

### **3.1 Objectives of Grazing Management**

Chapter 1 set forth the overall purposes of this GMP, namely, to contribute an important element of the long term Adaptive Management Program goals of enhancement/restoration of native habitats and to identify grazing practices that are consistent with the Draft Southern NCCP/HCP Planning Guidelines and the Draft Watershed Planning Principles.

To achieve these overall purposes, the following specific objectives of the GMP are:

1. Establish a minimum RDM per acre for active and proposed pastures, and adjust as necessary to reflect changes developed as a result of task 2 below.
2. Identify interim and long-term changes to existing and proposed pasture configurations and stocking levels to maximize use of available forage and facilitate the restoration of perennial grasses including native grasses.
3. Identify a timed rotational grazing scheme to maximize use of available forage and facilitate the restoration and/or long term management of native grasses and coastal sage scrub.
4. Identify sensitive habitat areas where cattle grazing shall be excluded seasonally or permanently.
5. Identify additional facilities required to promote better distribution of cattle within pastures as a strategy to manage geologic and abiotic resources (e.g., water sources, shade, supplemental feed/ nutritional blocks).
6. Outline methods (i.e., cattle exclosures) for monitoring forage levels in order to assess range conditions and to provide guidance on the introduction and removal of cattle.
7. Identify pastures that may be subject to prescribed fire. Identify appropriate pasture rest periods following burns to promote habitat recovery.
8. Outline procedures for re-evaluating grazing management practices every 3 to 5 years to ensure that existing practices are achieving the desired results.

### **3.2 Grazing Management**

This section describes the basic practice of grazing management on RMV, both in terms of general concepts and specific applications.

The production of grassland, whether annual or native, for forage purposes is dependant on four factors: precipitation, temperature, soil characteristics and residue. These four factors largely control forage productivity and seasonal species composition. These factors also change the timing and characteristics of the four distinct growth phases: break of season, winter growth, rapid spring growth and peak forage production. Break of season follows the first fall rains that exceed 1 inch during a 1-week period. Timing of the break dramatically affects forage production. Winter growth period occurs as the fall break season ends and is the result of cooling temperatures, shorter days, and lower light levels. Rapid spring growth begins with the onset of warming spring temperatures, longer days and higher light intensities. Peak forage production occurs at the end of rapid spring growth (UC Extension, Leaflet 21378).

While the precise dates of the four distinct growth phases are subject to the factors noted above, generally speaking on RMV, for annual grasses break of season occurs late October – early November, winter growth occurs mid-December through early February, rapid spring growth occurs between early February and mid-March and peak forage production occurs by late March. Although influenced by the same factors noted above, native grasses generally lag slightly behind annual grasses by about eight weeks on Rancho Mission Viejo (T. Bomkamp, personal communication).

#### **a. Current Grazing Practices**

RMV has grazed cattle on its property since 1882. Since that time RMV has practiced a rational grazing pattern that takes into account available water, forage productivity and a desire to maintain an average of 25% RDM for “natural” or “unimproved” pastures. Natural pastures are those not artificially improved through the planting of a forage crop, e.g., barley. Availability of water, forage productivity and the desired level of RDM in turn dictate the stocking levels of RMV pastures.

The following sections describe the existing pasture configurations, residue, stocking levels and grazing pattern on RMV lands.

#### **1. Existing Pasture Configurations & Resources**

The current configuration of active grazing pastures or future configuration of a proposed grazing area is shown on *Figure 5*. The vegetation types within each pasture (*Table 3*) is based on the current or proposed configuration, not the historic configuration shown in *Figure 1*.

### ***Active Grazing Pastures***

The following pastures are actively grazed: Lower Chiquita, Vineyard, Bull Pasture, Lower Gobernadora, River Pasture (south of the Cow Camp crossing), South 40, Sierra, Rinconada, Cristianitos, Gabino and Talega.

### ***Proposed Grazing Pastures***

Resumption of grazing is proposed for Nicks Pasture, Upper Chiquita, Horseshoe Pasture and River Pasture north of the Cow Camp crossing.

## **2. Existing Residue**

Residue or dry residual matter is the dry organic matter remaining at the end of grazing. Residue, acting as mulch, influences germinating plants and soil organic matter. Residue is therefore is major manageable factor governing productivity and composition (UC Extension, Leaflet 21378). Amounts of residue dry matter per acre vary according to geography, soil conditions and livestock use. Areas with heavy rainfall, erosive soils or steep hills need more residual dry matter than do flat, stable soils in drier climates. To maintain desired forage production, therefore, it is useful to set *minimum* residue standards. Rancho Mission Viejo has historically used an average RDM of 25% (for example, 25% of produced forage. If produced forage was 1000 lbs per acre for a pasture, the RDM would be 250 lbs per acre) as the minimum standard for pastures with natural forage, i.e., annual/native grassland. RMV also plants forage (barley) in the alluvial valleys of Lower Chiquita, Vineyard, Bull Pasture, Lower Gobernadora and South 40. RDM standards are not established for planted forage areas because these areas are replanted annually. This GMP will review the 25% RDM standard for natural forage and make recommendations for revisions as necessary.

As an example of a post peak productivity assessment of the RDM conditions on the property, existing RDM was estimated in July 2003 using the visual determination method described in UC Extension Leaflet 21327. RMV staff estimated existing residue using the following levels:

- *Light* grazing leaves little or no patchy appearance. Unused plant matter averages 3 or more inches in height and small objects are masked. The residual dry matter is more than an average of 800 pounds per acre.
- *Moderate* grazing leaves an average of 2 inches of unused plant matter, a patchy appearance and little bare soil. Small objects will not show at a distance of 20 feet or more. The residual dry matter ranges from 400 to 700 pounds per acre.



**TABLE 3**  
**VEGETATION COMMUNITIES WITHIN RANCHO MISSION VIEJO PASTURES<sup>1</sup>**

Pasture	Agriculture	Chaparral	Developed	Disturbed	Grassland	Open Water	Marsh	Riparian	Cliff & Rock	Coastal Sage Scrub	Stream-courses	Vernal Pools	Woodlands & Forest	TOTAL
Bull	126.7	103.2	0.0	0.2	5.6	0.0	0.0	6.5	0.0	235.9	0.0	0.0	57.6	535.6
Cristianitos	0.3	551.3	42.6	112.8	1,173.1	3.1	0.0	319.4	0.2	1130.6	6.5	0.0	118.7	3458.6
Gabino	0.9	2096.2	0.4	0.0	853.6	0.0	0.6	553.1	1.8	2841.7	0.0	0.0	70.8	6,419.0
Horseshoe	0.0	13.3	0.0	0.0	0.1	0.0	0.0	1.0	0.0	26.9	0.0	0.0	1.9	43.2
Lower Chiquita	1,363.9	129.9	78.4	13.2	274.7	0.9	2.4	117.7	0.0	1,063.1	0.0	0.0	53.7	3,098.2
Lower Gobernadora	87.5	103.1	1.5	74.5	18.1	0.0	0.0	26.7	0.0	214.0	0.0	<0.01	20.7	546.2
Nick's	13.3	206.9	16.3	0.0	75.9	0.0	0.0	88.7	0.0	246.1	0.0	0.0	5.1	652.5
Rinconada	0.0	146.6	22.8	160.7	370.1	59.3	0.0	136.9	4.1	333.9	0.0	0.0	160.4	1,394.8
River	147.8	16.8	189.6	24.7	172.2	68.8	10.8	219.3	0.0	199.5	6.6	0.0	35.6	1,091.8
Sierra	0.3	0.0	0.9	0.0	582.3	0.0	0.0	42.2	0.0	250.6	0.0	0.0	1.6	877.9
South 40	23.8	2.7	0.1	0.0	8.6	0.0	0.0	1.4	0.0	5.4	0.0	0.0	3.1	44.9
Talega		358.4	10.0	0.0	467.1	0.0	0.0	150.5	0.0	575.3	0.0	0.0	32.4	1,593.8
Upper Chiquita	445.9	67.2	33.7	2.6	6.6	0.0	0.0	21.9	0.0	458.8	0.0	0.0	12.4	1,049.3
Vineyard	90.1	0.1	0.0	48.0	2.9	0.0	0.0	7.4	0.0	4.9	0.0	0.0	0.0	153.5
<b>TOTAL</b>	<b>2,300.6</b>	<b>3,795.9</b>	<b>399.2</b>	<b>436.7</b>	<b>4,028.1</b>	<b>132.1</b>	<b>13.9</b>	<b>1,593.7</b>	<b>6.2</b>	<b>7,603.6</b>	<b>13.2</b>	<b>&lt;0.01</b>	<b>274.3</b>	<b>20,998.5</b>

<sup>1</sup> Source: Southern NCCP/HCP Vegetation Database (1993), as revised by Dudek in 2004.

- *Heavy* grazing leaves less than 2 inches of unused plant matter. Small objects and areas of bare soil are visible at 20 feet or more. Residual dry matter is less than 400 pounds per acre.

**TABLE 4**  
**ESTIMATED DRY RESIDUAL MATTER FOR**  
**RANCHO MISSION VIEJO PASTURES IN JULY 2003**

Pasture	Grazing Level	Estimated Dry Residue
Chiquita Pastures <sup>1</sup>	None	>800+ lbs/ac
Nick's Pasture	None	>800+ lbs/ac
River Pasture	Light – Moderate	>650-750 lbs/ac
Sierra	Light	>750 lbs/ac
Rinconada	Light	>750 lbs/ac
Cristianitos Pasture	Light	>700-800 lbs/ac
Gabino	Light - Moderate	>600 lbs/ac
Talega	Light	>800 lbs/ac
<sup>1</sup> Residues were estimated for Upper Chiquita. Lower Chiquita is planted with barley therefore residues are not applicable.		

To verify the visual assessment, residual dry matter weights were taken in three pastures in accordance with the method described in Leaflet 21327. Results of this verification were as follows:

- Rinconada: 1,890 lbs per acre
- Sierra: 1,038 lbs per acre
- Gabino: 1,946 lbs per acre

The assessment results (*Table 4*) and the subsequent dry weight verification show that RDM on RMV typically reflects light to moderate grazing.

### **3. Existing Grazing Patterns**

Generally cattle are grazed in the natural southern pastures (South 40, Sierra, Rinconada, Cristianitos, Gabino and Talega) from October to May to take advantage of the break of season through peak production of annual grasses. In late May or early June cattle are moved from the southern pastures to the northern pastures in the Chiquita and Gobernadora sub-basins (i.e., Lower Chiquita, Lower Gobernadora, Vineyard and Bull Pasture) and remain there until late September to take advantage of the barley stubble. From May through most of September, the

southern pastures “rest”. From October through most of May the natural areas of the northern pastures rest , while the alluvial valleys of Lower Chiquita, Bull Pasture, Lower Gobernadora and the Vineyard are re-planted with barley. Allowing a rest or fallow period is a well know agricultural concept, the benefits of which are documented in the literature. On Rancho Mission Viejo, these periods of rest are essential for the production of the next grazing seasons forage particularly in the natural southern pastures. During the transition from the southern pastures to the northern pastures in May or June, cattle are held temporarily in River Pasture, while adjustments to the herd size are made. On average the herd size is reduced by 20% during this transition time. In late September, cattle are returned to the southern pastures.

#### **4. Existing Stocking Rates**

Stocking rates on RMV vary according to the availability of water, the productivity of forage and the RMV 25% RDM standard. Generally speaking, in an average rainfall year, the Rancho Mission Viejo cattle herd averages approximately 500 head during the southern pasture grazing season (October – May ), distributed as follows: Talega 50 head, Gabino 125 head, Cristianitos 125 head, Rinconada 60 head and Sierra 100 head. As discussed above this is reduced by 20% during the transition from the southern pastures to the northern pastures, resulting in approximately 400 head being distributed in the northern pastures between June and September as follows: Chiquita Pastures 300 head and Vineyard, Bull Pasture, Lower Gobernadora 100 head (combined).

##### ***a) Future Grazing Practices***

The Draft NCCP/HCP Planning Guidelines and SAMP principles call for the GMP to address four fundamentals contained within the GMP policy statement, namely:

- address the needs of species and habitat identified for protection
- promote perennial grasses including native grasses
- allow for continued cattle grazing sufficient to support cattle operations
- where appropriate, reduce fuel loads for fire

This GMP will therefore describe adjustments to the current grazing practices necessary to implement these fundamentals and contribute to the AMP goals regarding natural habitat restoration/enhancement and comply with the Draft NCCP/HCP Planning Guidelines and the SAMP principles.

This section focuses on those portions of the policies dealing with native grasses and sufficiency of forage. Species needs are discussed in Section 3.3 of this Chapter and fire management is discussed in Section 3.4.



**b) Recommended Residual Dry Matter**

As noted above, recommended RDM for RMV pastures should account for rainfall, slope and soil type. Rainfall averages 12 to 16 inches per year, generally falling between the months of November and March. Sixteen (16) inches is considered “normal” for RMV. Wet and dry cycles, typically lasting 15 to 20 years, are characteristic of southern California. The region presently appears to be emerging from a wetter-than-normal cycle of years beginning in 1993. Previously, five consecutive years of sub-normal rainfall and runoff occurred in 1987 through 1991 (PCR, 2002). 2001 and 2002 were both below normal rainfall years (averaging 4 inches), while 2003 was above normal at 18 inches. Years with less than average rainfall result in lower productivity and can affect species composition. Slope and soil type are described in the Existing Setting section for each pasture and summarized below in *Table 5*.

*Table 5* sets forth the recommended RDM levels for RMV pastures.

**TABLE 5  
RECOMMENDED RESIDUAL DRY MATTER  
FOR RANCHO MISSION VIEJO PASTURES**

<b>Pasture</b>	<b>Slope</b>	<b>Soil Type</b>	<b>Recommended Dry Residue</b>
Chiquita Pastures	Low – Moderate	Mixed sands/silts and hardpan	750 lbs/ac
Nick's Pasture	Low – Moderate	Clays & silts	750 lbs/ac
River Pasture	Low	Mixed silts/ clay and alluvium	725 lbs/ac
South 40	Low-Moderate	Clays	750 lbs/ac
Sierra	Moderate	Clays	750 lbs/ac
Rinconada	Low – Moderate	Silts	750 lbs/ac
Cristianitos Pasture	Low- Moderate	Clays	750 lbs/ac
Gabino	Moderate	Mixed silts/ clay and sands/silts	750 lbs/ac
Talega	Moderate	Sands	750 lbs/ac

**2. Recommended Stocking Rate**

To determine stocking rates for RMV pastures, two factors must be known, a) the total monthly forage requirement and b) the total annual forage per pasture. The following methodologies are

taken from UC Extension Leaflet 21456. The Animal Unit (AU) is the standard measurement of livestock forage requirements. One Animal Unit Month (AUM) is the amount of feed required to support one AU for one month. This value depends on the type of feed used (i.e., 1 AUM = 1,000 lb of air dry forage (e.g., stand of annual grasses) or 800 lb of hay or 533 lb of concentrate, etc.). Table 6 shows representative AU values for cattle at different production stages using a mature cow with calf as the Standard Unit of 1.0.

a) *Total Forage Requirement*

**TABLE 6**  
**ANIMAL UNIT VALUES FOR AIR DRY FORAGE**

<b>Animal Type</b>	<b>AU</b>	<b>Monthly Forage requirement/head (lb air dry forage)<sup>1</sup></b>
Mature cow with calf	1.00	1,000
Mature bull	1.25	1,250
Weaned calf	0.6	600
Yearling 12-17 mos	0.7	700
Yearling 17-22 mos	0.75	750
<sup>1</sup> Monthly forage = AU x 1,000 air dry forage		

To determine the total monthly forage requirement, multiply the monthly forage requirement per head by the number of animals to be grazed:

$$\begin{array}{rclcl}
 \text{Monthly} & \times & \text{Number} & = & \text{Total} \\
 \text{Forage} & & \text{of} & & \text{Forage} \\
 \text{Requirement/} & & \text{Animals} & & \text{Required/} \\
 \text{Head} & & & & \text{Month}
 \end{array}$$

Using the average RMV herd of 500 head, divided as follows, 300 mature cows with calf, 20 mature bulls, 75 yearlings 12-17 mo and 75 yearlings 17-22 months, and 30 weaned calves the total forage required per month is as follows:

**TABLE 7**  
**TOTAL FORAGE REQUIRED PER MONTH**

<b>Animal Type</b>	<b>Number of Animals</b>	<b>Monthly Forage requirement/head (lb air dry forage)</b>	<b>Total Forage Required/Month (lbs/month)</b>
Mature cow with calf	300	1,000	300,000
Mature bull	20	1,250	25,000
Weaned calf	30	600	18,000
Yearling 12-17 mos	75	700	52,500
Yearling 17-22 mos	75	750	56,250
		<b>Total</b>	<b>451,750</b>

To calculate the total forage required, multiply the total forage required per month by the grazing season:

$$\begin{array}{ccccc} \text{Total} & & \text{Grazing} & = & \text{Total} \\ \text{Forage} & \times & \text{Season} & & \text{Forage} \\ \text{Required/} & & & & \text{Required} \\ \text{Month} & & & & \end{array}$$

For the 500 head of cattle RMV grazes for 8 months in the southern pastures, 3,614,000 lbs of forage would be required. For the 379 head that grazes in the northern pastures for 4 months, assuming a 25% reduction in cows, yearling and weaned calves, total forage required would be 1,377,600 lbs.

**b) Total Available Forage**

Total available forage is calculated by subtracting the desired residue level from the estimated production value and multiplying the difference by the number of grazable acres, as follows:

$$(\text{Production per Acre} - \text{Residue per Acre}) \text{ Acres} = \text{Available Forage}$$

For example, available forage on a 10 acre pasture with a recommended RDM of 750 lbs per acre with a production value of 850 lbs per acre would be  $(850-750) \times 10 = 1,000$  lbs available forage. In this example the 10 acre pasture would be capable of supporting one mature cow with calf for one month.

Because quantity and quality of available forage changes throughout the year, it is necessary to make seasonal adjustments. For example, late season or summer natural forage has limited

nutrient value (a more common sense way to think of this is “green grass is better than brown grass). *Table 8* sets forth adjustment factors.

**TABLE 8**  
**SEASONAL FORAGE AVAILABILITY ADJUSTMENT**

Season of Use	Seasonal Availability Adjustment
Year long	1.0
Winter	0.7
Spring	1.3
Summer	0.8
Fall	0.6

Total available forage is calculated by multiplying the available forage by the seasonal adjustment factor, as follows:

$$\text{Available Forage} \times \text{Seasonal Adjustment} = \text{Total Available Forage}$$

For example, using the available forage of 1,000 lbs from the previous example and adjusting for the highest production value, i.e., Spring, the total available forage would be 1,000 lbs x 1.3 = 1,300 lbs for the ten acre pasture.

*Tables 9 and 10* estimate the total available forage for each of the RMV pastures subject to this GMP. As noted above precipitation, temperature, soil characteristics and residue influence production and as such total available forage varies for year to year. For this GMP, an average production value of 1,500 lbs was used (Leaflet 21456). Recall that several pastures reviewed in Section 2 will not be grazed in the future as a result of either development or conservation of the pasture for habitat purposes (e.g., Ladera Land Conservancy). Also recall that available forage is only calculated for those pastures with RDM goals i.e., natural or unimproved pastures. As noted above, southern pastures are grazed in the winter and spring, while northern pastures are grazed in the summer and fall. *Tables 9 and 10* reflect this rotational grazing pattern.



**TABLE 9**  
**TOTAL AVAILABLE FORAGE FOR NORTHERN PASTURES**

<b>Pasture</b>	<b>Summer</b>	<b>Fall</b>
Chiquita Pastures	586,800	440,100
Nick's Pasture	259,200	194,400
River Pasture	397,200	297,900
<b>Total</b>	<b>1,243,200</b>	<b>932,400</b>

**TABLE 10**  
**TOTAL AVAILABLE FORAGE FOR SOUTHERN PASTURES**

<b>Pasture</b>	<b>Winter</b>	<b>Spring</b>
Sierra	460,425	858,075
Rinconada	610,050	1,132,950
Cristianitos	1,498,875	2,783,625
Gabino	2,268,000	4,212,000
Talega	643,125	1,194,375
<b>Total</b>	<b>5,480,475</b>	<b>10,181,025</b>

Based on the Total Available Forage set forth in *Tables 9 and 10*, and the required forage discussed above (3,614,000 lbs of forage in southern pastures for 500 head and 1,377,600 lbs of forage for northern pastures for 379 head) natural or unimproved RMV pastures produce more than sufficient forage to support the average RMV herd. It should be noted that in addition to the natural northern pastures, Vineyard, Bull, and the alluvial valleys of Lower Gobernadora and Lower Chiquita are improved via barley plantings which contribute significant additional forage value.

Based on the Total Available Forage set forth in *Tables 9 and 10* recommended maximum stocking rates, based on a mature cow (1,000 lbs AUM) for all natural northern and southern pastures are set in *Tables 11 and 12*. These stocking rates for northern pastures do not include cattle grazed on barley, therefore overall herd size in summer and fall will be higher than noted here due to the availability of barley forage. It should be noted that these stocking rates are designed to be adapted to the conditions in any given year such that the recommended residue is maintained. Changes to the stocking rates should be made according to the methods reviewed above. Other factors which influence the decision of how many cattle to stock in general (i.e., what size cattle herd to maintain) are those related to expenses. Expenses include insurance, interest, utilities (e.g., cost of water), health costs (innoculations etc), transportation, materials

(e.g., fencing costs) and labor. It is the combination of forage availability, expenses and market demand for beef that ultimately determine the herd size on RMV.

**TABLE 11**  
**RECOMMENDED MAXIMUM STOCKING RATES FOR NORTHERN PASTURES**

<b>Pasture</b>	<b>Summer</b>	<b>Fall</b>
Chiquita Pastures	146	110
Nick's Pasture	65	49
River Pasture	99	74
<b>Total</b>	<b>310</b>	<b>233</b>

**TABLE 12**  
**RECOMMENDED MAXIMUM STOCKING RATES FOR SOUTHERN PASTURES**

<b>Pasture</b>	<b>Winter</b>	<b>Spring</b>
Sierra	56	107
Rinconada	76	142
Cristianitos	187	348
Gabino	283	526
Talega	80	149
<b>Total</b>	<b>682</b>	<b>1,272</b>

### 3. Recommended Grazing Patterns in Relation to Adaptive Management Program Enhancement/ Restoration and Management Goals Following Transfer of Lands to RMV Open Space

#### *a) Role of Grazing in Restoration of Native Grasses*

Prior to discussing recommended grazing practices, it is useful to review the literature on grazing, particularly as it relates to native (valley and foothill) grasslands. The effects of grazing on valley and foothill grasslands however remain unclear. In spite of the fact that a long history of intensive grazing in California following European settlement has been cited as one of the primary reasons for the demise of native grasslands (Burcham 1957; Dasmann 1966 as cited; Keeley 1990; Bartolome and Gemmill 1981), most research has found that some intensity of grazing is beneficial to, or at least does not negatively affect, native grasses (Huntsinger *et al.* 1996). Several researchers have documented cases where native grasses have not increased in abundance on sites that have been excluded from grazing over 20 to 40-year periods (White

1967; Bartolome and Gemmill 1981; Goode 1981). Heady (1968, 1977) suggested that large native herbivores present prior to European colonization may have been an important factor in grassland formation and ecology. This assertion supports findings that some form of managed grazing may be useful as part of efforts to maintain or restore native grasses. Menke (1996) considers "Prescribed grazing to constitute the primary component of the first phase of a perennial grass restoration program." (pg. 23). Edwards (cite) notes that "bunchgrasses can benefit from grazing in a number of ways." (p.7) Grazing prevents the accumulation of dead residue within the grass bunch, increasing vigor and greater culm and seed production. Thatch reduction between bunches allows light and space for seedling recruitment. Edwards goes on to state "with proper levels of grazing at proper times, grazing can selectively reduce competition from plants lacking comparable recovery reserves such as annual grasses." The concept of timed grazing (i.e., proper levels of grazing at proper times) is central to the grazing systems described by Allan Savory in his Holistic Resource Management (HRM).

#### ***b) Role of Grazing in Long-term Management of Coastal Sage Scrub***

As described above, the RMV practices of a north-south rotational grazing pattern can be postulated is the "proper level of grazing at the proper time" for RMV pastures. The current diversity and quality of habitat types and species on RMV would appear to support this statement. As a whole, RMV lands can be characterized as high quality upland and riparian vegetation communities that support a variety of listed and unlisted species (for a detailed description of the resources present on RMV the reader is referred to the Biological Resources Section of the GPA/ZC EIR. A specific example of this occurs in the Chiquita Pastures. The highest densities of California gnatcatchers occur in the Chiquita Pastures (particularly between Oso Parkway and San Juan Creek) which have not burned since the 1950's but are actively grazed. Based on this set of factors, one could postulate that the timed grazing used by the Ranch benefits coastal sage scrub by controlling the proliferation of annual grasses and maintaining a habitat structure suitable for the California gnatcatcher. Alternatively, one could postulate that the prevalence of gnatcatchers in the Chiquita Pastures is related to the production of barley as forage for cattle in the Chiquita Pastures - the cattle concentrate in the planted areas and do not forage extensively in the coastal sage scrub (the barley has a higher nutrient value); as a consequence the light grazing in CSS may provide a thinning function that offsets or substitutes for the absence of a major wildfire in middle Chiquita Canyon in over 50 years. In any event, it does appear that generally speaking cattle and native species have co-existed on RMV for several decades under the current grazing pattern and the current grazing practices are compatible with species persistence on the Ranch. A substantial change to the current grazing pattern, i.e., concentration of cattle in either northern or southern pastures, would eliminate the respective rest periods for these pastures, resulting in increased pressures on both forage and possibly non-forage habitats and associated species present in the pastures. The concentration of cattle in either the northern or southern pastures would also lower cattle productivity over time. This

GMP does not, therefore, recommend a substantial change to the overall RMV rotational grazing pattern following transfer of lands to the RMV Open Space. No change to the overall north-south grazing pattern described above is recommended following transfer of lands to the RMV Open Space. The exact configuration of the RMV Open Space will influence the number of cattle grazed in the north-south pattern, as available pasture will be reduced with future development of the Ranch Plan. The following pastures would be reduced by future development: Chiquita, Gobernadora, Bull, Nick's, Rinconada, Cristianitos, Gabino, and Talega. Reduction in available grazing acres and available forage will result in a smaller cattle herd being grazed on RMV over the long-term. Development within these pastures and the associated phased dedication of areas into RMV Open Space is anticipated to be phased over 20 to 25 years. As such, the overall adjustment to the herd size will also occur over a 20 to 25 year timeframe.

***c) Timed Grazing Recommendations for Specific Sub-basins***

The GMP does recommend specific changes to the manner in which cattle are grazed with a view towards increasing the productivity, health and vigor of native grasslands in specific areas. Appropriately timed grazing can have several beneficial effects on the vigor of native grasslands:

- Removal of litter and thatch
- Recycling of nutrients
- Stimulation of tillering (sprouting of new stalks)
- Removal and control of alien species
- Reduced transpiration (loss of water) by alien species making more water available for native grasses.

Consistent with the recommendations of the Draft NCCP/HCP Planning Guidelines and SAMP principles, timed grazing is one method to be used in the near-term for native grasslands enhancement in the following areas:

- Upper Gabino Canyon coastal sage scrub/valley needlegrass grassland (CSS/VGL) enhancement area
- Upper Cristianitos VGL enhancement area
- Blind Canyon VGL enhancement area

***d) Upper Gabino Canyon CSS/VGL Enhancement Area***

Section 6 of the Draft Southern NCCP/HCP Planning Guidelines describes the Upper Gabino Canyon CSS/VGL enhancement area as follows (see *Figure 6-1* of Guidelines):



Upper Gabino Canyon currently generates fine sediment due to extensive gully formation in the headwaters area. A combination of slope stabilization, grazing management and CSS/VGL restoration will reduce sediment generation and promote infiltration of stormwater which will reduce downstream impacts. This area has been identified for CSS/VGL restoration because some areas mapped as grassland in 1990 have since naturally revegetated with sparse CSS. Allowing a mixed community to regenerate may thus represent a more natural climax situation. This area has at least one area of annual grassland adjacent to the creek suitable for revegetation and several patches of low quality VGL suitable for enhancement.

The Restoration Plan prepared to support the RMV Open Space Adaptive Management Program describes the approach to slope stabilization (i.e., repair of the gullies) in Upper Gabino. In summary, repair of the gullies to stabilize the slopes involves three steps: (1) re-grading of the existing ranch road to drain in the opposite direction to the prevalent slope in the canyon, (2) re-contouring and filling in of the existing gullies and (3) stabilization of the repaired areas with straw wattles and VGL seed and plugs. For further details on this effort, the reader is referred to the Restoration Plan.

Grazing patterns in the Gabino pastures, specifically Upper Gabino, need to be managed to address two goals: (1) facilitate recovery of the repaired areas; and (2) encourage proliferation of existing VGL. Two specific adjustments are proposed to accomplish these goals. To facilitate the recovery of the repaired areas, stocking rates will be temporarily decreased to a maximum of 50 head for one to three VGL growing seasons i.e., November through April which is anticipated to provide sufficient time for establishment of VGL species in the repair areas.

In order to encourage the proliferation of existing VGL, cattle will be grazed in the upper portion of Gabino pasture identified for VGL enhancement during rapid spring growth and the peak production of annual grasses i.e., early February to late March. Grazing cattle during the rapid growth period and peak production of annual grasses will reduce annual grass seed production, reduce transpiration by the annual species, remove litter and thatch and promote the recycling of nutrients. By grazing cattle during the rapid spring growth and peak production of annual grassland species and then moving the cattle off the VGL enhancement area, native species will start their rapid spring growth and peak production after the cattle have reduced the competition from annual species.

#### *e) Upper Cristianito VGL Enhancement Area*

Section 6 of the Draft Southern NCCP/HCP Planning Guidelines describes the Upper Cristianitos VGL enhancement area as follows:

Upper Cristianitos is recommended for VGL revegetation and enhancement to reduce the generation of fine sediments from clayey terrains, promote stormwater infiltration and to enhance the value of upland habitats adjacent to Cristianitos Creek. This area includes patches of annual grassland underlain by clay soils suitable for revegetation and low quality VGL suitable for enhancement. These recommended revegetation and enhancement areas also are contiguous with existing medium quality grassland, suggesting a high likelihood of successful restoration.

Similar to the grazing pattern proposed for the portion of Upper Gabino pasture identified for CSS/VGL restoration, a small adjustment to current grazing practices is recommended for the Upper Cristianitos VGL enhancement area. As noted in the description of the existing RMV grazing patterns, the southern pastures, including Cristianitos, are grazed between October and May. In order to reduce competition from annual grasses in the VGL enhancement area, the GMP recommends that grazing in the VGL enhancement area be concentrated in early February to late March during the rapid spring growth and peak production periods for annual species and ahead of the same periods for native species beginning by late March early April.

***f) Blind Canyon VGL Enhancement Area***

Section 6 of the Draft Southern NCCP/HCP Planning Guidelines describes the Blind Canyon VGL enhancement area as follows:

Portions of Blind Canyon mesa are recommended for grassland revegetation and enhancement. This area has at least one patch of annual grassland suitable for revegetation and possibly two patches of low quality VGL suitable for enhancement. These areas are adjacent to existing medium quality VGL, suggesting a high likelihood of successful restoration. Additional fieldwork in the area may reveal additional restoration opportunities.

To promote native grasses in Blind Canyon which lay within the TRW pasture, the GMP recommends that grazing in the VGL enhancement area be concentrated in early February to late March during the rapid spring growth and peak production periods for annual species and ahead of the same periods for native species.

***g) Upper Chiquita Canyon Conservation Easement Area***

As discussed in Section 2, cattle have not been grazed in the Chiquita Pastures north of Oso Parkway since 1996. Consistent the requirements of the FTCN – Oso Section Biological Opinion and TCA's management plan for this area, the following grazing practices are recommended for Chiquita Pastures north of Oso Parkway: RDM is set at 750 lbs per acre. Based on the productivity of the Chiquita grasslands, the recommended maximum stocking rate will be 146

head in a normal rainfall year. As noted previously stocking rates are subject to change (either up or down) to maintain the recommended RDM. Chiquita is a northern pasture and as such is recommended for grazing in the summer and fall, specifically in the months of September through May.

#### **4. Recommended Configurations & Resources**

In order to implement the recommended grazing patterns described above, minimal changes to existing pasture configurations and resources are necessary. Existing fencing within the Gabino, Cristianitos & Blind pastures will allow for the movement of cattle in and out of the VGL enhancement areas.

In order to graze cattle within the Chiquita pastures north of Oso Parkway, improvement to the fencing adjacent to Oso Parkway and SR-241 will be necessary. A thorough evaluation, and improvements as necessary of all fencing in the Chiquita pastures shall be conducted prior to the re-introduction of cattle into this area.

### **3.3 Sensitive Habitat Exclusions**

Sensitive habitat exclusions (i.e., those areas where cattle should be excluded) can be broken into two categories: a) those areas from which cattle should be removed on a temporary basis (e.g., seasonally); and b) those areas where cattle should be removed permanently.

#### **a. Seasonal Exclusions**

The purpose of seasonal exclusions is to remove cattle from a specific area for a specific time period for the benefit of a specific resource or species. This GMP recommends seasonal exclusions during the breeding season of the arroyo toad that runs approximately from March to mid-June. As noted above, the current RMV grazing practice is to graze cattle in the southern pastures (Sierra, Rinconada, Cristianitos, Gabino and Talega) from October to May. In late May or early June cattle are moved from the southern pastures to the northern pastures in the Chiquita and Gobernadora sub-basins (i.e., Lower Chiquita, Lower Gobernadora, Vineyard and Bull Pasture) and remain there until late September. During the transition from the southern pastures to the northern pastures, cattle are held temporarily in River Pasture, while adjustments to the herd size are made. As noted in the description for the arroyo toad, toads occur in discrete reaches of San Juan Creek, lower Gabino Creek, lower Cristianitos Creek and Talega Creek. The potential for cattle grazing and toad breeding to overlap therefore occurs in the following pastures: Cristianitos (Gabino Creek), Talega (Talega Creek) and River (San Juan Creek) pastures (*Figure 4*). Arroyo toads do not occur in upper Gabino Creek within Gabino pasture, and Cristianitos Creek lies within the Donna O'Neill Conservancy or TRW lease area where

cattle are permanently excluded. To reduce potential toad mortality resulting from trampling of either egg masses or metamorphs by cattle, the following seasonal exclusions are recommended:

1. Cattle should be seasonally excluded from active breeding pools and adjacent sand bars and benches to the extent practical within lower Gabino Creek during arroyo toad breeding season. Temporary fencing around active breeding pools and adjacent sand bars and benches should be erected to discourage cattle from entering these areas.
2. Cattle should be seasonally excluded from active breeding pools and adjacent sand bars and benches to the extent practical within San Juan Creek during arroyo toad breeding season. Temporary fencing around active breeding pools and adjacent sand bars and benches should be erected to discourage cattle from entering these areas.

No recommendations are made for Talega pasture because Talega Creek is largely located on MCB Camp Pendleton property, outside the RMV perimeter fence.

#### **b. Permanent Exclusions**

The purpose of permanent exclusions is to remove cattle from a specific area for the benefit of a specific resource or species. Cattle are currently excluded from the Gobernadora Ecological Restoration Area and the Donna O'Neill Conservancy. The GMP recommends continued exclusion of cattle from these areas, with the exception for fuel modification treatment as discussed in the next section. In addition to these permanent exclusions, the GMP also recommends exclusion of cattle from the slope wetlands located in the Chiquita, Rinconada and Sierra Pastures.

### **3.4 Fire Management**

As discussed in Section 3.1, one of the objectives of this GMP is to identify pastures that may be subject to prescribed fire, and identify appropriate pasture rest periods following burns to promote habitat recovery.

An integral part of the Adaptive Management Program is the Wildland Fire Management Plan (WFMP). The WFMP is composed of five parts, (1) Fire Management Program, (2) Prescribed Fire Program, (3) Long-Term Strategic Fire Protection Plan, (4) Short-Term Tactical Fire Suppression Plan and (5) Research and Monitoring Criteria. Pertinent to this GMP is the relationship between grazing and fire. According to the WFMP, "because of the high numbers of wildfires that have burned through Rancho Mission Viejo since the late 1900's plus an active



cattle grazing program, and the late 1980's and early 1990's Vegetative Management Program (prescribed burns) the wildland vegetation is fairly uniform throughout RMV" (page 3-9). The predominate vegetation over most of the Ranch is scattered coastal sage scrub over cured grass (Fuel Model 2). Should the fire frequency be disrupted (ie. longer intervals between fires occurs) or cattle grazing be eliminated from RMV, the result would be an evolution of the vegetation into fuel models that have the potential for catastrophic fires i.e., FM 6 (chaparral fuels 6ft in height or less) and eventually FM 4 (chaparral fuels greater than 6ft). Grazing management therefore plays a positive role in the management of fire on RMV.

The WFMP identifies prescribed burns as a management tool in the following areas:

- Sulphur Canyon (CSS restoration site)
- Talega/La Paz Canyon (Oak woodland site)
- Cristianitos/Gabino (Oak woodland site)
- Chiquita/Narrow Canyon (Native grassland site)
- Canada Gobernadora (Native grassland site)

Grazing can also play a negative role in the recovery of burned areas. Burned areas, whether as a result of a prescribed burn or a "natural" wildfire, need time to recover. The re-introduction of cattle into a burned area too early can negatively affect the natural recovery process and may result in state-transition from one vegetation type to another (e.g., coastal sage scrub to grassland). The WFMP contains management hypotheses to be tested for three of the major habitat types on RMV (CSS, grassland and oak woodland). Results of the testing of these hypotheses will identify the optimal time that grazed can be re-introduced into a burned area.

The WFMP contains no management hypothesis for riparian systems as according to the WFMP "fire has no place in riparian area management". According to the WFMP most fires in riparian zones are accidental and of high severity, causing relatively high rates of top kill. Riparian areas should be kept fire free if all possible. According to the WFMP the fuel load in GERA is increasing and there is an abundance of ladder fuels that will carry wildfire into the crowns of the planted oaks, willows and sycamores. The WFMP recommends maintenance of a fire break between GERA and the surrounding native or non-native fuels. Plus the pruning of low hanging branches on the oaks and sycamore to reduce ground fire laddering. To facilitate reduction of fuel loads within GERA, this GMP propose the use of timed grazing within GERA. Once every three years, up to 30 head of bulls will be grazed in GERA between the months of June to October. Timed grazing within GERA will reduce the risk of a severe wildfire in GERA by reducing the both the grass fuel load and the ladder fuel load.

Similar to GERA, the Donna O'Neill Land Conservancy may require periodic fuel load reduction, up to 20 head of cattle for a period of 60-90 days in late summer/early fall (August-October) is recommended.

## **CHAPTER 4: MONITORING**

### **4.1 Relationship of Grazing Management Plan to Stressor Based Adaptive Management Program**

*Appendix J* is the proposed Adaptive Management Program for the RMV Open Space. The proposed Adaptive Management Program is stressor based. The underlying principle of this approach is that management and monitoring should be directed primarily towards environmental factors known or thought to be directly or indirectly responsible for ecosystem change. Over-grazing is identified as one of six general environmental stressors known or likely to be relevant to the habitat reserve. The Adaptive Management Program presents conceptual models that depict known and potential relationships between over-grazing and the vegetation community and individual species responses. Further, the Adaptive Management Program presents adaptive management issues, goals and objectives and monitoring in relation to these conceptual models. Hypotheses between the role of grazing and vegetation communities and individual species responses are set forth, and monitoring is proposed to response to these hypotheses.

It is not the function of this GMP to set forth and respond to adaptive management hypotheses. These need to be viewed from the vegetation community and individual species perspective as described in Adaptive Management Program. Rather, as described in Section 1, the purposes of the GMP are to: 1) contribute an important element of the long term Adaptive Management Program goals of enhancement/restoration of native habitats; and 2) demonstrate consistency with Draft NCCP/HCP Planning Guidelines and SAMP principles regarding grazing management. To achieve these purposes the GMP has identified grazing practices which seek to maintain and, where feasible, enhance long-term net habitat value within the subregion, promote perennial grasses, including native grasses, provide sufficient forage to support a cattle operation and where appropriate reduce fuel loads for fire. The monitoring portion of the GMP should therefore seek to answer whether these purposes are being achieved. In answering whether these objectives are being achieved, monitoring for the GMP will provide valuable input into the iterative feedback loop of the Adaptive Management Program.

### **4.2 Monitoring Objectives**

To answer the question of whether the GMP is achieving its purposes the monitoring objectives are established for each of the elements addressed by the GMP, namely, forage production, restoration of native habitats and sensitive habitat exclusions:

### **4.3 Forage Production and Residue**

#### ***Objectives***

The following objectives are established for forage production and residue:

- Conduct monitoring of RDM levels to ensure consistency with recommended levels
- Conduct monitoring for sufficiency of forage production to support a cattle operation.

#### ***Monitoring***

Accurate inventory and monitoring is essential to effective management of the grazed pastures. This information together with the existing conditions data described above will provide RMV managers with the data set necessary to set and adjust AUM's, determine current pasture conditions, predict future pasture conditions, and evaluate management practices.

##### **a. Plot Location and Design**

Forage production and RDM measurements should be taken in all natural or unimproved pastures. A minimum of ten permanent sample plots should be established on a stratified basis throughout the pasture in locations indicative of representative or typical conditions. All plot locations should be located using GPS and a permanent marker to provide a continuous record. Forage production measurements should be taken at peak forage production time to record the maximum available forage. RDM should be measured before the break of season.

##### **b. Technique**

According to Leaflet 21327, RDM weights can be estimated by direct clipping and weighing, double sampling (visual estimates with clipped herbage reference points) and with experience, visual estimates. The current RMV managers have over 40 years experience in running cattle on RMV lands and have traditionally used the visual estimate method. RMV managers intend to continue using this method. To provide a verification of the visual estimate, direct clipping and weighing will also be used. The normal procedure for determining the weight of residual dry matter is to use either a square foot or 1/10 square meter frame and clip the herbage as close to the ground as possible (approximately ½-inch high). All litter or shattered plant material at the ground surface which can easily be picked up should be included in the sample. Grams scales are recommended for weighing samples in the field, and air-dry weights are satisfactory under most summer and early fall conditions. Wet or green forage samples should be oven dried for dry matter determination. Grams per square foot multiplied by 96 gives the pounds per acre. Example: 12 grams per square foot x 96 = 1150 pounds per acre. All species within the square



foot will be recorded, as will physical information including soils, soil moisture, slope and aspect. Weather conditions at the time of sampling will also be recorded.

**c. Permanent Photo Points**

In conjunction with the selection of plot locations and the location of same with GPS and permanent marker, a photo point will be established. Photos should be taken at the time of sampling using the same ASA film and approximately the same time of day. The photo point will provide a visual reference of the plot location, and further verify the visual estimate of the RMV managers.

**d. Reporting**

All forage production and RDM measurements will be recorded on data sheets (Exhibit A) and compiled for use in the annual report discussed in Section 4.6.

#### **4.4 Restoration of Native Habitats**

Monitoring for the restoration of native habitats and their response to the application of timed grazing as a restoration technique will be accomplished as part of the Adaptive Management Program, and not as part of this GMP. The monitoring obligation of the GMP relative to restoration of native habitats is to ensure that the recommended grazing patterns are followed. In this regard monthly reports will be prepared by RMV managers documenting the location and number by pasture of cattle on the ranch. Exhibit B is a sample form that RMV managers will use to prepare the reports.

A brief summary of the Adaptive Management Program monitoring proposed for native grasslands and coastal sage scrub is provided below. The reader is referred to Adaptive Management Program (*Appendix J*) for further details.

**a. Coastal Sage Scrub**

Coastal sage scrub will be monitored at the landscape, habitat and species levels. The routine passive, long-term monitoring of coastal sage scrub and focal species will include two main tasks:

- Evaluation and update of the entire coastal sage scrub vegetation database at 5-year intervals.
- Annual on-the-ground monitoring of selected sample plots distributed across the RMV Open Space in a spatial distribution that represents the heterogeneity of the

Reserve and in key areas where environmental stressors are most likely to operate (e.g., along the Open Space-development edge).

**b. Native Grasslands**

The monitoring program for grasslands will use the same general methods described above for coastal sage scrub and the reader is directed to that section for more detail. The key points for the monitoring program are summarized here:

- Monitoring at landscape, habitat, species, and species assemblage levels.
- 5-year mapping of grassland system.
- Annual on-the-ground monitoring of selected sample plots across the physiographic gradient of grasslands in the RMV Open Space.
- Collection of regional climate, weather and air quality information

## **4.5 Sensitive Habitat Exclusions**

Similar to Restoration of Native Habitats, the monitoring of specific habitat or species responses to cattle exclusions is a function of the Adaptive Management Program. Monitoring through the Adaptive Management Program will determine whether exclusions are a positive or negative influence through the iterative testing of hypothesis related to the conceptual models prepared for both habitat types and specific species.

The obligation of the GMP is to monitor and report on implementation of the recommended exclusions. For permanent exclusions, e.g., vernal pools, RMV managers will report quarterly on the status of the exclusion. Questions such as is the exclusionary mechanism (e.g., fencing) in place and is the mechanism effective (e.g., is it keeping cattle out) will be asked. If the mechanism is not effective, alternatives will be proposed and reviewed with the Habitat Reserve Manager.

For seasonal exclusions, e.g., arroyo toad breeding season, reporting will occur on a weekly basis for the duration of the exclusion. Similar questions will be asked for seasonal exclusions, such as whether the exclusionary mechanism (e.g., fencing) is in place and whether the mechanism is effective (i.e., is it keeping cattle out). If the mechanism is not effective, alternatives will be proposed and implemented as appropriate.

## **4.6 Annual Reporting**

RMV managers will prepare an annual report summarizing all monitoring efforts and the results thereof, and provide same to the County of Orange.