4.1.3 BIOLOGICAL RESOURCES

This chapter describes the biological setting of the San Juan Creek and western San Mateo Creek Watersheds within the SAMP Study Area, including the Cleveland National Forest (Cleveland National Forest). The SAMP Study Area is approximately 113,000 acres. The main focus of the watersheds study is the RMV Planning Area where future the County of Orange has approved a development project (The Ranch Plan) in November 2004. Rancho Mission Viejo owns the only significant areas in the SAMP Study Area that are not already entitled or dedicated as open space.

For the most part, those portions of the SAMP Study Area outside the RMV Planning Area are under public ownership. Overall, approximately 40 percent of the watersheds are already protected open space, including the Cleveland National Forest, which occupies the majority of the upper watersheds. Caspers Wilderness Park and Starr Ranch Audubon Sanctuary also comprise a large area of the upper San Juan Watershed. The middle portion of the Arroyo Trabuco is within O'Neill Regional Park and portions of lower Arroyo Trabuco are in the process of being added to the County of Orange regional park system. Other protected areas in the San Juan Creek Watershed include Upper Chiquita Canyon Conservation Area, Chiquita Ridge Open Space, General Thomas F. Riley Regional Park, Tijeras Creek Open Space, Cañada Gobernadora Ecological Restoration Area (GERA), and the Ladera Ranch Open Space. The majority of the Donna O'Neill Land Conservancy is within the San Mateo Creek Watershed. The majority of upper San Mateo Creek Watershed remains undeveloped. However, portions of the upper watershed and most of the lower San Mateo Creek Watershed are on Department of Defense lands occupied by MCB Camp Pendleton. MCB Camp Pendleton lands in the San Mateo Creek Watershed are used for military training, agriculture, and recreation.

To describe the biological setting of the San Juan Creek and Western San Mateo Creek Watersheds SAMP Study Area, this chapter includes the following subchapters:

Subchapter 4.1.3.1 Database Development Methods

Subchapter 4.1.3.2 Vegetation Communities and Associated Species. This subchapter addresses the SAMP Study Area and the key wildlife species that are typical of, or indicate, high quality vegetation communities.

Subchapter 4.1.3.3 Sensitive Wildlife and Plant Species in the SAMP Study Area

Subchapter 4.1.3.4 Wildlife Habitat Linkages and Corridors

4.1.3.1 Database Development Methods

The information used to prepare this biological setting discussion is derived from various databases prepared specifically for the SAMP Study Area. The database originally consisted of a vegetation map and sensitive species information compiled into Geographic Information System (GIS) coverages by the County of Orange for the 132,000-acre Southern Subregion NCCP planning area and for the Central and Coastal NCCP planning area. These databases were provided to the NCCP/HCP consultant by the County in 1993 for the Southern Subregion NCCP and 2005 for the Central and Coastal NCCP portion of the SAMP Study Area west of I-5. The methods used to prepare the SAMP Study Area databases are briefly described below, and are described in more depth later in this subchapter.

Habitat and Vegetation Communities

The vegetation layer of the database is based on habitat mapping originally performed by Dames and Moore (circa 1992). The mapping was based primarily on color aerial photo (circa 1990) interpretation. The mapping used the Orange County Land Cover/Habitat Classification System (Gray and Bramlet 1992) which is a hierarchical system that identifies separate vegetation associations and sub-associations. The classification system facilitates data analysis and reserve design while maintaining the level of detail required to accurately identify habitat areas of high biological and/or strategic value.

As depicted on Figure 4.1.3-1, the vegetation layer has been modified in-house by Dudek in response to changing biological conditions in the portion of the SAMP Study Area in the Southern Subregion since 1993, primarily where grading for various large-scale developments has removed vegetation (e.g., Ladera Ranch and Talega in south Orange County). The Central and Coastal Subregion database was not modified. Please note that vegetation communities discussed in this subchapter are upland vegetation communities. Aquatic vegetation communities are discussed in Chapter 4.1.2.

Focus Sensitive Wildlife and Plant Species

The database for sensitive wildlife and plant species locations and/or suitable habitat in the SAMP Study Area was compiled from the cumulative results of a number of general and focused biological survey efforts and existing databases, including the following:

- Coastal California gnatcatcher surveys conducted by Michael Brandman Associates on various private lands in 1990 and 1991 and for the Southern Orange County Transportation Infrastructure Improvement Project (SOCTIIP) (previously referred to as the Foothill Transportation Corridor South project in 1994-1996.

- Bird surveys conducted by Sweetwater Environmental Biologists on County of Orange park land in 1993.

- Focused surveys for the orange-throated whiptail conducted by Lilburn Corporation on portions of the RMV Planning Area in 1994.

- Focused surveys conducted by Bontrager for the coastal California gnatcatcher (1989), coastal cactus wren (1989 to 1990), and tricolored blackbird (1989) on the RMV Planning Area.

- A general survey of the distributions of sensitive biological resources and wildlife corridors on the RMV Planning Area (Bontrager 1990).

- Focused bird surveys conducted by Dudek in three areas: Coto de Caza/Dove Canyon, Northrop Grumman Space Technology TRW Capistrano Test Site, and Reservoir Canyon.

- A wildlife corridor study conducted by Dudek throughout the NCCP Subregion in 1994.

- A cumulative database on nesting raptors in the NCCP planning area compiled by P. Bloom between 1990 and 2000.

- Pitfall trap data for Audubon Starr Ranch provided by P. DiSimone.

- Focused surveys conducted in 1998 by Dudek and Harmsworth Associates throughout the RMV Planning Area for riparian birds.

- Focused surveys for sensitive and rare plants conducted in 1998 and 2003 by (GLA) throughout the RMV Planning Area and in lower Arroyo Trabuco in 2000.

- Focused surveys conducted in 1998 by P. Bloom throughout the NCCP planning area for arroyo toad and western spadefoot toad and additional arroyo toad data collected in 2001 by Bloom and Niemela.

- Focused surveys by Dudek for least Bell's vireo, southwestern willow flycatcher, coastal California gnatcatcher, and arroyo toad in lower Arroyo Trabuco in 1997.

- Focused surveys for sensitive wildlife and plants by Dudek in middle Chiquita Canyon in 1998.

- Focused surveys for California gnatcatcher by Dudek in 2003 on the Donna O'Neill Land Conservancy.

- Focused surveys for rare plants conducted by F. Roberts and D. Bramlet in 2003 on the Donna O'Neill Land Conservancy.

- Vernal pool and fairy shrimp surveys conducted in 2001 on the RMV Planning Area jointly by Dudek and PCR.

- The California Natural Diversity Database.

- A cumulative database for sensitive and rare plants compiled by botanist F. Roberts (submitted when Mr. Roberts was USFWS staff).

- CRREL and PCR/BALANCE/PWA studies of riverine and non-riverine wetlands in support of the SAMP and NCCP.

- Sensitive species data collected by P&D Consultants in 2001 for SOCTIIP.

- Updates to the listed species database from the USFWS in 2002 incorporating surveys conducted under federal permits from 1999 to 2002.

- Various other studies and anecdotal records of species from the Science Advisors and other biologists for the NCCP planning area and specific projects (e.g., Beier and Barrett 1993; Padley 1992; Harmsworth Associates 1997, 1998, 2000).

These various survey and study efforts have resulted in a cumulative database that provides a strong portrayal of the abundance, richness, and distribution of biological resources in the SAMP Study Area.

Role of the NCCP Science Advisors

As part of the Southern Subregion NCCP planning process, a panel of scientists with conservation biology, species, and regional and local expertise was brought together by The Nature Conservancy. This panel, known as the Southern Orange County NCCP Science Advisors (Science Advisors), prepared a document titled *Principles of Reserve Design and*

Species Conservation for the Southern Orange County NCCP (1997). The Science Advisors were brought together to provide scientific information and experience to assist the conservation planning process for the Southern Subregion NCCP. They were tasked to develop three products: (1) principles of reserve design, (2) principles for conservation of species and habitats, and (3) principles and goals for an adaptive management program. Under the second task, the Science Advisors developed a list of species to be addressed as part of the conservation planning process. This list of species was not confined to those primarily associated with coastal sage scrub, but included species using all types of wildlands in the Southern Subregion NCCP planning area.

4.1.3.2 Vegetation Communities and Associated Species

Coastal Sage Scrub

General Description

Coastal sage scrub is represented by several major associations that occur discontinuously from the San Francisco Bay area south to El Rosario in Baja California, Mexico. Some classification systems are based on dominant species (e.g., Holland 1986; Sawyer and Keeler-Wolf 1995; White and Padley 1997), while others are based on geographic location (e.g., Axelrod 1978; Westman 1982). The most commonly cited geographic-based associations include those of Axelrod (Fransiscan, Diablan, Lucian, Venturan, Diegan, and Riversidean) and Westman (Diablan, Venturan, Riversidean, Diegan, Martirian, and Vizcainan). Coastal sage scrub is found most extensively at lower elevations of coastal southern California, but occurs up to 4,265 feet in elevation in the Coast Ranges. It transitions into Mojave Desert vegetation to the east and to Sonoran Desert vegetation in Baja California, Mexico (Axelrod 1978; Westman 1981a).

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 prolifera*), 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.

Coastal Sage Scrub Communities in the SAMP Study Area

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.

"Scrub" as defined for this SAMP Study Area, 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 the SAMP Study Area, 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.

***Venturan-Diegan Sage Scrub*.** This variable scrub community occurs on rocky, well-drained slopes away from the immediate coast (where it is replaced by the "coastal bluff scrub" community). This community is defined by the presence of one or more shrub species characteristic of coastal sage scrub, such as California sagebrush, California buckwheat, bluff monkeyflower (*Mimulus longiflorus*), goldenbush (*Isocoma* spp.), and prickly-pear. The understory is variable and frequently includes annual and perennial grasses; in spring, annual wildflowers may occupy open ground in relatively undisturbed scrub.

***Southern Cactus Scrub*.** Southern cactus scrub generally contains greater than 20 percent cactus (*Opuntia* spp.) with the remainder of the community consisting of other typical Venturan-Diegan sage scrub species. This community occurs primarily on south-facing slopes on low foothills away from the immediate coast. This community is of particular value to the coastal populations of the cactus wren (*Campylorhynchus brunneicapillus*).

***Coastal Bluff Scrub*.** Coastal bluff scrub consists of low scrub vegetation on exposed bluffs and cliffs, usually immediately adjacent to the ocean.

***Brittlebush/Buckwheat Scrub (Riversidean Coastal Sage Scrub)*.** Brittlebush/buckwheat scrub fits within Holland's (1986) description of Riversidean sage scrub. It is typically found on shallow, rocky soils (Kirkpatrick and Hutchinson 1980).

***Other Scrub Types and Ecotones*.** Scalebroom scrub (*Lepidospartum squamatum*) is associated primarily with broad floodplains and alluvial fans of interior Orange County, and is characterized by the presence of scalebroom. Saltbush scrub is defined by the presence of Brewer's saltbush (*Atriplex lentiformis* spp. *breweri*) as a dominant. In Orange County, this community typically occurs in low, saline places near the coast. California gnatcatchers (*Polioptila californica*) have been known to nest in pure stands of saltbush scrub, at least in coastal areas where gnatcatcher density is relatively high. Scrub/grassland ecotones are defined as an open scrub/grassland with shrub cover of 5 to 20 percent. Scrub/eucalyptus is an ecotone occurring where eucalyptus trees have been planted within extant scrub. Until the

eucalyptus trees become dominant to the point that the scrub is excluded from this community, scrub/eucalyptus may provide valuable wildlife habitat, including sensitive species such as California gnatcatcher and Belding's orange-throated whiptail (*Aspidoscelis* [*Cnemidophorus hyperythra beldingi*]).

Distribution of Coastal Sage Scrub in the SAMP Study Area

As identified on Table 4.1.3-1, there are 24,434 acres of coastal sage scrub in the SAMP Study Area. Coastal sage scrub is well distributed throughout the SAMP Study Area. At the lower elevations in the western portion of the SAMP Study Area, it occurs in a mosaic with grasslands, while in the eastern and northern parts of the SAMP Study Area, it is more interspersed with chaparral. Coastal sage scrub comprises approximately 33 percent of the remaining natural uplands in the SAMP Study Area.

TABLE 4.1.3-1
UPLAND VEGETATION COMMUNITIES/LAND COVERS IN THE SAMP STUDY AREA[a.]

Vegetation Community/Land Cover	Acres in SAMP Study Area
Upland Communities	
Coastal Sage Scrub	24,434
Chaparral	32,305
Grassland	12,468
Forest	2,698
Coast Live Oak Woodland	1,786
Cliff and Rocks	66
Upland Communities Subtotal	**73,757**
Non-Wildlands	
Agriculture	4,440
Disturbed	1,285
Developed	26,188
Non-Wildlands Subtotal	**31,913**
Total Upland Habitats	**105,670**

a. Source: Southern Subregional NCCP Vegetation Database (1993), as revised by Dudek & Associates, Inc. and Central and Coastal NCCP Database (1993), as received by Dudek in 2005.

Wildlife in Coastal Sage Scrub

Coastal sage scrub supports a rich diversity of wildlife species, including birds, mammals, reptiles, and invertebrates. While many widely ranging species that occur throughout shrublands in California may be encountered in coastal sage scrub, some species are restricted almost exclusively to this habitat type. Species that are indicative of high quality coastal sage scrub and of the potential presence of other species dependent on this vegetation community include the California gnatcatcher, cactus wren, Dulzura kangaroo rat (*Dipodomys simulans*), Dulzura California pocket mouse (*Chaetodipus californicus femoralis*), northern red-diamond rattlesnake (*Crotalus ruber ruber*), orange-throated whiptail, San Diego horned lizard (*Phrynosoma coronatum blainvillei*), and spotted night snake (*Hypsiglena torquata*) (Science Advisors 1997).

Human-Related Disturbances and Threats to Coastal Sage Scrub

Human-related disturbances have affected and continue to affect coastal sage scrub associations throughout the region. Of all human-related effects, livestock grazing and potentially increased fire frequency from fires intentionally set or otherwise caused by human activities have had the greatest and most pervasive effects on extant scrub in the region (Hobbs 1983; Monroe et al. 1992; Keeley and Keeley 1984; Westman 1976). Grazing by livestock has affected coastal sage scrub ecosystems for about 500 years. Humans may have ignited wildfires in coastal scrub for several thousand years, and naturally-ignited fires have occurred both before and during that period.

***Grazing*.** Grazing of livestock has, in many areas, affected both the extent and quality of coastal sage scrub. The degree of impact on scrub habitats from grazing often depends on whether or not a grazing management plan is prepared and grazing is conducted in accordance with the management plan. As an example, on Santa Cruz Island, 130 years of uncontrolled grazing by feral sheep reduced the coastal sage scrub cover to only six percent of the island (Brumbaugh and Leishman 1982). Westman (1987) observed that heavy sheep grazing has extensively impacted the understory of some stands of coastal sage scrub in Riverside County. Similar effects occur as a result of uncontrolled cattle grazing. Conversely, many researchers have found that removing intense grazing pressure from grasslands may encourage establishment of coastal sage scrub (Vogl 1976; Burcham 1957; Hobbs 1983; Kirkpatrick and Hutchinson 1980).

***Fire*.** As coastal sage scrub has evolved in a Mediterranean climate, it generally is assumed (based upon studies conducted in chaparral) that coastal sage scrub adapts to periodic wildfire disturbance. These inferences, however, should not be generalized to all coastal sage scrub associations because there are a number of characteristics of coastal sage scrub that differ from chaparral which could affect fire ecology. Coastal sage scrub's resilience to periodic wildfire is not completely understood, but seems to be a product of the reproductive strategies of the constituent species and the nature of the fire regime. Compared to chaparral, coastal sage scrub has lower shrub cover, higher volatile oil content, greater cover by herbaceous (or understory) species, shorter duration of nitrogen-fixing species, and more marked variation in post-fire sprouting patterns (Westman et al. 1981). Typically, coastal sage scrub has much less standing biomass and litter accumulation and constituent shrub species also are capable of continual reproduction by seed, unlike many chaparral species.

There appears to be a difference in recovery patterns dependent upon the geographic location of the coastal sage scrub and, perhaps, fire regimes (White 1995). In coastal areas, most sage scrub species resprout from underground root crowns, although there can be substantial seedling germination. This is not the case in inland areas, where there is little or no regeneration from sprouting and virtually all recovery is dependent upon seed germination. Habitat recovery in these areas is lower. This may be due to an adaptation to a fire interval that was longer than occurs today or that these species once were more effective in recolonizing from seed. Coastal sage scrub assemblages that regenerate primarily by seeding may be inherently more vulnerable to the effects of non-native species than stands that regenerate by sprouting (O'Leary 1990; White 1995). The SAMP Study Area is coastal; therefore, sprouting from root crowns is expected to be of primary importance for the regeneration of coastal sage scrub in this area.

Wildfires and controlled burns occur with increasing frequency in southern California (Zedler et al. 1983). High fire frequency (i.e., short intervals between fires) may permanently alter the floristic composition and structure of a site, including the extirpation of weak resprouting species such as California sagebrush (Malanson and O'Leary 1982). Fires at 5- to 10-year intervals may

result in type conversion from chaparral to coastal sage scrub (Keeley 1987; O'Leary et al.1992). Type conversion from coastal sage scrub or chaparral to grassland may result from repeated burning in successive or alternate years (Zedler et al. 1983).

Chaparral

General Description

Chaparral vegetation occurs along the Pacific Coast to the mountain foothills at 0 to 6,562 feet from southern Oregon to the San Pedro Martir Mountains in Baja California, Mexico (Detling 1961; Axelrod 1973). The distribution of chaparral mostly is in California where it is one of the most widespread vegetation types, encompassing an estimated 11,197 square miles or about seven percent of the total land area of the state (Davis et al. 1994). Species composition is varied within California where as many as 50 different subassociations have been recognized (Sawyer and Keeler-Wolf 1995). Additional forms of chaparral are known from Arizona and northeastern Mexico, and the Rocky Mountain Region but these types are isolated by greater than 77 square miles of desert, and are adapted to higher summer rainfall and a different fire regime (Keeley 2000).

Chaparral is a shrub-dominated habitat that is composed largely of evergreen, sclerophyllous species that range from approximately 3 to 13 feet in height (Keeley 2000). Other growth forms, including soft-leaved subshrubs, perennial herbs, geophytes (bulbs and corms), and annual herbs, are less abundant in mature chaparral, but can be present in abundance in early and late successional stands (Keeley 2000). Sparse stands of trees can occur within chaparral, typically within transition areas with conifers at higher elevations and oaks on north-facing slopes or ravines (Hanes 1977; Keeley 2000). Depending on the species composition and underlying topography and soil, the structure of chaparral can range from low, monotonous, smooth-textured vegetation to more heterogeneous stands approaching the vertical structure of woodlands (Keeley 2000).

From inland and high elevations to coastal locations, chaparral occurs in both large continuous stands or within a patchwork of habitats including coastal sage scrub, grasslands, oak woodlands, coniferous habitats and several wetland habitats (Heady 1977; Hanes 1977; Callaway and Davis 1993). Chaparral near the coast tends to occur in disjunct patches occupying more mesic habitats, whereas coastal sage scrub is distributed more extensively in drier habitats (Kirkpatrick and Hutchinson 1980; Malanson and O'Leary 1994). Mountain foothill and high elevation stands of chaparral are larger and more continuous, with coastal sage scrub occurring in smaller patches generally restricted to steep and south-facing exposures (Keeley 2000). Oak woodlands border chaparral in more mesic areas (e.g., ravines, north-facing slopes) that have developed deeper soils (Griffen 1977). Oak woodlands are thought to develop within late successional chaparral in areas with more developed soils (Cooper 1922; Wells 1962). The native grassland-chaparral interface is not well understood; however, research has shown cases of type conversion from chaparral to annual grasslands with frequent fire or mechanical disturbance (Zedler et al. 1983).

Chaparral generally is thought to be a fire-dependent system based on the many adaptations of its characteristic species, and its resilience in form and species composition to periodic burning (Keeley 1986, 1992). Most of the characteristic shrub species in chaparral can be organized generally into three adaptive strategies related to fire: (1) shrubs that have stems that regenerate following fire from below ground burls (resprouters), (2) shrubs that produce large amounts of dormant seed that persist for long periods of time and germinate by heat or chemical processes initiated by fire (obligate seeders), and (3) plants that apply both strategies

(Keeley 1977). Within chaparral vegetation, non-shrub plant growth forms may also employ these strategies or fire avoidance to persist within this fire prone system (e.g., geophyte species whose bulbs or corms persist following fire, annual herb species with long seed dormancy and heavy annual seed production, and annuals with the ability to disperse seeds over long distances) (Keeley 1986).

The species composition of a particular chaparral stand is largely influenced by fire. Chaparral generally returns to pre-fire structure and composition within a normal fire regime (Keeley 1986); however, considerable research has documented various effects of fire regime on species mortality (Keeley 2000). Frequency of fire has been shown to affect chaparral species composition, where short fire intervals may eliminate obligate seeding species in favor of resprouters (Keeley 1986, 1992). Additional research has shown that fire temperature or intensity also has a strong influence on post-fire species composition (Davis et al. 1989; Rice 1993; Tyler 1995). Stand age following fire is thought to influence the reproduction of species based on reproductive strategies. Research has shown that seedling recruitment is more common for resprouting species in old (>56 years) stands of chaparral whereas seedling recruitment for obligate seeding species was extremely uncommon (Keeley 1986, 1992). This research has led to the conclusion that short-interval fires may adversely affect the presence of obligate resprouting species in favor of obligate seeders.

The floristic composition of chaparral varies depending on biogeography, local habitat characteristics, and fire history. Of the many growth forms present in chaparral, woody evergreen perennials are the dominant plants and, as such, exert the most influence on the habitat. The most common and widespread species within chaparral is chamise (*Adenostoma fasciculatum*) (Hanes 1971). This species occurs in most stands of chaparral and is the dominant plant in drier habitats (Keeley 2000). The ubiquity of this species is likely explained by its many adaptations to drought, fire, and disturbance (Hanes 1977). Other common shrub species include representatives from manzanita (*Arctostaphylos* spp.), wild-lilac (*Ceanothus* spp.), silk-tassel bush (*Garrya* spp.), oak (*Quercus* spp.), redberry (*Rhamnus* spp.), *Rhus* spp., laurel sumac, mountain-mahogany (*Cercocarpus betuloides*), toyon (*Heteromeles arbutifolia*), holly-leaf cherry (*Prunus ilicifolia*), and mission manzanita (*Xylococcus bicolor*) (Holland 1986). Soft-leaved subshrubs are less common in chaparral than in coastal sage scrub but occur within canopy gaps of mature stands, and may be more prevalent following fire (Holland 1986; Keeley 2000; Sawyer and Keeler-Wolf 1995). Common species include California buckwheat, sages (*Salvia* spp.), California sagebrush, and monkeyflower. Suffrutescent and perennial herbaceous species commonly include deerweed (*Lotus scoparius*), nightshade (*Solanum* spp.), Spanish bayonet (*Yucca whipplei*), rock-rose (*Helianthemum scoparium*), golden yarrow (*Eriophyllum confertiflorum*), *Bloomeria* spp., *Brodiaea* spp., onion (*Allium* spp.), sanicle (*Sanicula* spp.), *Lomatium* spp., soap plant (*Chlorogalum* spp.), and bunch grasses (*Nassella* spp. and *Melica* spp.) (Holland 1986; Sawyer and Keeler-Wolf 1995). Vines commonly present in chaparral include wild cucumber (*Marah* spp.), dodder (*Cuscuta* spp.), chaparral-pea (*Lathyrus* spp.), bedstraw (*Galium* spp.), poison-oak (*Toxicodendron diversilobum*), and honeysuckle (*Lonicera* spp.). Annual species persisting in mature chaparral or in the post-burn flora vary according to geographic location, but typically include lupine (*Lupinus* spp.), *Lotus* spp., California thread-stem (*Pterostegia drymarioides*), *Claytonia* spp., *Gnaphalium* spp., *Phacelia* spp., *Gilia* spp., whispering bells (*Emmenanthe penduliflora*), and fiesta-flower (*Pholistoma* spp.) (Holland 1986; Sawyer and Keeler-Wolf 1995).

Chaparral Communities in the SAMP Study Area

Gray and Bramlet (1992) identify several chaparral and scrub-chaparral ecotone/sere associations in Orange County. The subassociations generally are self-descriptive by their titles.

Chaparral subassociations known from the SAMP Study Area include southern mixed chaparral, chamise chaparral, scrub oak chaparral, toyon-sumac chaparral, snowball ceanothus chaparral, and manzanita chaparral. The scrub-chaparral ecotone/sere subassociations are characterized by gradations between scrub and chaparral vegetation communities. Two scrub-chaparral ecotone/sere subassociations known from the SAMP Study Area are chamise-sage scrub and maritime chaparral-sagebrush, the former dominated by chamise and California sagebrush, the latter dominated by lemonadeberry, laurel sumac, and toyon.

Distribution of Chaparral in the SAMP Study Area

A total of 32,305 acres of chaparral has been mapped within the SAMP Study Area (Table 4.1.3-1). Chaparral generally occurs in a mosaic with coastal sage scrub in the eastern and central portions of the SAMP Study Area in association with rugged topography and higher elevations. Chaparral is the dominant vegetation community in the Cleveland National Forest. Chaparral comprises approximately 44 percent of the remaining wildlands in the SAMP Study Area.

Wildlife in Chaparral

Wildlife species typically associated with high-quality chaparral include wrentit (*Chamaea fasciata*), bushtit (*Psaltriparus minimus*), spotted towhee (*Pipilo maculatus*), California thrasher (*Toxostoma redivivum*), black-chinned sparrow (*Spizella atrogularis*), Dulzura kangaroo rat, Dulzura California pocket mouse, coastal rosy boa (*Charina trivirgata roseofusca*), coastal western whiptail (*Aspidoscelis* [*Cnemidophorus*] *tigris stejnegeri*), northern red-diamond rattlesnake, and lyre snake (*Trimorphodon biscutatus*) (Science Advisors 1997).

Human-Related Disturbances and Threats to Chaparral

Because chaparral and many of its component species are widely distributed, there are no identified direct threats to chaparral as a vegetation type. Certain locations of chaparral, endemic sensitive species or unique chaparral associations; however, may be vulnerable to local extirpation. Large-scale changes in climate or pollution may affect the distribution of chaparral species, but research on the effects of potential changes is not well developed. Fire suppression has been described as a threat to chaparral, but this also has not been demonstrated over large areas (see discussion above for fire and chaparral relationships).

Grasslands

General Description

California grasslands are described as two grassland associations: (1) non-native, annual grassland, and (2) native perennial grassland (Heady 1977; Keeley 1990; Sims and Risser 2000). There is a basic disagreement about the historic distribution of native grasses in California before the introduction of non-natives. Some have suggested that the extant perennial grasslands represent stands of “pristine” native grasslands (Heady 1977; Keeley 1990; Sims and Risser 2000). In a critical review of past research on native grasslands in California, Hamilton (1997) argued that most of the current distribution of annual grasslands in central and southern California historically was not extensively perennial grasslands, but rather shrublands, woodlands, or desert scrub vegetation. Although there is debate about the distribution and pristine nature of native grasslands, it is agreed that areas supporting native grasses in southern California currently are uncommon and support a high diversity of native, and often sensitive, plant species.

Annual Grasslands. Annual grasslands primarily are composed of annual grass species introduced from the Mediterranean basin and other Mediterranean-climate regions with variable presence of non-native and native herbaceous species (Baker 1989; Mack 1989). Species composition of annual grasslands may vary over time and place based on grazing or fire regimes, soil disturbance, and annual precipitation patterns (McNaughton 1968; Heady 1977; Keeley 1990). Annual grasslands are likely to be dominated by several species of grasses that have evolved to persist in concert with human agricultural practices (Jackson 1985; cited in Sims and Risser 2000) such as: slender oat (*Avena barbata*), wild oat (*Avena fatua*), foxtail chess (*Bromus madritensis*), soft chess (*Bromus hordeaceus*), ripgut grass (*Bromus diandrus*), barleys (*Hordeum* spp.), Italian ryegrass (*Lolium multiflorum*), perennial ryegrass (*Lolium perenne*), rat-tail fescue (*Vulpia myuros*), and Mediterranean schismus (*Schismus barbatus*). Annual grasslands also typically support an array of annual forbs from the Mediterranean-climate regions such as red-stemmed filaree (*Erodium cicutarium*), broad-lobed filaree (*Erodium botrys*), mustards ([(*Brassica* spp.], short-podded mustard [*Hirschfeldia incana*], wild radish [*Raphanus sativus*]), tocalote (*Centaurea melitensis*), Italian thistle (*Carduus pycnocephalus*), artichoke thistle or cardoon (*Cynara cardunculus*), common catchfly (*Silene gallica*), burclover (*Medicago* spp.), and cat's-ear *(Hypochaeris* spp.) (Keeley 1990). Low abundances of native species are sometimes present within annual grasslands.

These native species usually include disturbance specialists with several different growth forms such as: subshrubs (e.g., *Lotus* spp., *Eriogonum* spp., *Lessingia* spp., *Isocoma* spp., *Ericameria* spp.); succulents (*Opuntia* spp.); perennial geophytes (e.g., blue dicks [*Dichelostemma capitatum*]), and herbaceous annuals (e.g., doveweed [*Eremocarpus setigerus*], vinegar weed [*Trichostemma lanceolatum*], and tarweed [*Centromadia, Deinandra, Hemizonia*]) (Holland 1986; Sawyer and Keeler-Wolf 1995; Keeley 1990).

Most annual grasslands likely have developed as a result of past agricultural or urban development-related activities, including discing, brushing, grading, or overgrazing of native habitats. Because annual grasslands generally are associated with these disturbances, abiotic factors (excluding fire) probably play a diminished role in determining their distribution. Some large-scale physical environmental factors (e.g., climates with summer drought) may facilitate development of annual grassland within native habitats (Sims 1988; Keeley 1990). However, it is doubtful that annual grasslands would develop in most habitats in the absence of fire, grazing, or other form of disturbance. Species composition varies from one site to another but several annual grass species appear to show site preferences based on annual rainfall (Janes 1969). This research described grassland species along a rainfall gradient with soft chess and broad-lobed filaree on the mesic end (less than 8 inches of annual rainfall) and foxtail chess and red-stemmed filaree in more xeric conditions (less than 7.5 inches) (Janes 1969). Abiotic factors also are thought to influence the species composition of annual grasslands on a local scale. Seasonal variation in temperature, rainfall, and physical microsite differences have been shown to influence annual grassland species composition (Evans and Young 1989; cited in Sawyer and Keeler-Wolf 1995).

It is clear that annual grasslands have expanded into the former ranges of native grasslands (*sensu.* Clements 1920), coastal sage scrub (O'Leary and Westman 1988; Minnich and Dezzani 1998), chaparral (Zedler et al. 1983), and oak woodlands (Callaway and Davis 1993). The scientific literature on type conversion of native systems generally has shown that altered fire frequencies, grazing pressure, or other physical disturbance, combined with competitive exclusion by non-native species, have caused the expansion of annual grasslands into native habitats previously occupied by perennial species. Minnich and Dezzani (1998) documented changes in the distribution of coastal sage scrub and annual grassland within a portion of

western Riverside County. Annual grasslands in this region currently are expanding into areas formerly supporting coastal sage scrub.

Some authors have noted that annual grasslands have remained stable over time and it has been proposed that annual grassland species should be accepted as "new natives" and managed as though they were native systems (Heady 1977). However, acceptance of the current distribution of annual grasslands may be shortsighted because recent research in the coastal sage scrub/annual grassland interface has shown that the stability of annual grasslands may be related to permanent changes in soil nutrient and moisture regimes caused by the presence of exotic species (Heunneke and Mooney 1989) and air pollution (Allen et al. 1996; Padgett et al. 1999; Minnich and Dezzani 1998).

Valley and Foothill Grasslands. Native grasslands have been described as occurring in many topographic locations within California (Sawyer and Keeler-Wolf 1995), with affinities toward more mesic north and east slope-aspects within a limited region (Keeley 1991, 1993). It is more likely that native grasslands usually are associated with soil characteristics particular to a local area. Statewide, native grasslands occur on a large variety of soil series; however, most of these support oak woodlands and other vegetation types (Barry 1972; Heady 1977). The current distribution of valley and foothill grasslands within southern California is limited to areas supporting deep clayey soils that have not been heavily disturbed by mechanical disturbance (Keeley 1993). Most research has provided descriptive accounts of the soil conditions supporting perennial grasslands as deep, brown, fertile, and having high clay content (Adams 1964; Heady 1977; Keeley 1990; Sims and Risser 2000). For example, soil affinities for valley and foothill grasslands have been established within southeastern Ventura County where soil depth and percentage clay particles were positively related, and percentage rock was negatively related to percentage cover of native perennial grasses (Keeley 1993). Few soil chemical studies have been conducted within valley and foothill grasslands and no strong relationship has been established between native grasses and soil nutrients (nitrogen, potassium, or phosphate) (Keeley 1993). Another consistent theme is that native grasslands occur on soils that remain saturated during the winter and become completely dry during summer months (Keeley 1990; Holland 1986).

No conclusive evidence has emerged concerning the relationship between valley and foothill grasslands and other shrubland or woodland habitats within the same landscape. Research on the role of fire in the distribution and maintenance of valley and foothill grasslands has offered few conclusive findings. Some research suggests that the distribution of native grasslands was related to a long history of burning by Native Americans (Sampson 1944; Bean and Lawton 1973; Timbrook et al. 1982). Others dismiss burning by Native Americans as not playing a significant role in the distribution of native grasslands, suggesting alternatively that lightning-caused fires were more important for maintaining grassland ecology (Heady 1977). Evidence supporting this assertion includes the finding that more common native grassland dominants (*Nassella pulchra, N. lepida*) are adapted to fire by resprouting and producing greater volumes of seed following fire (Ahmed 1983; Keeley and Keeley 1984). Several field studies have reported an increased cover of *Nassella* spp. after burn treatments (Hatch et al. 1991; Dyer et al. 1996; Wills pers. comm. 1995), while other studies have shown mixed effects of burning on species abundance (Hatch et al. 1999). Although preliminary research has pointed to increasing abundance of native grasses following fire, there is little research describing the role of fire on maintaining other native species within valley and foothill grassland habitat.

The effects of grazing on valley and foothill grasslands also remains unclear. In spite of the fact that a long history of intensive grazing in California 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). Conversely, 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), for example, considers "Prescribed grazing to constitute the primary component of the first phase of a perennial grassland restoration program."

Grasslands in the SAMP Study Area

The NCCP vegetation database for the SAMP Study Area does not reliably distinguish between annual and native grasslands.[1] However, several individual mapping efforts have been conducted in various areas of the SAMP Study Area which allow for a general characterization of the annual and native grasslands.

***Annual Grasslands*.** Annual grasslands in the SAMP Study Area are dominated by bromes (*Bromus madritensis, Bromus diandrus, Bromus hordeaceus*), wild oats (*Avena barbata, Avena fatua*), rat-tail vescue, barleys (*Hordeum* spp.), and Italian ryegrass (Gray and Bramlet 1992; Michael Brandman Associates 1996; Dudek 2001). Annual forbs common to non-native grasslands in the SAMP Study Area include Indian milkweed (*Asclepias eriocarpa*), tocalote, common fiddleneck (*Amsinckia menziesii*), popcornflower (*Plagiobothrys* spp.), black mustard (*Brassica nigra*), field mustard (*Brassica rapa*), common catchfly, stickwort (*Spergula arvensis*), miniature lupine (*Lupinus bicolor*), white-whorl lupine (*Lupinus densiflorus* var. *austrocollium*), burclover (*Medicago polymorpha*), bristled clover (*Trifolium hirtum*), red-stemmed filaree, white-stemmed filaree (*Erodium moschatum*), and fluellin (*Kickxia spurria*) (Michael Brandman Associates 1996). Tarweeds and doveweed become dominant in later summer and fall (Michael Brandman Associates 1996). Large portions of the grasslands in the SAMP Study Area also are dominated by dense stands of cardoon. Gray and Bramlet (1992) describe 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.*

***Native Grasslands*.** Native grasslands in the SAMP Study Area are designated as valley needlegrass grassland (called southern coastal needlegrass grassland by Gray and Bramlet). Needlegrass grassland is defined 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 barbinodis*), 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; Michael Brandman Associates 1996).

[1] The NCCP database does include mapping for native and annual grasslands, but a comparison with recent field studies (e.g., Dudek 2001) indicates that the database is not accurate.

Distribution of Grasslands in the SAMP Study Area

There are 12,468 acres of grassland in the SAMP Study Area (Table 4.1.3-1). Grasslands are scattered throughout the lower elevations of the SAMP Study Area with the largest, contiguous concentration in the southern portion. Other areas supporting large patches of grassland include Chiquita Ridge, Ladera Open Space, Thomas F. Riley Regional Park, Cristianitos Canyon, the Northrop Grumman Space Technology TRW Capistrano Test Site, and upper Gabino Canyon. Only 135 acres of grassland are mapped in the Cleveland National Forest. Grassland accounts for approximately 17 percent of the natural uplands in the SAMP Study Area.

Although annual and native grasslands are not reliably differentiated in the NCCP vegetation database, some survey work was done on the RMV Planning Area by St. John in 1989 (St. John 1990); later mapping in specific areas was completed by Dudek (1997, 2001) and Michael Brandman Associates (1996). Generally, native grasslands are patchy north of Ortega Highway, with patches occurring in Ladera Open Space east of Arroyo Trabuco (Dudek 2001) and Chiquita Canyon (St. John 1990; Dudek 1997, 2001; Michael Brandman Associates 1996). Much of the native grassland is located in the western San Mateo Watershed portion of the SAMP Study Area in upper Gabino Canyon (St. John 1990; Dudek 2001), Verdugo Canyon (St. John 1990), and Cristianitos Canyon (St. John 1990; Michael Brandman Associates 1996; Dudek 2001). St. John made a preliminary estimate of approximately 3,300 to 4,000 acres of native grassland on the RMV Planning Area, 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 (approximately 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 SAMP Study Area, but individual patches are unlikely to be more than a few tens of acres in size. The cumulative total of these unmapped areas is likely to be no more than a few hundred acres.

Wildlife in Grasslands

Wildlife species that are indicative of grasslands and the potential presence of other grassland species include white-tailed kite (*Elanus leucurus*), northern harrier (*Circus cyaneus*), burrowing owl (*Athene cunicularia*), grasshopper sparrow (*Ammodramus savannarum*), California horned lark (*Eremophila alpestris actia*), Savannah sparrow (*Passerculus sandwichensis*), lark sparrow (*Chondestes grammacus*), western meadowlark (*Sturnella neglecta*), loggerhead shrike (*Lanius ludovicianus*), American badger (*Taxidea taxus*), western skink (*Eumeces skiltonianus*), ring-necked snake (*Diadophis punctatus*), western spadefoot toad (*Spea* [*Scaphiopus*] *hammondii*), and a variety of bats (Science Advisors 1997). Several other raptors depend on grasslands for foraging, including red-tailed hawk (*Buteo jamaicensis*), golden eagle (*Aquila chrysaetos*), ferruginous hawk (*Buteo regalis*), turkey vulture (*Cathartes aura*), and merlin (*Falco columbarius*). It should be noted that although the Science Advisors (1997) listed burrowing owl as a grassland indicator species, they are quite rare in the SAMP Study Area and currently there are no known nesting sites (Hamilton and Willick 1996).

Human-Related Disturbances and Threats to Grasslands

Threats to valley and foothill grasslands may include disturbance of clay soils by agricultural activities, invasion of exotic species, grazing and urban development.

Woodlands and Forest

General Description

Woodlands and forests in the SAMP Study Area consist of coast live oak woodland, coast live oak forest, canyon live oak forest, and bigcone spruce forest.

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 4,291 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 SAMP Study Area, extend from eastern Mendocino County at 40 degrees north latitude through the North Coast, Central Coast, and Transverse ranges on north-facing and coast-facing slopes and in canyons below 3,937 feet (Barbour and Minnich 2000). The range continues through the interior valleys and foothill slopes of the Penninsular ranges, mainly between 492 feet and 4,593 feet, and south to the Sierra San Pedro Martir at 30^{o} 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 5,003 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).

Soils that commonly 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 where 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.

Bigcone spruce forest is dominated by bigcone Douglas-fir (*Pseudotsuga macrocarpa*) and canyon live oak (*Quercus chrysolepis*), with lesser amounts of interior live oak (*Quercus wislizeni*), big-leaf maple (*Acer macrophyllum*), California laurel (*Umbellularia californica*), and California ash (*Fraxinus dipetala*) (Gray and Bramlet 1992). McDonald (1990) noted that Douglas-fir and canyon live oak are strongly associated and may be considered a climax community.

Woodlands and Forest in the SAMP Study Area

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, 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, Douglas' nightshade (*Solanum douglasii*), *Phacelia* spp., and common eucrypta (*Eucrypta chrysanthemifolia*) (Gray and Bramlet 1992).

Distribution of Woodlands and Forest in the SAMP Study Area

Coast live oak woodlands and forest occur throughout the SAMP Study Area and comprise approximately 4,484 acres (Table 4.1.3-1). The largest areas of coast live oak woodland are in the eastern portion of the SAMP Study Area in Caspers Wilderness Park, the hills west of Bell Canyon, and in the northern portion of the SAMP Study Area in Live Oak Canyon and upper Arroyo Trabuco. Live oak forest primarily occurs on the Donna O'Neill 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. Canyon live oak forest and bigcone spruce forest are limited to upper elevations of the Cleveland National Forest.

Wildlife in Woodlands and Forest

Woodlands and forests provide habitat for a variety of species, including nesting, cover, and food. Wildlife species that are indicators of high quality oak woodlands and the potential presence of other woodland species include Cooper's hawk, long-eared owl (*Asio otus*), western screech owl (*Megascops kennicottii*), acorn woodpecker (*Melanerpes formicivorus*), Nuttall's woodpecker (*Picoides nuttallii*), ash-throated flycatcher (*Myiarchus cinerascens*), bobcat (*Lynx rufus*), brush mouse (*Peromyscus boylii*), Pacific slender salamander (*Batrachoseps pacificus*), and various bats (Science Advisors 1997).

Human-Related Disturbances and Threats to Woodlands and Forest

Threats to oak woodlands primarily stem from habitat destruction, reproductive depression, and disease. Holland and Keil (1995) state that in the vast majority of California oak woodland sites, oak reproduction ceased around 1900. The loss of acorn viability can be attributed to cattle and sheep in rangelands and an overabundance of deer in many northern California areas (Holland and Keil 1995). The oak woodland habitat also has been altered by the replacement of native bunch grasses with exotic annual grasses which produce many more seeds. Man's reduction in the number of predators of seed-eating animals which predate oak acorns also has been found to be a threat (Holland and Keil 1995). Introduced annual grasses, due to their rapid growth and uptake of available surface water, also contribute to the loss of native grasses historically present in oak woodlands and savannas as well as diminishing water supplies for oak seedlings (Stephenson and Calcarone 1999). In some areas, it appears that California laurel is replacing coast live oak, possibly due to grazing (Holland 1988). Wood cutting, although not as prevalent in southern California, has left areas of stumps because oaks were not able to reestablish (Holland 1988). Root rot, caused by over watering during the summer in urban oaks also has been known to cause mortality (Holland and Keil 1995). Since about 1995, a die off of oaks in Santa Cruz and Marin counties, termed Sudden Oak Death, has occurred, apparently indirectly from a water mold of the genus *Phytophthora* (EBCNPS 2001). This water mold breaks down

the tree's circulatory system and makes it vulnerable to invasion by bark beetles, which normally cannot invade healthy trees. This water mold is infecting at least three species of oak: coast live oak, tanoak (*Lithocarpus densiflorus*), and black oak (*Quercus kelloggii*).

Cliff and Rock

General Description

Cliff and rock habitats support a variety of vascular plants and lichens, depending on the amount of water and microhabitat conditions of the particular site (Gray and Bramlet 1992). Gray and Bramlet distinguish between xeric and mesic cliffs and rock outcrops.

Xeric cliffs typically are on inland, south- and southwest-facing slopes. Plant species on xeric cliffs include California brickellbush (*Brickellia californica*), long-stemmed buckwheat (*Eriogonum elongatum*), chia (*Salvia columbariae*), Bigelow's spike-moss (*Selaginella bigelovii*), bird's-foot fern (*Pellaea mucronata*), wild canterbury-bell (*Phacelia minor*), dudleya (*Dudleya* spp.), littleseed muhly (*Muhlenbergia microsperma*), California fluffweed (*Filago californica*), grape soda lupine (*Lupinus excubitus*), Spanish bayonet, needlegrass (*Achnatherum coronatum*), strigose deerweed (*Lotus strigosus*), San Diego jewelflower (*Caulanthus heterophyllus*), sapphire eriastrum (*Eriastrum sapphirinum*), white pincushion (*Chaenactis artemisiifolia*), and bicolor cudweed (*Gnaphalium bicolor*).

Mesic cliffs typically occur in moist canyons and ravines near perennial water sources. Plant species on mesic cliffs include California wishbone (*Mirabilis californica*), Bigelow's spike-moss, *Phacelia* spp., coffee fern (*Pellaea andromedifolia*), lanceleaf dudleya (*Dudleya lanceolata*), snapdragon (*Antirrihinum* spp.), California polypody (*Polypodium californicum*), silverback fern (*Pentagramma triangularis*), California cloak fern (*Notholaena californica*), and California threadstem (*Pterostegia drymarioides*). Mesic cliffs also support foliose- and cructose-type lichens, mosses, and liverworts (Gray and Bramlet 1992).

Rock outcrops are similar to vegetated cliffs, but occur on gentler slopes and support a different vegetation community (Gray and Bramlet 1992). Typical species found on rocks include pine-bush (*Ericameria pinifolia*), dot-seed plantain (*Plantago erecta*), rat-tail fescue, California croton (*Croton californicus*), rosin-weed (*Osmadenia tenella*), many-stemmed dudleya (*Dudleya multicaulis*), turkish rugging (*Chorizanthe staticoides*), rattlesnake spurge (*Chamaesyce albomarginata*), sapphire eriastrum, Bigelow's spike-moss, awn grass (*Aristida* spp.), cottonweed (*Micropus* spp.), nest straw (*Stylocline* spp.), herba impia (*Filago* spp.), and cryptantha (*Cryptantha* spp.).

Cliff and Rock in the SAMP Study Area

Cliff and rock within the SAMP Study Area include xeric cliffs, mesic cliffs, and rock outcrops, and associated species as described above.

Distribution of Cliff and Rock in the SAMP Study Area

Of the 66 acres of mapped cliff and rock habitat in the SAMP Study Area, about 57 acres are in the Cleveland National Forest. About nine acres of cliff and rock outside the Cleveland National Forest are found in three general locations: west of Trampas Canyon, in the southern portion of the Donna O'Neill Land Conservancy, and in middle Gabino Canyon.

Wildlife in Cliff and Rock

Cliff and rock may be used by a variety of wildlife. Prominent species associated cliff and rock habitats include golden eagle, prairie falcon (*Falco mexicanus*), coastal rosy boa, banded gecko (*Coleonyx variegatus*), woodrats (*Neotoma* spp.), and various bats.

Human-Related Disturbances and Threats to Cliff and Rock

No specific disturbances or threats have been identified for cliff and rock areas in the SAMP Study Area. However, public recreation such as hiking and rock climbing generally may be a threat to plants that are endemic to cliff and rock microhabitats and sensitive wildlife species that use and depend on these areas such as golden eagle, prairie falcon, coastal rosy boa, and bats.

Non-Natural Land Covers

Agriculture

Agriculture consists of annual crops, vineyards, orchards, dairies, stockyards, and other farming and ranching activities (Gray and Bramlet 1992). Agriculture in the SAMP Study Area primarily is cattle grazing, orchards, and nursery operations on the RMV Planning Area. Agriculture comprises approximately 4,440 acres of the SAMP Study Area. Chiquita Canyon, Cañada Gobernadora, Cristianitos Canyon, Blind Canyon, and upper Gabino Canyon have historically been grazed. The Color Spot and Tree of Life nurseries are located in the RMV Planning Area adjacent to San Juan Creek. Citrus orchards are located adjacent to Color Spot Nursery and in Chiquita Canyon and Cristianitos Canyon.

Disturbed Habitat

Disturbed habitat includes cleared or graded, burned, and mined areas. Disturbed areas may be barren or support ruderal (weedy) vegetation such as tocalote, wild oat, black mustard, prickly sow-thistle (*Sonchus asper*), and prickly lettuce (*Lactuca serriola*) (Gray and Bramlet 1992). Disturbed areas in the SAMP Study Area include active and former sand and gravel mining operations in Arroyo Trabuco, Trampas Canyon, and San Juan Creek and clay mining in Cristianitos Canyon, as well as various pre-construction cleared areas. Disturbed habitat comprises approximately 1,285 acres in the SAMP Study Area.

Developed

The developed category includes all urban areas, road, non-natural parks, and cleared and graded areas (may overlap with the disturbed category) (Gray and Bramlet 1992). Most of the City of Mission Viejo is developed, as are large portions of the City of San Juan Capistrano. “Developed” is the third largest land cover in the SAMP Study Area after chaparral and coastal sage scrub, totaling 26,188 acres, and accounting for about 23 percent of the 113,000-acre SAMP Study Area.

4.1.3.3 Sensitive Wildlife and Plant Species in the SAMP Study Area

The County of Orange, landowners, and wildlife agencies provided the Science Advisors with a list of wildlife and plant species to be considered in the conservation planning process. While the list provided to the Science Advisors was not exhaustive of all species that might be of concern for conservation planning in southern California, it provided a wide range of species

that are representative of the wildland habitats in the SAMP Study Area and species which ultimately may be selected for regulatory coverage. These species are depicted on Figure 4.1.3-2.

Listed Species and Other Planning Species

Draft NCCP/HCP Southern Planning Guidelines and Watershed Planning Principles

The Science Advisors developed a species planning hierarchy for the purpose of conducting conservation analyses based on life history characteristics, degree of rarity or endemism, regional and global context, response to management, extant population size and trend, genetics, and other variables as necessary. Species were assigned to one of three groups based on these factors.

Group 1: Minimal conservation action is needed for Group 1 species. Their conservation would be minimally affected by the outcome of the planning process based on the following criteria:

- The conservation would have a very limited impact on the species;
- The species is not found or is insignificant in the SAMP Study Area; and/or
- The species has very high population numbers in the SAMP Study Area.

The Group 1 species include:

Birds

Allen's hummingbird (*Selasphorus sasin*)
American bittern (*Botaurus lentiginosus*)
bald eagle (*Haliaeetus leucocephalus*)
bank swallow (*Riparia riparia*)
Belding's Savannah sparrow (*Passerculus sandwichensis beldingi*)
black rail (*Laterallus jamaicensis*)
black swift (*Cypseloides niger*)
black tern (*Chlidonias niger*)
Brewer's sparrow (*Spizella breweri*)
brown pelican (*Pelecanus occidentalis*)
canvasback (*Aythya valisineria*)
clapper rail (*Rallus longirostris*)
common loon (*Gavia immer*)
Costa's hummingbird (*Calypte costae*)
gull-billed tern (*Sterna nilotica*)
hairy woodpecker (*Picoides villosus*)
harlequin duck (*Histrionicus histrionicus*)
hepatic tanager (*Piranga flava*)
hermit warbler (*Dendroica occidentalis*)
horned grebe (*Podiceps auritus*)
least bittern (*Ixobrychus exilis*)
California least tern (*Sterna antillarum browni*)
Lewis' woodpecker (*Melanerpes lewis*)
long-billed curlew (*Numenius americanus*)
mountain plover (*Charadrius montanus*)

olive-sided flycatcher (*Contopus cooperi*)
osprey (*Pandion haliaetus*)
peregrine falcon (*Falco peregrinus*)
prairie falcon (*Falco mexicanus*)
purple martin (*Progne subis*)
reddish egret (*Egretta rufescens*)
rufous hummingbird (*Selasphorus rufus*)
large-billed Savannah sparrow (*Passerculus sandwichensis rostratus*)
western snowy plover (*Charadrius alexandrinus nivosus*)
spotted owl (*Strix occidentalis*)
summer tanager (*Piranga rubra*)
Vaux's swift (*Chaetura vauxi*)
Virginia warbler (*Vermivora virginiae*)
western grebe (*Aechmophorus occidentalis*)
white-faced ibis (*Plegadis chihi*)
yellow rail (*Coturnicops noveboracensis*)

Reptiles

southern sagebrush lizard (*Sceloporus graciosus vandenburgianus*)

Mammals

San Diego desert woodrat (*Neotoma lepida intermedia*)
Stephens' kangaroo rat (*Dipodomys stephensi*)

Group 2: Group 2 species are best conserved by protecting habitats at a landscape-level through general NCCP reserve design tenets and through adaptive management. Their conservation can be inferred from a well planned and managed network of reserves in a functioning landscape. Criteria for Group 2 species include one or more of the following:

- The species is relatively widespread in the SAMP Study Area;
- The species occurs in relatively robust populations within the SAMP Study Area and possibly elsewhere;
- Life history characteristics respond to habitat/landscape-level conservation;
- Detailed surveys or inventories are not crucial in order to conserve the species;
- The species is known to, or likely to, respond well to habitat management;
- The species is locally genetically indistinct; or
- No individual action is needed other than habitat conservation and management.

Group 2 wildlife species are listed in Table 4.1.3-2 and Group 2 plant species are listed in Table 4.1.3-3.

Group 3: Group 3 species are best conserved at the species-specific level. They require one or more of three types of conservation action: (1) refinement of reserve design or specific management activities, (2) reintroduction and/or specific enhancement, or (3) additional data

and research to determine basic needs. Criteria for Group 3 species include one or more of the following:

- The species is known or predicted to occur in extremely low populations;
- The species is narrowly endemic in the SAMP Study Area;
- The species has highly specialized life history requirements;
- The SAMP Study Area is known to be crucial to the survival of the entire species;
- The species is known or suspected to respond poorly to management;
- The species is highly sensitive to small changes in the landscape or habitat;
- The species is dependent on intensive conservation activities; or
- The species is widespread, but extremely uncommon.

Group 3 wildlife species also are listed in Table 4.1.3-2 and Group 3 plant species are listed in Table 4.1.3-3.

TABLE 4.1.3-2
GROUP 2 AND GROUP 3 WILDLIFE SPECIES

Common Name Scientific Name	Federal/State/ Science Advisors Group	Habitat Associations	Number of Locations/ Populations	Potential Habitat Acreage
Birds				
American white pelican *Pelecanus erythrorhynchos*	–/CSC/2	open water	No data points	346
barn owl *Tyto alba*	–/–/2, Umbrella Species	grassland, agriculture, riparian, woodland	59 nest sites	27,573
Bell's sage sparrow *Amphispiza belli belli*	FSC, BCC/CSC/2	coastal sage scrub, chaparral	2 points	56,739
Bewick's wren *Thyromanes bewickii*	–/–/2	coastal sage scrub, chaparral, riparian, woodland	No data points	67,358
black skimmer *Rynchops niger*	FSC, BCC/CSC/2	open water, marsh	No data points	487
burrowing owl *Athene cunicularia*	FSC, BCC/CSC/3	grassland, agriculture, coastal sage scrub	No data points	41,342
cactus wren *Campylorhynchus brunneicapillus* (San Diego and Orange County populations only)	BCC/CSC/2	coastal sage scrub w/southern cactus scrub	1,387 points	24,434
California gnatcatcher *Polioptila californica*	FT/CSC/2	coastal sage scrub	691 points	24,434
California gull *Larus californicus*	–/CSC/2	agriculture, water, beach, marsh	No data points	4,722
California horned lark *Eremophila alpestris actia*	–/CSC/2	grassland, agriculture, woodland	17 points	21,438
California thrasher *Toxostoma redivivum*	FSC/–/2	coastal sage scrub, chaparral	No data points	56,739

TABLE 4.1.3-2 (Continued)
GROUP 2 AND GROUP 3 WILDLIFE SPECIES

Common Name Scientific Name	Federal/State/ Science Advisors Group	Habitat Associations	Number of Locations/ Populations	Potential Habitat Acreage
Cooper's hawk *Accipiter cooperii*	–/CSC/2	woodland, riparian	44 nest sites	10,619
double-crested cormorant *Phalacrocorax auritus*	–/CSC/2	open water, salt marsh	No data points	346
elegant tern *Sterna elegans*	FSC, BCC/CSC/2	open water	No data points	346
ferruginous hawk *Buteo regalis*	FSC, BCC/CSC/3	grassland, agriculture	No data points	15,954
golden eagle *Aquila chrysaetos*	BEPA, BCC/CSC, SFP/2, Umbrella Species	coastal sage scrub, chaparral, grassland, agriculture, cliff and rocks	1 nest site	73,759
grasshopper sparrow *Ammodramus savannarum*	–/–/2	Grassland	676 points	12,468
lark sparrow *Chondestes grammacus*	FSC/–/2	grassland-shrub-woodland margins	No data points	NA[a.]
Lawrence's goldfinch *Carduelis lawrencei*	FSC, BCC/–/2	coastal sage scrub, chaparral	1 point	56,734
least Bell's vireo *Vireo bellii pusillus*	FE/SE/3	southern willow scrub riparian	45 nesting sites	1,073
loggerhead shrike *Lanius ludovicianus*	FSC, BCC/CSC/2	coastal sage scrub, grassland, agriculture	19 points	41,342
long-eared owl *Asio otus*	–/CSC/3	woodland, riparian	8 nest sites	10,619
merlin *Falco columbarius*	–/CSC/2	grassland, agriculture	No data points	16,954
northern harrier *Circus cyaneus*	–/CSC/2	marsh breeding; grassland, agriculture, coastal sage scrub foraging	3 nest sites	41,342 foraging
Pacific slope flycatcher *Empidonax difficilis*	–/–/2	woodland, chaparral	No data points	36,789
red-breasted sapsucker *Sphyrapicus ruber*	FSC/--/2	woodland, riparian	No data points	10,619
red-shouldered hawk *Buteo lineatus*	–/–/2	woodland, riparian	65 nest sites	10,619
rufous-crowned sparrow *Aimophila ruficeps*	–/CSC/2	coastal sage scrub	400 points	24,434
sharp-shinned hawk *Accipiter striatus*	–/CSC/2	coastal sage scrub, grassland, woodland	No data points	41,434
short-eared owl *Asio flammeus*	–/CSC/2	salt marsh, grassland, agriculture	No data points	16,551
southwestern willow flycatcher *Empidonax traillii extimus*	FE/SE/3	southern willow scrub riparian	6 nest sites	1,073
Swainson's hawk *Buteo swainsoni*	FSC, BBC/ST/2	grassland, agriculture	No data points	16,954
tricolored blackbird *Agelaius tricolor*	FSC, BBC/CSC/3	marsh breeding; grassland, agriculture foraging	Two recent breeding locations	16,954 foraging
western yellow-billed cuckoo *Coccyzus americanus occidentalis*	FC, BCC/SE/3	riparian	No data points	6,135

TABLE 4.1.3-2 (Continued)
GROUP 2 AND GROUP 3 WILDLIFE SPECIES

Common Name Scientific Name	Federal/State/ Science Advisors Group	Habitat Associations	Number of Locations/ Populations	Potential Habitat Acreage
white-tailed kite *Elanus leucurus*	FSC/SFP/3	riparian, woodland, grassland, agriculture, coastal sage scrub	37 nest sites	52,007
yellow-breasted chat *Icteria virens*	–/CSC/3	riparian	128 points	6,135
yellow warbler *Dendroica petechia*	–/CSC/3	riparian	33 points	6,135
Reptiles and Amphibians				
arroyo toad *Bufo californicus*	FE/CSC/3	riparian, water courses with sandy benches along streams	See text	See text
California glossy snake *Arizona elegans occidentalis*	–/–/3	coastal sage scrub, chaparral, grassland	4 points	69,253
California red-legged frog *Rana aurora draytonii*	FT/CSC/3	riparian, water courses	No data points	NA
coast patch-nosed snake *Salvadora hexalepis virgultea*	–/CSC/2	coastal sage scrub, chaparral, grassland	3 points	69,253
coast range newt *Taricha torosa*	–/CSC/2	coastal sage scrub, chaparral in association with water	No data points	NA
Coastal rosy boa *Charina trivirgata roseofusca*	–/–/2	chaparral, coastal sage scrub with cliff and rock	3 points	NA
coastal western whiptail *Aspidoscelis* [*Cnemidophorus*] *tigris stejnegeri*	–/–/2	coastal sage scrub	84 points	24,434
northern red-diamond rattlesnake *Crotalus ruber ruber*	–/CSC/3	coastal sage scrub, grassland	17 points	36,948
orange-throated whiptail *Aspidoscelis* [*Cnemidophorus*] *hyperythra beldingi*	–/CSC/2	coastal sage scrub, chaparral, woodland	174 points	61,223
San Diego banded gecko *Coleonyx variegatus abbotti*	–/–/3	chaparral, coastal sage scrub with cliff and rock	1 point	NA
San Diego horned lizard *Phrynosoma coronatum blainvillei*	–/CSC/2	coastal sage scrub, chaparral	42 points	56,739
California mountain kingsnake *Lampropeltis zonata* San Diego population	–/CSC/2	coniferous forest, chaparral high elevation	No data points	NA
San Diego ringneck snake *Diadophis punctatus similis*	–/–/2	woodland, grassland, agriculture, riparian	9 points	27,527
silvery legless lizard *Anniella pulchra pulchra*	FSC/CSC/3	coastal sage scrub, chaparral, riparian, beach; sandy soils	No data points	NA
southwestern pond turtle Emys [*Clemmys*] *marmorata pallida*	FSC/CSC/3	ponds, water courses	12 points	NA
two-striped garter snake *Thamnophis hammondii*	–/CSC/3	riparian, vernal pool, marsh, open water, water courses	7 points	6,840

TABLE 4.1.3-2 (Continued)
GROUP 2 AND GROUP 3 WILDLIFE SPECIES

Common Name Scientific Name	Federal/State/ Science Advisors Group	Habitat Associations	Number of Locations/ Populations	Potential Habitat Acreage
Coronado skink *Eumeces skiltonianus interparietalis*	–/CSC/2	chaparral, grassland, coastal sage scrub, coniferous forest	20 points for *Eumeces skiltonianus*. May not all be Coronado skink	NA
western spadefoot toad Spea [*Scaphiopus*] *hammondii*	FSC/CSC/3	coastal sage scrub, chaparral, grassland, vernal pool	23 points	NA
Mammals				
California leaf-nosed bat *Macrotus californicus*	–/CSC/2	habitat associations not well understood	No data points	NA
Dulzura California pocket mouse *Chaetodipus californicus femoralis*	–/CSC/2	coastal sage scrub, chaparral	No data points	56,739
long-legged myotis *Myotis volans*	FSC/–/2	woodland, riparian	No data points	10,619
northwestern San Diego pocket mouse *Chaetodipus fallax fallax*	–/CSC/2	coastal sage scrub sparse	No data points	NA
Pacific pocket mouse *Perognathus longimembris pacificus*	FE/CSC/3	coastal sage scrub sparse	No data points	NA
pallid bat *Antrozous pallidus*	–/CSC/2	coastal sage scrub, chaparral, woodland	No data points	61,223
San Diego black-tailed jackrabbit *Lepus californicus bennettii*	–/CSC/3	coastal sage scrub, chaparral, grassland, agriculture	No data points	NA
southern grasshopper mouse *Onychomys torridus ramona*	FSC/CSC/3	grassland, sparse coastal sage scrub	No data points	NA
spotted bat *Euderma maculatum*	FSC/CSC/2	riparian forages over water	No data points	6,135
Townsend's western big-eared bat *Corynorhinus townsendii townsendii*	FSC/CSC/2	grassland, agriculture, woodland, caves, crevices, buildings	No data points	21,438
western mastiff bat *Eumops perotis californicus*	FSC/CSC/2	cliff and rock; forages widely	No data points	NA
Fish				
arroyo chub *Gila orcutti*	–/CSC/3	Riparian, water courses	Arroyo Trabuco, San Juan Creek, lower Cañada Gobernadora	NA
southern steelhead *Oncorhynchus mykiss*	FE/CSC/3	Riparian, water courses	Outside SAMP Study Area in Devil Canyon in the San Mateo Watershed & Salt Creek in San Juan Creek Watershed	NA

TABLE 4.1.3-2 (Continued)
GROUP 2 AND GROUP 3 WILDLIFE SPECIES

Common Name Scientific Name	Federal/State/ Science Advisors Group	Habitat Associations	Number of Locations/ Populations	Potential Habitat Acreage
threespine stickleback *Gasterosteus aculeatus* spp.	–/–/3	Riparian, water courses	Arroyo Trabuco, upper San Juan Creek, upper Bell Canyon	NA
tidewater goby *Eucyclogobius newberryi*	FE/CSC/2	Riparian, water courses	Downstream of SAMP Study Area in San Mateo Watershed	NA
Invertebrates				
Harbison's dun skipper *Euphyes vestris harbisoni*	–/–/3	woodland with larval host plant San Diego sedge *Carex spissa*	No data points	NA
Quino checkerspot butterfly *Euphydryas editha quino*	FE/–/3	coastal sage scrub, grassland with larval host plant dot-seed plantain *Plantago erecta*	No data points. Considered to be extirpated from Orange County	NA
Riverside fair shrimp *Streptocephalus woottoni*	FE/–/3	vernal pools	3 general locations: Chiquita Ridge, Saddleback Meadows, Radio Tower Rd.	NA
San Diego fairy shrimp *Branchinecta sandiegonensis*	FE/–/3	vernal pools	2 general locations: Chiquita Ridge, Radio Tower Rd.	NA

NA: not applicable
BCC: Birds of Conservation Concern USFWS
BEPA: Bald Eagle Protection Act
CSC: California Special Concern Species
FC: Federal Candidate Species
FE: Federally Listed Endangered Species
FSC: Federal Species of Concern
FT: Federally Listed Threatened Species
SE: State Listed Endangered
SFP: State Fully Protected
ST: State Threatened

a. Potential habitat was not estimated for species with specific microhabitat requirements.

Science Advisors Categories

1. Species whose conservation is minimally affected by the reserve planning process
2. Species conserved most effectively at the habitat or landscape level.
3. Species requiring species-level conservation action.

Umbrella Species - Species that have large or broad habitat requirements that could serve other species

TABLE 4.1.3-3
GROUP 2 AND GROUP 3 PLANT SPECIES

Common Name Scientific Name	Status Federal/State/ CNPS/Science Advisors Group	Habitat Associations	Occurrence in SAMP Study Area: Locations/No. Counted or Estimated Individuals
Blochman's dudleya *Dudleya blochmaniae* ssp. *blochmaniae*	–/–/List 1B, 2-3-2/3	coastal bluff scrub, coastal sage scrub, Valley and foothill needlegrass grassland	One location in the Study Area west of I-5.
Catalina mariposa lily *Calochortus catalinae*	–/–/List 4, 1-2-3/2	coastal sage scrub, chaparral, Valley and foothill needlegrass grasslands in heavy soils	118/5,051 Occurs on Chiquita Ridge, in Cañada Gobernadora, the northeast portion of the Talega Development and the Saddleback Meadows area.
Chaparral beargrass *Nolina cismontana*	–/–/List 1B, 3-2-3/3	chaparral and coastal sage scrub; mostly associated with Cieneba sandy loam and Cieneba-Rock outcrop complex	7/7 Occurs in two areas: 1 location east of Live Oak Canyon Road and 6 locations on the steep, south-facing slopes east of the TRW facility.
cliff spurge *Euphorbia misera*	–/–/List 2, 2-2-1/3	sea bluffs, coastal sage scrub	No locations in database.
coastal goldenbush *Isocoma menziesii* var. *sedoides*	–/–/3	exposed areas on coastal bluffs, coastal bluff scrub	No locations in database.
Coulter's matilija poppy *Romneya coulteri*	–/–/List 4, 1-2-3/2	Coastal sage scrub and chaparral, dry washes, canyons, and mesic slopes	No locations in database, but one location known from upper Chiquita Canyon north of Oso Parkway.
Coulter's saltbush *Atriplex coulteri*	–/–/List 1B, 2-2-2/3	coastal bluff scrub, coastal sage scrub, Valley and foothill needlegrass grasslands; associated with alkaline or clay soils	Coulter's saltbush is known from three general locations in the SAMP Study Area: Chiquita Canyon, upper Cristianitos Canyon, and upper Gabino Canyon. Coulter's saltbush occurs in alkaline soils and is associated with southern tarplant in Chiquita Canyon.
graceful tarplant *Holocarpha virgata* ssp. *elongata*	–/–/List 4, 1-2-3/2	coastal sage scrub, Valley and foothill needlegrass grasslands, chaparral, and cismontane woodland	No locations in database.
heart-leaved pitcher sage *Lepechinia cardiophylla*	–/–/List 1B, 3-2-2/3	chaparral above 1,000 feet, cismontane woodland, coniferous forest	Two populations known from Trabuco Peak in the Cleveland National Forest.
many stemmed dudleya *Dudleya multicaulis*	–/–/List 1B, 1-2-3/3	coastal sage scrub, chaparral, Valley needlegrass grasslands; mesic barrens and cobbly clay soils	339/57,128 Known from five main areas in the SAMP Study Area: Chiquita Ridge; Chiquadora Ridge; Gobernadora/Central San Juan east of Gobernadora Creek and north of Color Spot Nursery; Trampas Canyon/Cristianitos Canyon extending south to the Talega development in the San Clemente Watershed; and upper

TABLE 4.1.3-3 (Continued)
GROUP 2 AND GROUP 3 PLANT SPECIES

Common Name Scientific Name	Status Federal/State/ CNPS/Science Advisors Group	Habitat Associations	Occurrence in SAMP Study Area: Locations/No. Counted or Estimated Individuals
			Gabino and La Paz canyons. A smaller cluster occurs east of the Northrop-Grumman facilities on the mesa. There also is a single record for the Bell Canyon area on Starr Ranch F. Roberts 1997 and locations in Caspers Wilderness Park not in the database, but these populations are considered to be small.
ocellated Humboldt lily *Lilium humboldtii* spp. *ocellatum*	–/–/List 4, 1-2-3/3	oak woodland and stream courses in foothill-mountain transition zone	Suitable habitat on Starr Ranch, Caspers Wilderness Park and in the Cleveland National Forest Potentially in the Foothill/Trabuco Specific Plan Area.
Pacific saltbush *Atriplex pacifica*	–/–/List 1B, 3-2-2/3	coastal bluff scrub, coastal sage scrub, alkali playas	No locations in database.
Palmer's grapplinghook *Harpagonella palmeri*	–/–/List4, 1-2-1/2	open patches of coastal sage scrub, coastal sage scrub-grassland ecotone, purple needlegrass grassland	82/27,147 Occurs on Chiquadora Ridge, east of Gobernadora Creek in the Gobernadora and Central San Juan Sub-basins, and in Cristianitos Canyon.
Parish's brittlescale *Atriplex parishii*	–/–/List 1B, 3-3-2/3	alkali swales, sinks, depressions, and grasslands with heavy clay-alkali components	No locations in database.
Parry's tetracoccus *Tetracoccus dioicus*	–/–/List 1B, 3-2-2/3	chaparral and coastal sage scrub on gabbroic soils	Only known from Cleveland National Forest.
prostrate spineflower *Chorizanthe procumbens*	–/–/–/3	chaparral, coastal sage scrub, pinyon-juniper woodland, Valley needlegrass grassland; associated with weathered mesa soils and gabbroic clay	No locations in database in SAMP Study Area but found along Cristianitos Road south of SAMP Study Area.
rayless ragwort *Senecio aphanactis*	–/–/List 2, 3-2-1/2	coastal sage scrub, cismontane woodland, alkaline soils	No locations in database.
San Miguel savory *Satureja chandleri*	–/–/List 1B, 2-2-2/3	chaparral, oak woodlands, oak forest, shaded stream courses	Known from Upper Hot Spring Canyon
southern tarplant *Centromadia parryi* spp. *australis*	–/–/List 1B, 3-3-2/3	alkali soils, sinks, depressions, and grasslands with heavy clay-alkali components	38/145,000+ Limited to two sub-basins in the SAMP Study Area. The largest population is in Chiquita Canyon and, including the Tesoro mitigation site, numbers more than 135,000 individuals. A large population numbering 10,000+ individuals occurs on the GERA site in Gobernadora.

TABLE 4.1.3-3 (Continued)
GROUP 2 AND GROUP 3 PLANT SPECIES

Common Name Scientific Name	Status Federal/State/ CNPS/Science Advisors Group	Habitat Associations	Occurrence in SAMP Study Area: Locations/No. Counted or Estimated Individuals
sticky dudleya *Dudleya viscida*	–/–/List 1B, 2-2-3/3	coastal bluff scrub, coastal sage scrub, chaparral; on shaded steep rocky cliffs and canyon walls	No locations in database. Suitable habitat on Starr Ranch, Caspers Wilderness Park and in Cleveland National Forest.
summer-holly *Comarostaphylis diversifolia* spp. *diversifolia*	–/–/List 1B, 2-2-2/2	chaparral	No locations in database.
thread-leaved brodiaea *Brodiaea filifolia*	FT/SE/List 1B, 3-3-3/3	coastal sage scrub, chaparral, grassland, vernal pools; heavy clay soils	33/9,618 Found in seven general locations in the SAMP Study Area, excluding the translocated population at Forster Ranch: Chiquadora Ridge; Cristianitos Canyon; Trampas Canyon, lower Gabino Canyon; middle Gabino Canyon, Talega ridgeline east of Northrop-Grumman; and just east of Trabuco Creek in the Arroyo Trabuco Golf Course project area.
western dichondra *Dichondra occidentalis*	–/–/List 4, 1-2-1/2	coastal sage scrub, chaparral, burned areas	4/individuals not counted Occurs in a 25-acre mapped area in the upper/middle portion of Gabino Canyon and several small populations in Cristianitos Canyon.

CNPS- California Native Plant Society

Lists
- 1A Presumed Extinct in California
- 1B Rare or Endangered in California and Elsewhere
- 2 Rare or Endangered in California, More Common Elsewhere
- 3 Need More Information
- 4 Plants of Limited Distribution

R-E-D code e.g., 3-3-3

- R Rarity
- 1 Rare, but found in sufficient numbers and distributed widely enough that the potential for extinction or extirpation is low at this time.
- 2 Occurrence confined to several populations or to one extended population.
- 3 Occurrence limited to one or a few highly restricted populations, or present in such small numbers that it is seldom reported.

- E Endangerment
- 1 Not endangered
- 2 Endangered in a portion of its range
- 3 Endangered throughout its range

- D Distribution
- 1 More or less widespread outside of California
- 2 Rare outside California
- 3 Endemic to California

In addition to the Group 1, 2, and 3 species, the Science Advisors identified several wildlife species that may serve as effective "umbrella" species for conservation planning purposes. These umbrella species have habitat requirements that would provide for other species. For example, mountain lion (*Puma concolor*) and bobcat require landscape-level habitat linkages and movement corridors that may serve other species. Species with large foraging territories such as large raptors provide habitat for other species. Umbrella species identified by the Science Advisors include:

American badger (*Taxidea taxus*)
barn owl (*Tyto alba*)
bobcat (*Lynx rufus*)
coyote (*Canis latrans*)
golden eagle (*Aquila chrysaetos*)
great horned owl (*Bubo virginianus*)
mountain lion (*Puma concolor*)
red-tailed hawk (*Buteo jamaicensis*)

Planning Species

The NCCP/HCP Southern Planning Guidelines notes that certain species were selected as conservation planning surrogates for identifying habitat areas that should be considered for protection. The NCCP/HCP Southern Planning Guidelines "Planning Species" include the following:

State- and Federally-Listed Species

Arroyo toad
California gnatcatcher
Least Bell's vireo
Southwestern willow flycatcher
San Diego fairy shrimp
Riverside fairy shrimp
Thread-leaved brodiaea

Unlisted Species

Cactus wren
Yellow warbler
Yellow-breasted chat
Tricolored blackbird
Grasshopper sparrow
White-tailed kite
Copper's hawk
Merlin
Golden eagle
Western spadefoot toad
Western pond turtle
San Diego horned lizard
Orange-throated whiptail
Mule deer
Mountain lion
Many-stemmed dudleya

Intermediate mariposa lily
Southern tarplant
Coulter's saltbush
Mud nama
Chaparral Beargrass
Saltspring Checkerbloom

Sensitive Wildlife and Plant Species Distribution in SAMP Study Area

The SAMP Study Area is divided into the San Juan Creek Watershed and the Western San Mateo Creek Watershed and their respective sub-basins for the purpose of discussing the distribution of listed and other sensitive wildlife (Figure 2-1). The San Juan Creek Watershed also includes areas that have not been subdivided into discrete sub-basins for planning purposes. These areas include the Cleveland National Forest, the Foothill/Trabuco Specific Plan area, and Arroyo Trabuco extending south from the Cleveland National Forest to the boundary of San Juan Capistrano.

San Juan Creek Watershed

Chiquita Canyon Sub-basin. The Chiquita Canyon Sub-basin is divided into three geographic areas: upper Chiquita Canyon, defined as the portion of the sub-basin north of Oso Parkway, middle Chiquita, defined as the portion of the sub-basin south of Oso Parkway to the "Narrows," and lower Chiquita Canyon defined as the portion of the sub-basin from the "Narrows" to the sub-basin boundary south of San Juan Creek and Ortega Highway. For discussion purposes, the western portion of the Gobernadora Sub-basin, referred to here as "Chiquadora Ridge," is included in the description below because this area is physically and biologically associated with the Chiquita Sub-basin (Figure 2-1).

Upland habitats mostly are comprised of coastal sage scrub, agriculture, patches of native and annual grassland, and patches of chaparral. As depicted on Figure 4.1.3-3, the 1,548 acres of coastal sage scrub in the Chiquita Canyon Sub-basin, including Chiquadora Ridge, supports 302 mapped locations of the California gnatcatcher, or about 44 percent of the locations in the SAMP Study Area. The sub-basin provides breeding and/or foraging habitat for a variety of other sensitive wildlife species, including cactus wren, ferruginous hawk, prairie falcon, merlin, northern harrier, wintering burrowing owls, loggerhead shrike, grasshopper sparrow, rufous-crowned sparrow, California horned lark, orange-throated whiptail, coastal western whiptail, San Diego horned lizard, northern red-diamond rattlesnake, mule deer, and mountain lion. Golden eagles whose territories are located in the Cleveland National Forest are known to occasionally forage in grasslands and agricultural areas of the sub-basin.

The mainstem creek supports herbaceous riparian, southern willow scrub, arroyo willow riparian forest, and coast live oak riparian forest habitats that generally are suitable for the least Bell's vireo and several other sensitive riparian and aquatic species, including yellow-breasted chat, yellow warbler, southwestern pond turtle (near the confluence with San Juan Creek), western spadefoot toad, and two-striped garter snake. As depicted on Figure 4.1.3-4, the riparian and woodland habitats in the mainstem creek and side canyons also provide nest sites for several raptor species, including Cooper's hawk, white-tailed kite, red-shouldered hawk, great horned owl, and barn owl. A tricolored blackbird breeding colony recently has been observed on slopes south of San Juan Creek behind a Rancho Mission Viejo residence in the recent past (define recent) (over 300 pairs in 2001; P. Bloom, pers. comm. 2002) and a small breeding colony was observed by Michael Brandman Associates in 1994 above the "Narrows" (Michael Brandman Associates 1996).

Vernal pools along Radio Tower Road south of Ortega Highway appear to be associated with localized bedrock landslides from the San Onofre and Monterey formations and support both the federally-listed Riverside fairy shrimp (vernal pool 2) and San Diego fairy shrimp (vernal pools 1 and 2), mud nama (*Nama stenocarpum*) (CNPS List 2), and the western spadefoot toad.

The Chiquita Canyon Sub-basin provides both north-south and east-west movement opportunities for mountain lion, mule deer, bobcat, coyote, and gray fox (see subchapter 4.1.3.4). Coastal sage scrub habitat along Chiquita Ridge provides north-south movement opportunities for California gnatcatchers, cactus wrens, and other sensitive sage scrub species. A known important east-west movement route includes a wildlife corridor from Arroyo Trabuco situated between the Ladera Ranch and Las Flores developments. Based on existing landscape features, potential habitat linkages from Chiquita Ridge to Sulphur Canyon are located just north of the SMWD wastewater treatment plant and through the "Narrows" area south of Tesoro High School.

Five locations of the state- and federally-listed thread-leaved brodiaea occur on Chiquadora Ridge southeast of the SMWD wastewater treatment plant, including the eastern portion of the Chiquita Sub-basin and the western portion of the Gobernadora Sub-basin and are illustrated on Figure 4.1.3-5. The population total for four of the five locations is only 85 flowering stalks, but the easternmost population on Chiquadora Ridge has about 2,000 individuals.

Lower Chiquita Canyon (south of the SMWD wastewater treatment plant), Chiquita Ridge, and Chiquadora Ridge, including the area within the Gobernadora Sub-basin, supports about 106 discrete locations of the many-stemmed dudleya totaling about 16,650 individuals (Figure 4.1.3-5).

Middle Chiquita Canyon supports about 35 mapped locations of southern tarplant ranging up to about 30,000 individuals in the largest mapped location (Figure 4.1.3-5). Five estimated discrete populations of 7,000, 7,500, 10,000, 20,000, and 30,000 individuals are located west of San Juan Creek. Locations east of the Creek are more disparate and smaller, with the largest numbering about 750 individuals. Lower Chiquita Canyon is a part of the Tesoro mitigation site which includes more than 11,000 individuals and another population numbering about 400 individuals.

Lower Chiquita Canyon, west of San Juan Creek supports two locations of Coulter's saltbush numbering 200 and 400 individuals, respectively (Figure 4.1.3-5). Middle Chiquita just above and below the Narrows supports numerous locations ranging from the 10s to 600 individuals. The location with 600 individuals is east and adjacent to the Creek about midway between the Narrows and Tesoro High School. Locations with 150, 150, and 200 individuals are west of the Creek. Middle Chiquita, just to the northwest of the SMWD wastewater treatment plant, supports five locations, of which four are west of the Creek. The locations west of San Juan Creek number 25, 50, 150, and 360 individuals, and the location east of the Creek has 100 individuals. Two small locations are located in a major side canyon southeast of the Narrows. These locations number 6 and 10 individuals, respectively.

Salt Spring checkerbloom (*Sidalcea neomexicana*) (CNPS List 2) occurs in two locations in the slope wetlands in lower Chiquita east of the Creek (Figure 4.1.3-5). These locations number 300 and 1,200 individuals, respectively.

***Cañada Gobernadora Sub-basin*.** The Cañada Gobernadora Sub-basin is divided into two main geographic areas: upper Cañada Gobernadora, which includes the Coto de Caza residential development; and lower Cañada Gobernadora, which is under Rancho Mission Viejo

ownership. In addition, as discussed above, the western portion of the sub-basin referred to as Chiquadora Ridge is physically and biologically associated with the Chiquita Sub-basin, and was discussed above in that context.

The valley floor of the Cañada Gobernadora Sub-basin supports agriculture and grazing activities and is characterized by deep alluvial sandy deposits with interbedded clay lenses. The Gobernadora Ecological Restoration Area (GERA) in the lower portion of San Juan Creek is dominated by southern willow scrub. The rolling terrain on the east side of the Creek supports a mixture of agriculture, coastal sage scrub, chaparral, and oak woodlands (Figure 4.1.3-3).

The Gobernadora Sub-basin, excluding Chiquadora Ridge west of San Juan Creek, supports approximately 1,242 acres of coastal sage scrub and 74 mapped locations of the California gnatcatcher. The slopes east of the creek support a smaller population of the California gnatcatcher compared to the population west of the creek, probably due to the higher percentage of chaparral. As previously depicted on Figure 4.1.3-2 and as depicted on Figure 4.1.3-6, other upland wildlife species in the sub-basin include cactus wren, rufous-crowned sparrow, grasshopper sparrow, coast patch-nosed snake, northern red-diamond rattlesnake, western whiptail, San Diego horned lizard, western skink, and mule deer.

Southern willow scrub in GERA provides nesting habitat for approximately 12 to15 least Bell's vireo sites and 6 southwestern willow flycatcher sites, as well as yellow-breasted chat, Cooper's hawk, red-shouldered hawk, and barn owl (Figures 4.1.3-2 and 4.1.3-4). Other woodlands in the area provide nesting habitat for the white-tailed kite and long-eared owl. A large colony of tricolored blackbirds periodically occurs in lower Cañada Gobernadora around the boundary of the RMV Planning Area just south of the boundary with Coto de Caza. Wetlands in southern Coto de Caza support a breeding population of tricolored blackbirds and grasslands and agriculture on the RMV Planning Area provides foraging habitat for the birds. The sensitive arroyo chub is known from the mouth of the creek at the confluence with San Juan Creek.

Raptors using the grasslands and agriculture areas in the sub-basin for foraging include ferruginous hawk and merlin. Golden eagles whose territories are located in the Cleveland National Forest are known to occasionally forage in grasslands and agricultural areas of the sub-basin.

Lower Cañada Gobernadora, including Sulphur Canyon, provides an important east-west habitat linkage connecting Chiquita and Wagon Wheel Canyons with habitat to the east in Bell Canyon and Caspers Wilderness Park. The riparian spine along the mainstem Gobernadora Creek and the adjacent uplands along Chiquadora Ridge both provide north-south habitat linkages for mountain lions and other large mammals. The uplands along the Chiquadora Ridge also provide a habitat linkage for California gnatcatcher, cactus wren, and a variety of other birds, reptiles, and small mammals.

The Gobernadora Sub-basin, east of San Juan Creek supports about 54 scattered locations of the many-stemmed dudleya, totaling more than 5,400 individuals (Figure 4.1.3-5). Palmer's grapplinghook also occurs in association with the dudleya. The valley floor supports a large population of southern tarplant numbering 10,000+ individuals in GERA.

***Bell Canyon Sub-basin*.** The Bell Canyon Sub-basin lies west of the Cañada Gobernadora Sub-basin, includes the western portion of Caspers Wilderness Park, all of the Starr Ranch Audubon Sanctuary, and extends into the Cleveland National Forest (Figure 2-1). The Bell Canyon Sub-basin, including the Cleveland National Forest portion, supports approximately

4,752 acres of coastal sage scrub, 4,672 acres of chaparral, and 963 acres of grassland and oak woodlands. Approximately 700 acres in Bell Canyon are disturbed habitat or developed.

The uplands in the Bell Canyon Sub-basin provide habitat for a variety of sensitive species, including about 29 locations of the California gnatcatcher, 178 locations of the cactus wren, as well as golden eagle, San Diego banded gecko, western patch-nosed snake, coastal rosy boa coastal western whiptail, orange-throated whiptail, San Diego horned lizard, San Diego ringneck snake, mule deer, and mountain lion (Figure 4.1.3-3). The uplands also provide potential foraging and overwintering habitat for the arroyo toad.

The Bell Canyon Sub-basin includes approximately 2,000 acres of riparian, woodland, and forest habitats that support a variety of sensitive species, including arroyo toad (about 29 adults in 1998), western spadefoot toad, yellow warbler, yellow-breasted chat, long-eared owl, Cooper's hawk, white-tailed kite, barn owl, and red-shouldered hawk (Figures 4.1.2-1, 4.1.3-2, and 4.1.3-4). The threespine stickleback is known from upper Bell Canyon on Starr Ranch.

Bell Canyon is one of the key north-south habitat linkages in the SAMP Study Area. It is used by mule deer and mountain lion, as well as bobcat, coyote, and gray fox. It also provides linkage and dispersal habitat for other sensitive species such as the California gnatcatcher, cactus wren, arroyo toad, western spadefoot toad, and a variety of other wildlife species.

***Upper San Juan Creek*.** Although the upper San Juan Creek was not mapped as a discrete sub-basin in the SAMP, it is a prominent feature in the northeastern portion of the SAMP Study Area. It is defined as the segment of San Juan Creek above the confluence with Bell and Verdugo Canyons, excluding the Lucas Canyon Sub-basin (described below) (Figure 2-1). Within the SAMP Study Area, upper San Juan Creek is entirely in Caspers Wilderness Park. The dominant upland vegetation community along upper San Juan Creek within the SAMP Study Area is coastal sage scrub, with chaparral becoming more dominant within the Cleveland National Forest. Upper San Juan Creek supports southern sycamore riparian woodland, floodplain scrub, mule fat scrub, and intermittent river and stream vegetation. The side canyons support coast live oak woodland and canyon live oak ravine forest (Figures 4.1.2-1 and 4.1.3-1).

Upper San Juan Creek above Bell Canyon supports one of the two largest populations of the arroyo toad in the SAMP Study Area, with more than 400 calling males estimated in 1998 surveys. The coastal sage scrub supports only nine California gnatcatcher locations, but numerous cactus wren locations (Figure 4.1.3-3). Other sensitive species known from the area include loggerhead shrike, yellow-breasted chat, red-shouldered hawk, barn owl, western spadefoot toad, and glossy snake (Figure 4.1.3-2 and 4.1.3-3). The mainstem creek is a key regional habitat linkage and wildlife movement corridor for mountain lion, mule deer, bobcat, and coyote.

***Lucas Canyon Sub-basin*.** The Lucas Canyon Sub-basin is located both within Caspers Wilderness Park and the Cleveland National Forest (Figure 2-1). Including the Cleveland National Forest, it has approximately 1,054 acres coastal sage scrub, predominantly on south-facing slopes, and 1,562 acres of chaparral, predominantly on the north-facing slopes. There also approximately 141 acres of grassland and 110 acres of riparian and woodland habitats in the Lucas Canyon Sub-basin (Figures 4.1.2-1 and 4.1.3-1). The south-facing slopes support nine locations of the California gnatcatcher and 72 locations of the cactus wren (Figure 4.1.3-3). In addition, two yellow warbler and two red-tailed hawk nest sites are known to occur in the Lucas Canyon Sub-Basin (Figures 4.1.3-4 and 4.1.3-6). There are no other documented sensitive species occurrences in the NCCP database for Lucas Canyon. However, it is expected that wildlife species common to coastal sage scrub such as rufous-crowned sparrow and

orange-throated whiptail could occur in Lucas Canyon. Lucas Canyon may provide movement habitat along the canyon bottom for large- and medium-sized mammals such as mountain lion, mule deer, bobcat, coyote, and gray fox.

***Central San Juan and Trampas Canyon Sub-basin*.** The Central San Juan and Trampas Canyon Sub-basin is divided into two main geographic areas: the Central San Juan sub-unit and the Trampas Canyon sub-unit. The Central San Juan sub-unit includes the reach of San Juan Creek extending from just south of the confluence with Bell Creek in the east to the confluence with Gobernadora Creek in the west. The Central San Juan sub-unit extends north from San Juan Creek for approximately 1.6 miles and encompasses a large north-south trending canyon through the center of the sub-unit. The Trampas Canyon sub-unit is south of San Juan Creek and is characterized by the silica sand mining operation that dominates the canyon and the rugged terrain between Cristianitos Canyon and San Juan Creek.

- ***Central San Juan Sub-Unit*.** The Central San Juan sub-unit supports coastal sage scrub, chaparral, oak woodlands, grassland, agriculture, and disturbed areas (Color Spot Nursery) (Figure 4.1.3-3). Approximately 13 or14 California gnatcatcher locations occur in the coastal sage scrub habitat north of Color Spot Nursery and they may use coastal sage scrub adjacent to San Juan Creek; this habitat probably is important for dispersal. Uplands adjacent to San Jan Creek provide foraging and estivation habitat for the arroyo toad. Other sensitive upland species in the uplands area of this sub-unit include cactus wren, rufous-crowned sparrow, grasshopper sparrow, San Diego desert woodrat, orange-throated whiptail, coastal western whiptail, northern red-diamond rattlesnake, San Diego ringneck snake, California glossy snake, and western skink (Figures 4.1.3-3 and 4.1.3-6). Sandy soils in and adjacent to San Juan Creek provide suitable habitat for the silvery legless lizard.

  Riparian and aquatic habitats within San Juan Creek provide breeding habitat for the arroyo toad and the least Bell's vireo (although both species occur in small numbers in this reach of the Creek), as well as yellow-breasted chat, yellow warbler, white-tailed kite, Cooper's hawk, red-shouldered hawk, great-horned owl, barn owl, red-tailed hawk, great blue heron, southwestern pond turtle, two-striped garter snake, western spadefoot toad, arroyo chub, and threespine stickleback (Figures 4.1.2-1 and 4.1.3-2). A breeding colony of tricolored blackbirds has been observed in previous years in San Juan Creek east of the intersection of Ortega Highway at Cristianitos Road.

  The San Juan Creek portion of this sub-unit is a key connection, especially for movement between the northern and southern portions of the subregion. It provides continuous upland habitat linkage connections, particularly along the southern side of the Creek for species such as the California gnatcatcher, cactus wren, rufous-crowned sparrow, and a variety of reptiles and small mammals. Large- and medium-sized mammals known or expected to use the riparian habitat as "live-in" habitat and for movement include mountain lion, mule deer, bobcat, coyote, and gray fox.

  North-south movement of large wildlife between San Juan Creek and Trampas Canyon and Cristianitos Canyon is constrained by Ortega Highway. High traffic volumes on Ortega Highway contribute to wildlife mortality. Wildlife have been documented to use two wildlife corridors that cross under the Highway: a corrugated steel pipe culvert near Radio Tower Road and a concrete box culvert west of Cristianitos Road connecting to Trampas Canyon (Dudek 1994).

The Central San Juan sub-unit supports about 20 locations of many-stemmed dudleya that generally are contiguous with the Gobernadora locations (i.e., they are part of the same complex) (Figure 4.1.3-5). These locations range up to about 2,000 individuals, but the median population size is much smaller at 50 individuals. There are 13 locations with 11 to 95 individuals and five locations with 100 to 345 individuals.

- ***Trampas Canyon Sub-unit*.** The Trampas Canyon sub-unit supports a mosaic of upland habitats, including coastal sage scrub, chaparral, grassland, and patches of oak woodland (Figure 4.1.3-3). The sub-unit supports approximately four California gnatcatcher locations and 20 cactus wren locations. Other sensitive wildlife species known from the sub-unit include orange-throated whiptail, red-diamond rattlesnake, and San Diego desert woodrat near the mouth of the Trampas Canyon. Raptors nesting in oak woodlands in the sub-unit include turkey vulture, white-tailed kite, Cooper's hawk, red-shouldered hawk, red-tailed hawk, and great horned owl (Figure 4.1.3-4). Although the riparian vegetation in the sub-unit does not provide high value breeding habitat for species such as the least Bell's vireo and other sensitive, non-raptor riparian birds, the ONIS mining lake provides resting and foraging habitat for common water fowl and other birds associated with open water and wetland vegetation such as pied-billed grebe, western grebe, mallard, ruddy duck, ring-necked duck, double-crested cormorant, herons, and American coot.

  Vernal pools along Radio Tower Road south of Ortega Highway (pools 7 and 8) appear to be associated with localized bedrock landslides from the San Onofre and Monterey formations. Vernal pool 7 supports both the Riverside fairy shrimp and San Diego fairy shrimp. The spadefoot toad also breeds in these vernal pools.

  Coastal sage scrub in the central portion of the Trampas Canyon subunit provides a nearly continuous north-south connection between San Juan Creek and the upper portion of the Cristianitos Sub-basin for bird species such as the California gnatcatcher and cactus wren (Figure 4.1.3-3). This portion of the subunit east of Trampas Creek, along with the Cristianitos Canyon Sub-basin, connects populations to the north in Chiquita Canyon with the MCB Camp Pendleton population south of the subregion.

  The central portion of the sub-unit east of the silica mine in Trampas Canyon and Cristianitos Road is also a habitat linkage between San Juan Creek and Cristianitos, Blind, La Paz, and Gabino Canyons used by mountain lion, mule deer, coyote, and bobcat. A concrete box culvert crossing of Ortega Highway just west of Cristianitos Road is a key crossing point for wildlife between San Juan Creek and Trampas Canyon.

  As previously address, north-south movement of large wildlife between San Juan Creek and Trampas Canyon and Cristianitos Canyon is constrained by Ortega Highway. The Trampas Canyon sub-unit supports one location of thread-leaved brodiaea with about 250 flowering stalks. There are about eight locations of many-stemmed dudleya with 20 to 700 individuals and five locations with 200 to700 individuals (Figure 4.1.3-5).

***Verdugo Canyon Sub-basin*.** Uplands within the Verdugo Canyon Sub-basin support coastal sage scrub, chaparral, grasslands, and small patches of oak woodland (Figure 4.1.3-3). Coastal sage scrub and chaparral are the predominant habitats, with the grasslands more prominent toward the canyon's confluence with San Juan Creek. The canyon floor supports sycamore riparian woodland and southern coast live oak riparian forest with small patches of mule fat scrub. Southern willow scrub also is present in tributaries to Verdugo Canyon (Figure 4.1.2-1).

There are relatively few sensitive species locations in the Verdugo Canyon Sub-Basin. One California gnatcatcher and approximately 16 cactus wren locations occur in the coastal sage scrub along the canyon (Figure 4.1.3-3). The yellow-breasted chat occurs in riparian habitat in the sub-basin; this habitat also supports nest sites for Cooper's hawk, red-shouldered hawk, red-tailed hawk, and barn owl (Figure 4.1.3-4). There is an historic record of a small breeding colony of the tricolored blackbird at the mouth of the canyon under the Ortega Highway bridge.

The Verdugo Canyon Sub-Basin provides a habitat connection for large- and medium-sized mammals. Mule deer are common in the canyon; it also provides habitat for mountain lion, coyote, bobcat, and gray fox.

Foothill/Trabuco Specific Plan Area. The Foothill/Trabuco Specific Plan area encompasses approximately 3,666 acres in the northern portion of the SAMP Study Area. The dominant vegetation communities in the Specific Plan area are coastal sage scrub (about 1,100 acres) and chaparral (1,070 acres) with lesser amounts of grassland and woodland. The minimum elevations in this area are about 984 feet above mean sea level and most of the Specific Plan area is above 1,198 feet. The coastal sage scrub and chaparral in this area is more typical of that found in the Cleveland National Forest than at the lower elevations in areas such as Chiquita Canyon.

Although California gnatcatchers are relatively sparse in the Foothill/Trabuco Specific Plan area, the NCCP database includes 17 scattered locations. Other sensitive wildlife species known in occupy the Specific Plan area include cactus wren, red-shouldered hawk, rufous-crowned sparrow, yellow warbler, yellow-breasted chat, orange-throated whiptail, coastal western whiptail, and Riverside fairy shrimp (vernal pools on the Saddleback Meadows site).

Sensitive plants in the area include small populations of Catalina mariposa lily located west of Live Oak Canyon Road and one location of chaparral beargrass east of the road.

Canyons and drainages within the Foothill/Trabuco Specific Plan area provide important movement corridors for mountain lions and other larger species between Arroyo Trabuco and the Cleveland National Forest.

Arroyo Trabuco. The Arroyo Trabuco area primarily encompasses O'Neill Regional Park extending from the Cleveland National Forest in the north to the City of San Juan Capistrano boundary in the south. The dominant vegetation communities are coastal sage scrub and grasslands that total more than 1,000 acres. The Arroyo Trabuco area also supports more than 700 acres of riparian and woodland habitats.

Sensitive species in the Arroyo Trabuco area include the California gnatcatcher, with about 40 locations scattered within and adjacent to the arroyo. Most of the locations are clustered in the southern portion of the Arroyo Trabuco. Up to 13 nesting territories of the least Bell's vireo have been documented in Arroyo Trabuco south of Crown Valley Parkway (Dudek 2000). Other nesting migrants in the arroyo are yellow warbler and yellow-breasted chat. The riparian and woodland habitats in Arroyo Trabuco also provide nesting habitat for several raptors, including Cooper's hawk, red-shouldered hawk, red-tailed hawk, white-tailed kite, great horned owl, and barn owl. Historic nesting sites are also known for the golden eagle, long-eared owl, and turkey vulture. Other sensitive species documented in the arroyo include cactus wren, rufous-crowned sparrow, coastal western whiptail, San Diego horned lizard, western skink, red-diamond rattlesnake, arroyo chub, and three-spined stickleback. The Arroyo Trabuco also is an important north-south movement corridor for large mammals such as mountain lion, mule deer, and coyote, although the southern portion of the arroyo at the boundary of the City of San Juan

Capistrano represents a dead-end for the mountain lion because of the urban development in the area.

***City of Dana Point*.** The City of Dana Point portion of the SAMP Study Area is a mix of urban development and undeveloped land dominated by grassland (Figure 4.1.3-2). Scrub habitat also occurs in modest amounts in addition to other more limited native vegetation communities including watercourses, riparian, and chaparral. Sensitive species known from the portion of Dana Point in the Study Area are California gnatcatcher and cactus wren and two raptors; red-tailed hawk and red-shouldered hawk.

City of Laguna Hills. A small portion of the City of Laguna Hills is located within the SAMP Study Area; this area is largely developed (Figure 4.1-3-2). The only natural vegetation community in Laguna Hills in the SAMP Study Area is grassland. No sensitive species have been documented in the SAMP Study Area within Laguna Hills.

***City of Laguna Niguel*.** The City of Laguna Niguel portion of the SAMP Study Area is largely urbanized (Figure 4.1.3-2). Undeveloped land in the SAMP Study Area within the City is dominated by grassland and smaller patches of coastal sage scrub. In addition, limited other native vegetation communities also occur including such aquatic resources as marsh, riparian, and watercourses. Other upland vegetation communities present include chaparral and woodland. Species that may occur in these vegetation communities are noted in the general description of each vegetation community.

***City of Mission Viejo*.** The City of Mission Viejo portion of the SAMP Study Area is largely urban uses (Figure 4.1.3-2). Undeveloped land is dominated by grassland and smaller patches of coastal sage scrub. Lesser amounts of aquatic vegetation communities including riparian, marsh, and streams also occur in addition to other upland communities such as chaparral and woodland. At least two raptors are known from the western portion of Mission Viejo; red-tailed hawk and northern harrier.

***City of Rancho Santa Margarita*.** Almost all of the City of Rancho Santa Margarita is located within the SAMP Study Area (Figure 4.1.3-2). Portions of the City within the SAMP Study Area are developed; however, natural vegetation communities are also present. A portion of the Arroyo Trabuco is within the City; biological resources within the Arroyo Trabuco are described above. In addition, Upper Chiquita Canyon is located within the City. Resources present in Upper Chiquita Canyon include coastal sage scrub, grassland, and woodland and small amounts of riparian. Sensitive species present include the California gnatcatcher, cactus wren, orange-throated whiptail, red-tail hawk, and grasshopper sparrow.

***City of San Clemente*.** The portion of the City of San Clemente in the SAMP Study Area is within the Donna O'Neill Land Conservancy at Rancho Mission Viejo (Figure 4.1-3-2). Several natural vegetation communities occur in the Donna O'Neill Land Conservancy including grassland, chaparral, riparian, scrub, woodland, and forest. Documented sensitive species present in the portion of the Donna O'Neill Land Conservancy in the City of San Clemente include grasshopper sparrow, rufous-crowned sparrow, Cooper's hawk, many-stemmed dudleya, vernal barley, Catalina mariposa lily, intermediate mariposa lily, Palmer's grapplinghook, and small-flowered morning glory.

***City of San Juan Capistrano*.** The City of San Juan Capistrano portion of the SAMP Study Area is a mix of urban development and undeveloped land dominated by grassland and smaller patches of coastal sage scrub (Figure 4.1.3-2). The coastal sage scrub supports more than 50 locations of the California gnatcatcher. Other upland species occurring in the coastal sage scrub

and grassland include cactus wren, rufous-crowned sparrow, grasshopper sparrow, loggerhead shrike, northern red-diamond rattlesnake, and western spadefoot toad. Nesting raptors in the area include Cooper's hawk, red-shouldered hawk and red-tailed hawk. Aquatic and wetland/riparian species occurring west of I-5 include arroyo chub, southwestern pond turtle, and western spadefoot toad.

San Mateo Creek Watershed

***Cristianitos Canyon Sub-basin*.** The Cristianitos Canyon Sub-basin (Figure 2-1) is dominated by grasslands; a large component is native grassland (approximately 330 acres) and coastal sage scrub (approximately 640 acres) (Figure 2-1). The grassland is predominant in upper Cristianitos and along the eastern side of the canyon, while coastal sage scrub and chaparral dominate the east-facing slopes on the western side of the canyon within the Donna O'Neill Land Conservancy (Figure 4.1.3-1). Riparian habitats in the sub-basin include coast live oak riparian woodland, southern willow scrub, and mule fat (Figure 4.1.2-1). Mule fat is a predominant component in the upper portion of the sub-basin. Tributaries to Cristianitos Creek from the Donna O'Neill Land Conservancy support coast live oak woodland and riparian woodland.

As depicted on Figure 4.1.3-7, the sub-basin supports approximately 12 California gnatcatcher locations and approximately 67 cactus wren locations. The sub-basin probably serves as a primary north-south dispersal area for the California gnatcatcher between the large populations in Chiquita Canyon and MCB Camp Pendleton. As previously depicted on Figure 4.1.3-7 and as depicted on Figure 4.1.3-8, other upland sensitive species in the sub-basin include grasshopper sparrow, rufous-crowned sparrow, California horned lark, San Diego horned lizard, coastal western whiptail, orange-throated whiptail, western patch-nosed snake, northern red-diamond rattlesnake, and San Diego desert woodrat. In 2001, five arroyo toads were observed in the reach of Cristianitos Creek from confluence with Gabino Canyon to about 3,000 feet north of the confluence (Figure 4.1.3-2). This area is marginal arroyo toad breeding habitat because of the fine sediments in the creek originating from the clay soils east of the creek. As previously shown on Figures 4.1.2-1 and 4.1.3-2and as shown on Figure 4.1.3-9, riparian and aquatic sensitive species in the sub-basin include white-tailed kite, Cooper's hawk, red-shouldered hawk, red-tailed hawk, great horned owl, barn owl, southwestern pond turtle, and western spadefoot toad. The grasslands provide foraging habitat for sensitive wintering raptors such as the ferruginous hawk and Swainson's hawk. Wintering burrowing owls also have been recorded in Cristianitos Canyon. In combination with Talega, Gabino, and La Paz Canyons, the Cristianitos Canyon Sub-basin provides a habitat connection for the mountain lion, mule deer, bobcat, coyote, and gray fox to adjoining sub-basins.

The Cristianitos Canyon Sub-Basin contains clay soils that support several sensitive plants including the thread-leaved brodiaea, many-stemmed dudleya, Palmer's grapplinghook, and western dichondra (Figure 4.1.3-10). The many-stemmed dudleya population is among the largest in the subregion. About 13 small, scattered locations of thread-leaved brodiaea occur in the Cristianitos Sub-basin, ranging from one to 120 individuals. A population complex of about 6,100 flowering stalks of thread-leaved brodiaea individuals occurs on the hill outcrop adjacent to the mine pits in the southern portion of Cristianitos Canyon on the boundary between the Cristianitos, Gabino, and Blind Canyons Sub-basins. The three largest populations in this complex number 2,000, 2,000 and 1,500 individuals each, with the other small locations each numbering 440, 150, and 18 individuals.

Many-stemmed dudleya in the Cristianitos Sub-basin comprises the largest concentrated populations of this species in the SAMP Study Area with more than 100 mapped locations

totaling more than 26,000 individuals. Within the Donna O'Neill Land Conservancy, there are about 45 locations of dudleya totaling about 9,000 individuals. Cristianitos Canyon outside the Donna O'Neill Land Conservancy supports about 62 locations totaling about 17,000 individuals.

Upper Cristianitos Creek supports two small locations of Coulter's saltbush numbering 3 and 12 individuals, respectively.

***Gabino and Blind Canyons Sub-basin*.** The Gabino and Blind Canyons Sub-basin in divided into three main planning sub-units: the upper Gabino Canyon sub-unit, the middle Gabino Canyon sub-unit, and the lower Gabino Canyon sub-unit, the later which includes Blind Canyon (Figure 2-1). The upper Gabino Canyon sub-unit encompasses the open grasslands at the headwaters of Gabino Creek. The middle Gabino Canyon sub-unit is defined by the narrow, steep-sided canyon between upper Gabino Canyon and the confluence of Gabino and La Paz Creeks. The lower Gabino Canyon sub-unit includes the portion of Gabino Canyon below its confluence with La Paz Creek and its confluence with Cristianitos Creek, and Blind Canyon.

- ***Upper Gabino Sub-unit*.** The open "bowl-shaped" portion of the Upper Gabino sub-unit adjacent to upper Gabino Creek is characterized by predominantly native grasslands (approximately 275 acres) on the gentle slopes leading away from the creek, with coastal sage scrub and chaparral dominating the surrounding rugged canyons and hills (Figure 4.1.3-7). The riparian habitat in the sub-unit includes relatively open coast live oak riparian woodland, sycamore riparian woodland, and mule fat (Figures 4.1.2-1 and 4.1.3-2).

  Numerous cactus wren locations are present in the sub-unit, but the population is not as dense as other areas within the SAMP Study Area (Figure 4.1.3-7). There are no documented California gnatcatcher locations in the upper Gabino Canyon sub-unit. The grasslands in the sub-unit provide high quality raptor foraging habitat and also provides habitat for the badger, burrowing owl, spadefoot toad, and horned lark. The riparian habitat in the sub-unit supports a few raptor nest sites for white-tailed kite, red-shouldered hawk, and red-tailed hawk, but not at the density of the downstream riparian habitats in middle Gabino Canyon where the canyon is narrow and closely bound by rugged terrain (Figure 4.1.3-9). Aquatic habitat (Jerome's Lake) in the sub-unit supports the southwestern pond turtle and two-striped garter snake (Figures 4.1.2-1 and 4.1.3-2). As part of the Gabino and Blind Canyons Sub-basin, upper Gabino Canyon also is an important habitat connection for movement and dispersal by the mountain lion, bobcat, coyote, and mule deer.

  As depicted on Figure 4.1.3-10, the sub-unit supports many-stemmed dudleya, Coulter's saltbush, and western dichondra. The boundary between the upper and middle Gabino sub-units supports several locations of many-stemmed dudleya ranging from about five individuals to about 700 individuals. One population just south boundary between middle and upper Gabino numbers about 1,500 individuals. Two locations near the county boundary with Riverside number about 500 and 700 individuals each, the latter of which overlaps the boundary with the La Paz Canyon Sub-basin. Coulter's saltbush occurs in the sub-unit in a small population of about 100 individuals west of and adjacent to the creek.

- ***Middle Gabino Sub-unit*.** The north two-thirds of the middle Gabino Canyon sub-unit is characterized by the narrow canyon bounded by steep, rugged slopes dominated by chaparral and smaller patches of coastal sage scrub (Figure 4.1.3-7). The lower one-third of the sub-unit broadens somewhat with flat benches supporting small patches of

grassland. The riparian habitat in the sub-unit includes coast live oak riparian woodland, sycamore riparian woodlands, and smaller areas of coast live oak woodland and mule fat scrub (Figure 4.1.2-1). Some portions of the canyon also support floodplain (alluvial) scrub.

There are three locations of the California gnatcatcher distributed along a north-south trending canyon in the lower portion of the middle Gabino Canyon sub-unit (Figure 4.1.3-7). As with the upper Gabino Canyon sub-unit, the western portion of the sub-unit includes numerous cactus wren locations. However, the population is not as dense as other areas of the SAMP Study Area. Other sensitive upland wildlife species in the sub-unit include rufous-crowned sparrow and orange-throated whiptail.

Breeding sites for a small population of the arroyo toad (e.g., two toads in 1998) extend approximately 3,000 feet above the confluence with La Paz Creek (Figures 4.1.2-1 and 4.1.3-2). The riparian habitat in the sub-unit also supports several nest sites for raptors, including white-tailed kite, Cooper's hawk, long-eared owl, great horned owl, barn owl, and red-tailed hawk (Figure 4.1.3-9).

As part of the Gabino and Blind Canyons Sub-basin, middle Gabino Canyon also is an important habitat connection for movement and dispersal by the mountain lion, bobcat, coyote, and mule deer.

One population of thread-leaved brodiaea (about 183 flowering stalks) is located in the northwest portion of the middle Gabino Canyon sub-unit. Many-stemmed dudleya is found in about five locations in the sub-unit, with the largest population of about 1,500 individuals located west of the creek near the boundary with the upper sub-unit (Figure 4.1.3-10). A 25-acre area mapped as western dichondra overlaps with this dudleya population. Many-stemmed dudleya also is known from two locations of 100 and 200 individuals each in the upper portion of Airplane Canyon and two small locations of about five individuals each at the confluence of Gabino and Airplane Canyons.

- ***Lower Gabino and Blind Sub-unit*.** The lower Gabino and Blind Canyons sub-unit is dominated by native and annual grasslands, with smaller patches of coastal sage scrub and substantial oak woodlands (Figure 4.1.3-7). The riparian habitat in the sub-unit consists of southern sycamore riparian woodland, coast live oak riparian forest and woodlands, mule fat scrub, and smaller areas of southern arroyo willow forest, coast live oak forest, and coast live oak woodland (Figures 4.1.2-1).

  The sub-unit supports approximately five California gnatcatcher locations and numerous cactus wren locations, although at densities much lower than in other areas of the SAMP Study Area (Figure 4.1.3-7). Other sensitive wildlife species occurring in upland habitats in the sub-unit include grasshopper sparrow, rufous-crowned sparrow, San Diego horned lizard, orange-throated whiptail, and red-diamond rattlesnake (Figures 4.1.3-7 and 4.1.3-8).

  Lower Gabino Canyon supports a moderate size arroyo toad breeding population (approximately 40 adults in 1998) between Cristianitos and La Paz Creeks (Figure 4.1.3-2). The grasslands adjacent to lower Gabino Canyon provide potential upland foraging and estivation habitat for the arroyo toad. Riparian habitat provides nesting sites for several raptors, including white-tailed kite, Cooper's hawk, red-tailed hawk, and great horned owl, as well as the yellow-breasted chat (Figures 4.1.3-2 and 4.1.3-9).

As described above for the lower portion of the Cristianitos Sub-basin, a population complex of about 6,100 flowering stalks of thread-leaved brodiaea is located on the hill outcrop adjacent to the mine pits in the southern portion of Cristianitos Canyon on the boundary between the Cristianitos, Gabino, Blind Canyons Sub-basins (Figure 4.1.3-10). There are several small locations of many-stemmed dudleya in the sub-unit, with one population numbering about 400 individuals. Intermediate mariposa lily occurs in two locations of about 12 and 305 individuals, respectively, at the border with the Cristianitos Canyon Sub-basin.

***La Paz Canyon Sub-basin*.** The predominant vegetation communities in the La Paz Canyon Sub-basin are coastal sage scrub (568 acres) and chaparral (674 acres) (Figure 4.1.3-7). Riparian habitats in the canyon include southern sycamore riparian woodland, coast live oak woodland, and mule fat scrub. The canyon bottom also supports alluvial fan (floodplain) scrub (Figures 4.1.2-1 and 4.1.3-2).

Sensitive wildlife species in the sub-basin include 1 location for the California gnatcatcher, 13 locations for the cactus wren, and records sitings for the San Diego horned lizard, grasshopper sparrow, rufous-crowned sparrow, and yellow-breasted chat (Figures 4.1.3-2, 4.1.3-7, and 4.1.3-8). Riparian habitat in the sub-basin supports nest sites for the long-eared owl, white-tailed kite, Cooper's hawk, red-tailed hawk, and red-shouldered hawk (Figure 4.1.3-9).

La Paz Canyon provides movement opportunities for wildlife including mountain lion, bobcat, coyote and mule deer among the Talega and Gabino and Blind Canyon subunits and Camp Pendleton.

Two locations of many-stemmed dudleya are in the upper portion of La Paz Canyon, in addition to the location with 700 individuals that overlaps with the Gabino Canyon Sub-basin (Figure 4.1.3-10). One of the populations has about 500 individuals and the other has one counted individual.

***Talega Canyon Sub-basin*.** Upland habitats in the Talega Canyon Sub-basin include coastal sage scrub, chaparral, and grassland, with a mixture of sage scrub and chaparral in the upper portion of the canyon, and grassland and sage scrub in the lower part of the canyon south of the Northrop Grumman facility (Figure 4.1.3-7). Riparian habitat in Talega Creek includes sycamore riparian woodland and coast live oak riparian woodland (Figures 4.1.2-1 and 4.1.3-2).

The sub-basin has 7 California gnatcatchers locations with 22 cactus wren locations scattered in the sage scrub on the south-facing slopes of the canyon (Figure 4.1.3-7). Other sensitive upland wildlife species in the sub-basin include rufous-crowned sparrow, grasshopper sparrow, coastal western whiptail, orange-throated whiptail, San Diego horned lizard, northern red-diamond rattlesnake, and San Diego ringneck snake.

Talega Canyon supports one of the major breeding populations of the arroyo toad in the subregion, in combination with breeding population in lower Gabino and Cristianitos Creeks (Figure 4.1.3-2). The uplands adjacent to Talega Creek provide foraging and estivation habitat for the arroyo toad.

Raptors nesting in Talega Canyon include white-tailed kite, long-eared owl, Cooper's hawk, red-shouldered hawk, red-tailed hawk, great horned owl, and barn owl (Figure 4.1.3-9). Talega Canyon also supports the two-striped garter snake.

Talega Canyon is a habitat connection for large- and medium-sized mammals such as mountain lion, mule deer, bobcat, coyote, and gray fox in the San Mateo Watershed.

Thread-leaved brodiaea occurs in four locations of the Talega Sub-basin on the mesa east of the Northrop Grumman site near the boundary with the Gabino and Blind Canyons Sub-basins and in one location just southeast of the site (Figure 4.1.3-10). One of the populations supports about 225 flowering stalks and the other three are estimated to be much smaller, with counts of about 21 individuals each.[2] Approximately 17 locations of many-stemmed dudleya totaling more than 300 individuals occur in the Talega Canyon Sub-basin. Chaparral beargrass occurs at five locations on the steep, south-facing slopes in the east portion of the sub-basin and one in coastal sage scrub in the north-central part of the sub-basin (Figure 4.1.3-10). These beargrass locations are among the few known from the subregion with the other two recorded sites found in an isolated canyon in the City of Mission Viejo and in the Live Oak Canyon area north of Arroyo Trabuco**.**

Other Planning Area

A small area comprising approximately 290 acres is located in the western portion of the San Mateo Creek Watershed on the RMV Planning Area south of the Cristianitos Sub-basin, southeast of the Donna O'Neill Land Conservancy and west of the Lower Gabino and Blind Canyons Sub-basin and the Talega Sub-basin (Figure 4.1.3-7). Although this area is outside the identified sub-basins, it has important biological resources and reserve design considerations. The dominant landscape feature of the area is lower Cristianitos Creek south of the confluence with Gabino Creek where it exits the RMV Planning Area (Figure 4.1.3-7).

Upland habitats in the area are dominated by annual grassland and small patches of coastal sage scrub and southern cactus scrub (Figure 4.1.3-7). A small patch of native grassland is present on the northeast corner of the area that overlaps with native grasslands in the Gabino and Blind Canyons Sub-basin. Riparian habitats in lower Cristianitos Creek include southern coast live oak forest and woodland, southern sycamore riparian woodland, southern willow scrub, arroyo willow riparian forest, and mule fat scrub. Recent studies have identified substantial invasive plant species in this area (Figure 4.1.2-1).

The small, scattered patches of coastal sage scrub support only one gnatcatcher location (Figure 4.1.3-7). Other sensitive wildlife species include about 6 cactus wren locations in scattered southern cactus scrub, about 16 locations for grasshopper sparrow in grasslands, and scattered locations of rufous-crowned sparrow, San Diego desert woodrat, orange-throated whiptail, and western whiptail (Figure 4.1.3-7). The grasslands adjacent to Cristianitos Creek also provide foraging habitat for both breeding resident and wintering raptors such as ferruginous hawk and Swainson's hawk.

The reach of Cristianitos Creek between the confluence with Gabino Creek and the planning boundary supports the arroyo toad (Figure 4.1.3-2). Toad counts for this reach have ranged from 11 individuals in 1998 to 37 in pre-1997 surveys, and toads have been found in the area in all surveys conducted.

The riparian habitat supports breeding habitat for the least Bell's vireo, yellow-breasted chat, and yellow warbler (Figures 4.1.2-1 and 4.1.3-2). A variety of raptors historically have nested in

[2] Only one of the three small populations originally mapped in 1994 was found in 2003. This location supported 21 individuals and therefore the estimate of 21 individuals also assigned to the other two unlocated populations.

the riparian habitat, including long-eared owl, Cooper's hawk, red-tailed hawk, red-shouldered hawk, great horned owl, and barn owl (Figure 4.1.3-9).

The only known sensitive plant from the area is many-stemmed dudleya, with approximately four discrete locations (Figure 4.1.3-10). Two of the locations have population counts of 20 and 33 individuals.

This area, in conjunction with the Cristianitos Sub-basin, probably serves as a primary north-south dispersal area for the California gnatcatcher between large populations in Chiquita Canyon and MCB Camp Pendleton. Also, in combination with the Talega, Gabino, La Paz, and Cristianitos Canyons above the confluence with Gabino Creek, this area provides a habitat connection for the mountain lion, mule deer, bobcat, coyote, and gray fox to adjoining sub-basins and MCB Camp Pendleton.

4.1.3.4 Wildlife Habitat Linkages and Corridors

A fundamental concept and central tenet of conservation biology theory is that habitat fragmentation and isolation leads to extinction of local populations as a result of two processes: (1) reduction in total habitat area which reduces effective population sizes, and (2) insularization of local populations which affects dispersal and immigration rates (Wilcox and Murphy 1985; Wilcove et al.1986). Wilcox and Murphy note that immigration may be impeded by conversion of natural habitat between occupied or potential habitat patches thereby increasing the probability of extinction. It is this latter point that is the core of the habitat linkage issue. That is, isolation of habitat patches accompanied by intervening inhospitable land cover (e.g., urban development, roadways) is thought to increase the probability of permanent extinction of local populations. Because of complex community-level interactions (e.g., mutualistic species, habitat guilds, keystone species), the loss of one or a few species from a habitat patch as a direct result of habitat fragmentation (primary extinctions) also may result in multiple "secondary" extinctions within the habitat patch (Wilcox and Murphy 1986).

The SAMP Study Area is partially urbanized and partially open space. In urbanized areas, there are varying opportunities for wildlife movement, ranging from highly constrained settings such as in the City of Mission Viejo where wildlife movement may be restricted to a man-made culvert, to more expansive areas, such as the Arroyo Trabuco, that provide live-in "habitat" for some species while conveying movement between surrounding development for a broader suite of species. Areas presently in open space generally facilitate wildlife movement in multiple directions and provide "live-in habitat" for many species, but can show constrained movement (e.g., along narrow vectors) where the open space is contiguous with already urbanized areas. The identification of the most important movement wildlife corridors and habitat linkages (as defined below) which would continue to support effective movement in the future environment with increased development must consider animal behavior, habitat affinities, and local topography.

For broad wildlife movement areas that presently allow for unconstrained movement, future development scenarios would restrict movement patterns to some extent. To weigh the merits of alternative development configurations/reserve designs, there is a need to preliminarily identify wildlife movement opportunities that are likely important to retain for ecosystem function. Identification of the areas most important for retaining effective wildlife movement in the future environment with development requires consideration of available wildlife movement data, existing species distributions, habitat affinities, animal behavior, and local geography. To provide guidance for the planning process, these factors were considered to identify areas that are considered important for maintaining wildlife movement functions under any alternative.

Important areas for maintaining wildlife movement functions are described in this subchapter. Furthermore, a distinction is drawn between habitat linkages and wildlife corridors:

- ***Habitat Linkages.*** Following Soule and Terborgh's (1999) use of the term "landscape linkage," habitat linkages are areas of natural habitat that function to join two larger blocks of habitat. They serve as connections between habitat blocks and help reduce the adverse effects of habitat fragmentation by providing a potential route for gene flow and long-term dispersal. Habitat linkages may serve both as "live-in" habitat and avenues of gene flow for small animals such as reptiles, amphibians, and rodents. Habitat linkages also provide for the transit of larger species, but as contrasted with wildlife corridors, as defined below, also may be "live-in" habitat for larger species (i.e., support breeding sites, frequent use areas, etc.). Habitat linkages also may be represented by continuous habitat or by closely spaced habitat "islands" that function as stepping stones for dispersal and movement (especially for birds and flying insects).

- ***Wildlife Corridors.*** As defined herein, wildlife corridors tend to be linear features that connect large blocks of habitat and provide avenues for frequent movement, dispersal, or migration of larger animals. Because of their narrower configuration, wildlife corridors generally serve a more limited function than habitat linkages and primarily are used for transit of larger species rather than as live-in habitat for a broader suite of species. Wildlife corridors may also contain "choke-points" (e.g., hourglass or funnel shapes) or man-made structures such as culverts and flood control channels that wildlife quickly move through.

Habitat linkages and wildlife corridors facilitate the dispersal by smaller, less mobile species and frequent movement (e.g., daily, weekly, etc.) by large mammal species such as mountain lion, mule deer, coyote, and bobcat. The species identified below are representative of a much broader suite of species served by the habitat linkages and corridors. Accordingly, the species identified should not be interpreted as the only species that benefit from the linkages and corridors. It can be reasonably assumed that habitat linkages and corridors that function for large mammals (except coyote) also function for many other species.

Except where only habitat linkages or corridors currently exist, the following discussion identifies habitat linkage and corridor functions within the general wildlife movement areas that appear to be important to be retained in the subregion. Identification of these linkage and corridor functions are based on field studies of wildlife movement in the SAMP Study Area (e.g., Beier and Barrett 1993, Dudek 1995; Michael Brandman Associates 1996; Padley 1992), input from the Science Advisors and the wildlife agencies, and the EIS team's review and analysis of the species, vegetation, and physiographic information for the subregion. Habitat linkages and wildlife corridors in the SAMP Study Area are shown in Figure 4.1.3-11 and include:

- The Arroyo Trabuco between about Avery Parkway and the Cleveland National Forest provides a habitat linkage for movement and dispersal of large species, as well as for numerous smaller, less mobile species (e.g., Beier and Barrett 1993; Dudek 1995; Padley 1992; Science Advisors 1997).

- The area between the Las Flores and Ladera Ranch developments connecting Arroyo Trabuco and Chiquita Ridge provides an existing habitat linkage for species such as the California gnatcatcher and a wildlife corridor for large mammals (e.g., Beier and Barrett 1993).

- The combined Chiquita Ridge and Creek area provides a north-south wildlife habitat linkage from San Juan Creek to the "horseshoe" of habitat surrounding the northern end of Coto de Caza. This linkage is important for species such as California gnatcatcher and cactus wren and also for movement and dispersal of large mammals (e.g., Beier and Barrett 1993; Dudek 1995; Michael Brandman Associates 1996; Padley 1992; Science Advisors 1997).

- The "Narrows" area separating middle and lower Chiquita Canyon consists of oak/riparian and coastal sage scrub habitats, and relatively little dry land farming. This area provides an east-west habitat linkage between Chiquita Ridge and Chiquadora Ridge and Sulphur Canyon for large mammals and small, mobile species such as the California gnatcatcher (e.g., Beier and Barrett 1993; Michael Brandman Associates 1996; Padley 1992).

- A mosaic of coastal sage scrub and grassland in lower Chiquita Canyon, such as the area adjacent to the SMWD wastewater treatment plant, provides an east-west movement corridor for California gnatcatcher dispersal, as well as for dispersal and movement of large mammals.

- The "horseshoe" connection north of Coto de Caza provides a "stepping-stone" habitat linkage for the California gnatcatcher and cactus wren. It probably has limited existing function as a wildlife corridor for large species, although coyotes likely move through the area and bobcat and mule deer may occasionally use the corridor.

- Chiquadora Ridge and adjacent Gobernadora Creek provide a north-south habitat linkage for California gnatcatcher and cactus wren to San Juan Creek, as well for movement and dispersal by large mammals (e.g., Beier and Barrett 1993; Michael Brandman Associates 1996; Padley 1992; Science Advisors 1997).

- Sulphur Canyon provides a north-south and east-west habitat linkage for large mammals between Chiquita Canyon and Wagon Wheel Canyon and Cañada Gobernadora that allows wildlife to move east to Bell Canyon and Caspers Wilderness Park. It also provides a north-south connection for smaller species such as California gnatcatcher and cactus wren (e.g., Beier and Barrett 1993; Michael Brandman Associates 1996; Padley 1992; Science Advisors 1997).

- Cañada Gobernadora between Coto de Caza and the mouth of Sulphur Canyon provides an east-west habitat linkage for large mammals between Chiquita Canyon and Wagon Wheel Canyon to the west and Bell Canyon and Caspers Wilderness Park to the east (e.g., Beier and Barrett 1993; Michael Brandman Associates 1996).

- San Juan Creek functions as a central nexus for north-south and east-west wildlife movement in the central part of the SAMP Study Area. It connects Chiquita Ridge and Chiquita Canyon with the Central San Juan Creek and Trampas Canyon Sub-basin to allow dispersal and movement to the south via Cristianitos Canyon. It also serves east-west wildlife movement and dispersal from Chiquita Canyon upstream to the Cleveland National Forest and major tributaries such as Cañada Gobernadora, Bell Canyon, and Verdugo Canyon (e.g., Beier and Barrett 1993; Dudek 1995; Padley 1992; Science Advisors 1997). It should be noted that under existing conditions, large wildlife species (coyote, mule deer, bobcat, and possibly mountain lion) moving between San Juan Creek and Trampas Canyon and the Radio Tower Road area either use existing

corrugated steel and concrete box culverts under Ortega Highway (Dudek 1995) or must cross the highway directly.

- Habitat west of the silica mine in Trampas Canyon currently provides dispersal opportunities for California gnatcatchers and other species between Chiquita Ridge and gnatcatcher populations in the cities of San Juan Capistrano and San Clemente, as well as eastward dispersal between Trampas Canyon and the Talega development to the Donna O'Neill Land Conservancy, Cristianitos Canyon, and MCB Camp Pendleton.

- Verdugo Canyon provides an east-west habitat linkage for large mammals between San Juan Creek and the Cleveland National Forest (Beier and Barrett 1993; Padley 1992).

- Upland coastal sage scrub and chaparral habitats adjacent to Verdugo Canyon may provide north-south movement opportunities for the cactus wren and other species, although it is likely that these species also disperse along San Juan Creek.

- Local gnatcatcher populations in the San Mateo Watershed are relatively small, compared with the remainder of the SAMP Study Area, and are concentrated along the Cristianitos Creek corridor and overlooking lower Talega Creek. Although there is the potential for gnatcatcher dispersal through coastal sage scrub patches throughout the San Mateo Watershed, an important habitat linkage for gnatcatchers within this watershed appears to be Cristianitos Canyon, which links San Juan Creek with local populations in lower Gabino Creek and MCB Camp Pendleton along lower Cristianitos Creek/San Mateo Creek.

- Gabino Canyon provides a north-south habitat linkage between the SAMP Study Area and the Cleveland National Forest for large mammals (Beier and Barrett 1993; Michael Brandman Associates 1996; Padley 1992; Science Advisors 1997) and may support dispersal by the cactus wren and other species.

- La Paz Canyon provides a north-south habitat linkage between the SAMP Study Area and the Cleveland National Forest for large mammals (Beier and Barrett 1993; Padley 1992) and possibly a habitat linkage for dispersal by the cactus wren and other species.

- Talega Canyon provides for east-west and north-south movement between the SAMP Study Area and MCB Camp Pendleton for large mammals (Beier and Barrett 1993; Padley 1992), cactus wren, and other species.

- The Saddleback Meadows area provides a lower elevation habitat linkage between the Southern Subregion SAMP Study Area and the Central Subarea component of the Central and Coastal NCCP/HCP Habitat Reserve. This area also provides a very limited wildlife corridor between the Central and Southern subregions via two 300-foot-long corrugated steel pipes that cross under El Toro Road (Dudek 1995). This crossing may be used by smaller animals such as coyote, gray fox, and raccoons, but likely is not used by bobcat, mule deer, or mountain lion because the pipes are long and confining, and preclude visual contact between the two ends because they have a slight bend.

- The area north of Oso Reservoir, including O'Neill Regional Park and Color Spot Nursery provides a lower elevation "stepping stone" habitat linkage between the Southern Subregion SAMP Study Area and the Central Subarea component of the Central and Coastal NCCP/HCP Habitat Reserve. With habitat restoration, this linkage likely would be suitable for the California gnatcatcher.

- The Foothill/Trabuco Specific Plan (1985) identified the locations of several habitat linkages and wildlife corridors within the upper Arroyo Trabuco area. The precise locations of extant linkages and corridors needs to be refined and based on information developed through the review of existing developments and recently submitted specific project plans.