SECTION 4: SPECIES ACCOUNTS FOR PLANNING SPECIES

This section provides species accounts and key habitat components for listed and unlisted "planning species" in the planning area, as identified in Section 3. The planning species are intended to serve as conservation planning surrogates for identifying habitat areas that should be considered for inclusion in the Habitat Reserve.

The following species accounts are a "work in progress" for the purpose of characterizing, analyzing and developing the conservation and management strategy for listed and other selected "planning species." As a "work in progress" this section provides species accounts for the seven listed species that occur in the Southern Subregion planning area:

- California gnatcatcher
- arroyo toad
- least Bell's vireo
- southwestern willow flycatcher
- San Diego fairy shrimp
- Riverside fairy shrimp
- thread-leaved brodiaea

The original species accounts for these seven species appeared in the April 2003 version of the Guidelines, but accounts for the arroyo toad and thread-leaved brodiaea have been revised based on new information collected since that time. For the arroyo toad, new natural history information regarding habitat use adjacent to breeding streams has been added. Also, the characterization of the *major population* in Talega Canyon in relation to the San Juan Creek *major population* has been refined. For the thread-leaved brodiaea, new plant survey data have been added, expanding a *major population* in lower Cristianitos/Gabino canyons, adding two new *important populations* in the southern Trampas Canyon and middle Gabino sub-basins, and refining population estimates for other previously documented locations. Because two new *important populations* of brodiaea have been identified, protection recommendations for these locations were added. As noted in Section 1, the agencies have not provided comments on these revised species accounts.

This section also provides accounts for unlisted wildlife and plant planning species. The new species accounts presented in this 2004 version are highlighted in boldface.

- **cactus wren**
- **Cooper's hawk**
- **grasshopper Sparrow**
- **merlin**

- **tricolored blackbird**
- **white-tailed kite**
- **yellow warbler**
- **yellow-breasted chat**
- **western spadefoot toad**
- **orange-throated whiptail**
- **San Diego horned lizard**
- **southwestern pond turtle**
- **chaparral beargrass**
- Coulter's saltbush
- intermediate mariposa lily
- many-stemmed dudleya
- mud nama
- **Salt Spring checkerbloom**
- southern tarplant

The unlisted species accounts for many-stemmed dudleya, mud nama and southern tarplant have been revised to include spring 2003 survey data and clarifications of population locations and sizes. As a result of new information for many-stemmed dudleya, a new *important population* in a *key location* in the upper portion of the Gobernadora sub-basin was identified and the lower Chiquita Canyon *important population* in a potential *key location* was upgraded to a *major population* in a *key location*. As noted above and in Section 1, these new and revised species accounts and protection recommendations have not been commented upon by the resource agencies.

Finally, the April 2003 version of the Guidelines included coarse conservation analyses for several of the planning species based on implementing the protection recommendations. These conservation analyses were omitted from the 2004 version because they are more appropriately, and more thoroughly, presented in the NCCP/HCP document rather than this planning document.

The accounts include both regional and subregional background information for the species as the basis for developing specific protection, management and restoration recommendations that can be applied at the watershed and sub-basin levels. Both the regional and subregional perspective are important because the relative importance of populations of planning species at the subregional, watershed and sub-basin level can only be understood within the broader context. Developing protection, management, and restoration recommendations for the planning species requires an understanding of each species' regional and subregional distribution, as well as the specific habitat affinities and key life history characteristic of each species. In this context, the following issues need to be addressed:

- The species' regional and subregional distribution;

- The relative importance of the Southern Subregion for the continued existence or recovery of listed species or sustainability of unlisted species;

- Existing regional or subregional protection of species, to the extent known;

- Key and important habitat characteristics of the species;

- Key and important life history characteristics (e.g., pollinators, dispersal mechanisms, response to fire); and

- Response of the species to management (e.g., directed or selective grazing, prescribed burns, exotics control/eradication, translocation, seed propagation).

Using the above information, *major populations* and *important populations* of the planning species are identified. *Major populations* are those considered sufficiently large to be self-sustaining with a minimum of active or intensive management intervention or that at least support enough breeding individuals to contribute reliably to the overall metapopulation stability of the species. *Important populations* may not meet the relative size standards of *major populations*, but may nonetheless be important to the species' long-term survival. For example, a smaller population in a key habitat linkage may be important for breeding success and exchange of genetic material and thus would be considered to be an *important population*, even though it would not be considered a *major population*.

To facilitate reserve design, *key locations* will be defined for some planning species. For planning purposes, *key locations* are those locations that are deemed necessary for the conservation of the species in the subregion. For example, populations of a species that are concentrated in a single or few locations would be *key locations*. *Key locations* may not be identifiable for some species that are widely scattered and lack population concentrations. *Major populations*, or some portion thereof, may be *key locations*, but not all *major populations*, or portions thereof, are necessarily *key locations*. With respect to *important populations*, most *important populations* would also be in *key locations*. An *important population* may not be a *key location* where, for example, more than one *important population* can fulfill a desired reserve design and species sustainability function (e.g., connectivity). The identification of a *key location* within a *major* or *important population* defines that portion of the population that is necessary for conservation of the species in the subregion. Portions of *major* or *important populations* that are not identified as *key locations* may be impacted consistent with the conservation of the species in the subregion. For listed species with critical habitat identified or proposed within the subregion the designation or proposed designation for a particular listed

species will be reviewed to determine whether the habitat designation should be proposed to be revised and whether special management considerations should be changed or amplified in light of the proposed Southern Subregion NCCP Conservation Strategy. For any listed species for which critical habitat has yet to be designated, habitat essential to the conservation of the species within the subregion and any special management considerations should be identified.

With regard to federally-listed species and other species ultimately designated as Identified Species in the final Southern NCCP/HCP, a main purpose of the final Conservation Strategy is to provide for the protection of those physical and biological features essential to the conservation of Identified Species in a manner consistent with the definitions set forth in FESA Section 3(5)(A)(i) and (ii). As indicated above, the draft Southern NCCP/HCP Guidelines have been formulated to identify *key locations* for listed and other species that are deemed necessary for the conservation of the species in the Subregion. These *key location* determinations, as well as specific connectivity, management and restoration recommendations, are provided for each planning area sub-basin, as well as for the overall planning area. In relation to FESA critical habitat considerations, the Southern NCCP/HCP thus provides the opportunity for a more focused analysis of species protection needs, including a more detailed analysis of special management considerations and habitat protection, consistent with FESA Section 3(5)(A)(i), than that which can be undertaken on a species-wide critical habitat designation (see discussion in footnote one below).[1]

Accordingly, the EIR/EIS for the Southern NCCP/HCP will evaluate the extent to which the proposed Conservation Strategy (including Habitat Reserve Alternatives) will provide protection for occupied habitat of the gnatcatcher on which are found those physical or biological features essential to the conservation of the species and which may require special management considerations or protection; and unoccupied habitat that is essential for the conservation of the species, consistent with FESA Section 3(5)(A)(i) and (ii). To the extent the recommended final Conservation Strategy differs from the existing and proposed critical habitat designation for the gnatcatcher, USFWS will consider all available information, including information from the final EIR/EIS, in developing the final rule for designating critical habitat for coastal California gnatcatcher. For all other federally listed species found in the Subregion and other Identified Species for which Species Accounts have been finalized pursuant to Sections 3 and 4 of these Guidelines, the EIR/EIS for the Southern NCCP/HCP will evaluate the extent to which the proposed Conservation Strategy (including Habitat Reserve Alternatives) will provide protection

[1] "The HCP development process provides an opportunity for more intensive data collection and analyses regarding the use of particular habitat areas by the gnatcatcher. The process also enables us to conduct detailed evaluations of the importance of such lands to the long-term survival of the species in the context of constructing a biologically configured system of interlinked habitat blocks. We will provide technical assistance and work closely with applicants throughout the development of future HCPs to identify lands essential for the long-term conservation of the gnatcatcher and appropriate management for those lands. By definition, if the gnatcatcher is a covered species under future HCPs, the plans should provide for the long-term conservation of the species." (Fed.Reg. Vol. 65, No. 206, 10/24/00, 63693)

for occupied habitat of the species on which are found those physical or biological features essential to the conservation of the species and which may require special management considerations or protection; and unoccupied habitat that is essential for the conservation of the species, consistent with FESA Section 3(5)(A)(i) and (ii).

Specific buffer recommendations and requirements are not included in the species accounts. Requirements, guidelines or recommendations for buffers of specific widths for some species have been incorporated into Biological Opinions or appear in listings of threatened and endangered species, critical habitat designations and the scientific literature. However, these buffer widths are variable, because appropriate buffer widths depend on a variety of factors, including adjacent habitat, adjacent existing and future land uses, topography, and potential or existing threats. Such variable factors are better addressed on a site-specific rather than a generic basis (i.e., one size does not fit all). In the following species accounts, information about suitable adjacent habitats, where relevant, is provided in the accounts to help guide planning for appropriate buffers.

4.1 Listed Species

4.1.1 California Gnatcatcher

Polioptila californica – California Gnatcatcher
Federal: Threatened
State: California Special Concern Species

a. Regional Status

Historically, the California gnatcatcher ranged from southern Ventura County southward through Los Angeles, Orange, Riverside, San Bernardino, and San Diego counties, and into Baja California, Mexico, to approximately 30 degrees North latitude near El Rosario (Atwood 1990). The gnatcatcher was considered locally common in the mid-1940s; but by the 1960s, this subspecies had declined substantially in the United States owing to widespread destruction of its habitat (Atwood 1990). Currently, the subspecies occurs on coastal slopes of southern California, ranging from southern Ventura southward through Palos Verdes Peninsula in Los Angeles County through Orange, Riverside, San Bernardino and San Diego Counties into Baja California to El Rosario, Mexico, at about 30 degrees North latitude (Atwood 1991).

Gnatcatcher sites listed in *Table 4-1* include cumulative observed locations of gnatcatchers dating from about 1989 to 2001. The sites may include breeding pairs or some unpaired individuals. Because gnatcatcher breeding populations fluctuate from year to year, these data are not intended to provide an accurate population estimate, but include gnatcatcher observations

recorded since about 1989 to provide a relative measure of gnatcatcher distribution and densities within southern California for the purpose of conservation planning.

TABLE 4-1. REGION-WIDE SUMMARY:
2001 STATUS OF COASTAL CALIFORNIA GNATCATCHER SITES
WITHIN KNOWN RANGE IN SOUTHERN CALIFORNIA

Regional Population Area(s)	Number of Counted Gnatcatcher Sites[1,2]
San Diego MSCP	1,819[3]
North San Diego County MHCP	378[4]
Central/Coastal NCCP Reserve	340[5]
Central/Coastal Special Linkage, NRPPA, Existing Use Area and Non-Reserve Open Spaces	140[6]
Protected Gnatcatcher Sites in Southern Orange County Subregion NCCP (Conservation Easements)	348[7]
Unprotected Sites in the Southern Subregion NCCP	389[7]
Palos Verde Peninsula, Los Angeles County	38[8]
APPROXIMATE TOTAL SITES IN NCCP/HCP PLANNING AREAS	*3,452 sites*
GNATCATCHER SITES LOCATED ON FEDERAL LANDS	
MCB, Camp Pendleton	620
Miramar MCAS	53
TOTAL GNATCATCHER SITES ON FEDERAL LANDS	*673 sites*
GNATCATCHERS WITHIN AREAS NOT COVERED BY 4(D) RULE PROTECTIONS BUT SUBJECT TO SECTION 9 ESA PROTECTIONS	
Riverside County	326[9]
Los Angeles County	97
San Bernardino County	27
Ventura County	12[10]
TOTAL GNATCATCHER SITES SUBJECT TO SECTION 9	*461 sites*
GNATCATCHER SITES IN NCCP/HCP PLANNING AREAS, FEDERAL LANDS OR SUBJECT TO SECTION 9 PROTECTIONS	
Gnatcatchers Sites in NCCP Planning Areas	3,445
Gnatcatchers Sites on Federal Lands	673
Gnatcatcher Sites Subject to Section 9 Protections	454
GNATCATCHER SITES NOT AUTHORIZED FOR TAKE	*4,579*
GNATCATCHER SITES AUTHORIZED FOR TAKE BY APPROVED NCCP'S	1,103
GRAND TOTAL	5,682

Notes:

1 Gnatcatcher sites include cumulative observed locations of gnatcatchers dating from 1989 to 2001. The sites may include breeding or unpaired individuals. These data are intended to provide information about observed occupied habitat.

2 Non-footnoted numbers are taken from the 1999 USFWS Biological Opinion for the Gnatcatcher 4(d) rule.

3 San Diego Multiple Species Conservation Plan, Table 3-5, page 3-45, August 1996.

4 Source is Dr. Wayne Spencer, Conservation Biology Institute, 2001.

5 Central and coastal Subregion NCCP/HCP, Table 1-ES, July 17, 1996.

TABLE 4-1. REGION-WIDE SUMMARY:
2001 STATUS OF COASTAL CALIFORNIA GNATCATCHER SITES (*Cont.*)
WITHIN KNOWN RANGE IN SOUTHERN CALIFORNIA

[6] Central and coastal Subregion NCCP/HCP with updated survey data by Harmsworth Associates for the North Ranch Policy Plan Area, 2001.
[7] Source is Dr. Philip Behrends, Dudek & Associates, Inc., 2001.
[8] Atwood et al., 1996
[9] Source is Western Riverside County Multi-Species Habitat Conservation Program sensitive species data base, 2001.
[10] Source is Susan Davison, EDAW, 2003.

The California gnatcatcher, is a small, long-tailed member of the thrush family (Muscicapidae). The gnatcatcher typically occurs in or near sage scrub habitat, which is a broad category of vegetation that includes the following plant communities as classified by Holland (1986): Venturan coastal sage scrub, Diegan coastal sage scrub, maritime succulent scrub, Riversidean sage scrub, Riversidean alluvial fan sage scrub, southern coastal bluff scrub, and coastal sage-chaparral scrub. Coastal sage scrub is composed of relatively low-growing, dry-season deciduous, and succulent plants. Characteristic plants of this community include coastal sagebrush (*Artemisia californica*), various species of sage (*Salvia* sp.), California buckwheat (*Eriogonum fasciculatum*), lemonadeberry (*Rhus integrifolia*), California encelia (*Encelia californica*), and *Opuntia* spp. Ninety-nine percent of all gnatcatcher locality records within coastal Orange and San Diego counties occur at or below an elevation of 300 meters (m) (984 feet [ft]) (Atwood 1990).

Gnatcatchers also use chaparral, grassland, and riparian habitats where they occur adjacent to sage scrub. The use of these habitats appears to be most frequent during late summer, autumn, and winter, with smaller numbers of birds using such areas during the breeding season. These non-sage scrub habitats are used for dispersal (see discussion below), but data on dispersal use are largely anecdotal (Bowler 1995; Campbell et al. 1998). Although existing quantitative data are poor regarding gnatcatcher use of these other habitats, these areas may be critical during certain times of year for dispersal or as foraging areas during drought conditions. Breeding territories have also been documented in non-sage scrub habitat. Campbell et al. (1998) discuss likely scenarios explaining why non-coastal sage scrub is used by gnatcatchers, including food source availability, dispersal areas for juveniles, temperature extremes, fire avoidance, and lowered predation rate for fledglings.

The California gnatcatcher is primarily insectivorous, non-migratory, and exhibits strong site tenacity (Atwood 1990). The diet of gnatcatchers, based on fecal analyses, includes leaf- and plant hoppers and spiders as dominant prey, with true bugs, wasps, bees, and ants as only minor components of their diet (Burger et al. 1999).

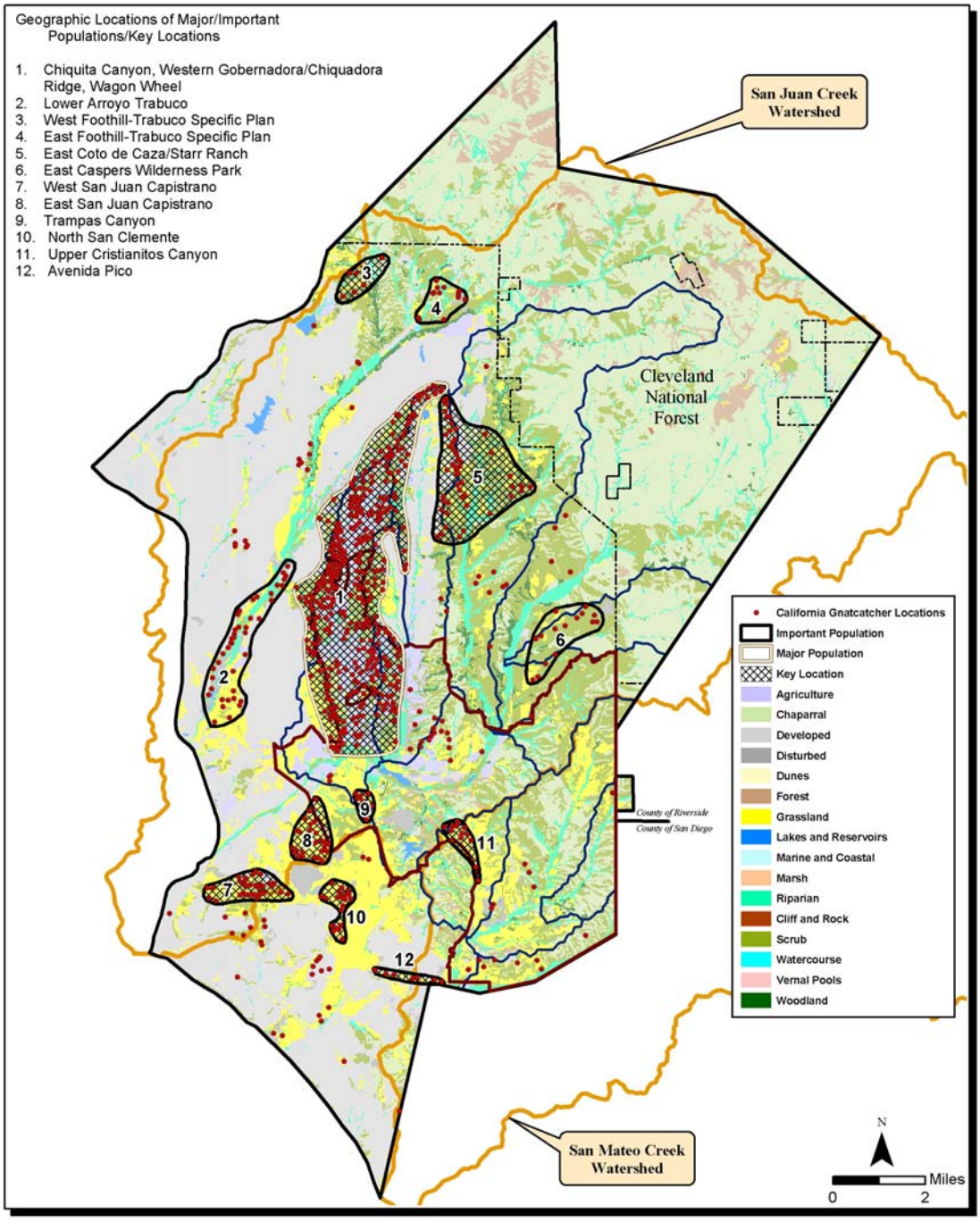
The breeding season of the gnatcatcher extends from mid February through middle August, with the peak of the nesting activity occurring from mid-March through mid-May. The gnatcatcher nest is a small, cup-shaped basket usually found one to three feet above the ground in a small shrub or cactus. Clutch sizes range between three and five eggs, with the average being four. Juvenile birds associate with parents for several weeks (sometimes months) after fledging (Atwood 1990). The coastal California gnatcatcher is a year-round resident. Post-breeding dispersal of fledglings occurs between late May and late November.

Two studies have documented dispersal by California gnatcatchers. Mean dispersal of juveniles in Orange County was found to be 1.05 kilometer (km) (0.65 mile [mi]) with one individual dispersing a total of 7.5 km (4.7 mi) (Galvin 1998). In an isolated population on the Palos Verdes Peninsula, the mean dispersal distance of gnatcatchers banded as nestlings for males was 2.8 km (1.7 mi) and for females was 3.3 km (2.0 mi) (Atwood et al. 1996). Although the mean dispersal distances that have been documented above are relatively low, dispersal of juveniles is difficult to observe and to document without extensive banding studies. It is likely that the few current studies underestimate the gnatcatcher's typical dispersal capacity because of the difficulty of detecting (Bailey and Mock 1998). Juvenile coastal California gnatcatchers are apparently able to traverse highly man-modified landscapes, including non-native landscaping vegetation, for at least short distances (Bailey and Mock 1998). Additionally, natural and restored coastal sage scrub habitat along highway corridors has been documented to be used for foraging and nesting by gnatcatchers and may serve important dispersal functions (Famolaro and Newman 1998).

Coastal sage scrub is patchily distributed throughout the range of the gnatcatcher, and the gnatcatcher is not uniformly distributed within the structurally and floristically variable coastal sage scrub community. Rather, the subspecies tends to occur most frequently within the coastal sagebrush-dominated stands on mesas, gently sloping areas, and along the lower slopes of the coast ranges (Atwood 1990). Territory size increases as vegetation density decreases and with distance from the coast, probably due to food resource availability. Therefore, gnatcatchers will use sparsely vegetated coastal sage scrub for shelter and to forage for insects as long as perennial shrubs are available.

b. Subregional Status

The 737 mapped locations for the California gnatcatcher in the Southern Subregion are distributed throughout the subregion, with population concentrations at the lower elevations. About 97 percent of the 737 mapped locations are at elevations below 366 m (1,200 ft) (*Figure 4-1*). The locations above 366 m are concentrated in the Foothill-Trabuco Specific Plan area and the eastern portion of Caspers Wilderness Park. *Table 4-2* provides a breakdown of mapped gnatcatcher locations by watershed and sub-basin. As illustrated in *Table 4-2*, the vast



Draft NCCP/HCP Planning Guidelines

California Gnatcatcher Distribution Map

FIGURE 4-1

majority of gnatcatcher locations are in the San Juan Creek Watershed. The San Clemente Hydrological Unit includes about 7 percent of the locations and the portion of the San Mateo Creek Watershed in the planning area supports only 4 percent of the locations.

TABLE 4-2
CALIFORNIA GNATCATCHER DISTRIBUTION
IN THE SOUTHERN SUBREGION

	No. Mapped Locations	Percent of Total
Sub-basins in San Juan Creek Watershed		
Chiquita Canyon	282	38%
Canada Gobernadora	109	15%
Central San Juan & Trampas Canyon	17	2%
Wagon Wheel Canyon	23	3%
Bell Canyon	29	4%
Lucas Canyon	10	1%
Verdugo Canyon	1	<1%
Other Sub-basins within Watershed	185	25%
SUBTOTAL	654	89%
Sub-basins in San Mateo Creek Watershed		
Cristianitos Canyon	12	2%
Gabino & Blind Canyons	4	<1%
La Paz Canyon	1	<1%
Talega Canyon	7	1%
Other Sub-basins within Watershed	5	<1%
SUBTOTAL	31	4%
San Clemente Hydrological Unit	52	7%
Total	*737*	*11%*

Gnatcatcher concentrations in the planning area also can be described in terms of relatively discrete local populations that lend themselves to an analysis of *major* and *important populations* and *key locations*. Generally these local populations are comprised of clusters of locations that probably encompass typical dispersal patterns within the local area. For example, the Chiquita population exhibits a clearly defined cluster of points, although the break between this population and the cluster on the ridge between Coto de Caza and Bell Canyon is somewhat arbitrary. On the other hand, the population east of Coto clearly is less concentrated even though there are substantial patches of coastal sage scrub available. Although empirical data for dispersal in the subregion are not available, based on dispersal studies conducted elsewhere (e.g.,

Galvin 1998; Baily and Mock 1998), it can be hypothesized where birds may move within the planning area. For example, Galvin's (1998) study of dispersal by gnatcatchers in southern Orange County found that most dispersal movements by juvenile gnatcatchers were less than 1 km (3,275 ft), although birds are capable of moving much farther (e.g., Baily and Mock 1998).

The Southern Subregion supports one *major population* centered in the Chiquita Canyon area, including Chiquadora Ridge and Wagon Wheel Canyon. This *major population* includes approximately 404 locations, or about 55 percent of the total locations in the subregion. This population also is a *key location* because it is central to several other *important populations* that are distributed throughout the subregion, as well as populations to the south on Camp Pendleton. Some of these *important populations* may only number a few mapped locations, but occur in areas important for geographic diversity and representation of the gnatcatcher in the subregion. *Important populations* that are also identified as *key locations* are integral to the overall function of the reserve for this species because they provide linkages to other populations, including populations on Camp Pendleton.

Table 4-3 summarizes the identified *major* and *important populations* and *key locations* for the California gnatcatcher in the Southern Subregion. These populations and locations are depicted in *Figure 4-1*. *Table 4-3* is followed by a narrative summary of these populations and locations.

TABLE 4-3
MAJOR AND IMPORTANT POPULATIONS OF THE
CALIFORNIA GNATCATCHER IN THE SOUTHERN SUBREGION

Population No.	Population Type/ Location	General Area	No. Locations
1	Major/Key Location	Chiquita Canyon, Western Gobernadora/ Chiquadora Ridge, Wagon Wheel	404
2	Important	Lower Arroyo Trabuco	41
3	Important/Key Location	West Foothill-Trabuco SP	6
4	Important	East Foothill-Trabuco SP	14
5	Important/Key Location	East Coto de Caza/Starr Ranch	52
6	Important	East Caspers Wilderness Park	15
7	Important/Key Location	West San Juan Capistrano	35
8	Important/Key Location	East San Juan Capistrano	28
9	Important/Key Location	Trampas Canyon	7
10	Important/Key Location	North San Clemente	21
11	Important/Key Location	Upper Cristianitos Canyon	13
12	Important/Key Location	Avenida Pico	8
Total Locations in Major and Important Population Areas			644 (87%)
Total Locations not included in Major or Important Population Areas			93 (13%)

The Chiquita Canyon area (No. 1 on *Figure 4-1*), including Chiquadora Ridge and Wagon Wheel Canyon supports a *major population*, both within the Southern Subregion, and within the range of the gnatcatcher in southern California. This area, which extends from the "horseshoe" in northern Coto de Caza south to San Juan Creek, includes 404 mapped locations of the gnatcatcher and accounts for 55 percent of the gnatcatchers in the subregion. As the *major population* in the subregion, this population also is in a *key location*.

- Lower Arroyo Trabuco (No. 2 on *Figure 4-1*) between about Avery Parkway and Oso Parkway supports an *important population* containing about 41 mapped locations. This population is linked to the Chiquita Canyon population through the open space habitat on Chiquita Ridge between the Las Flores and Ladera Ranch developments. This population is considered important because it contains a substantial number of gnatcatchers, provides dispersal areas and potentially a refugium for birds in Chiquita Canyon when wildfires occur. Although this area supports an *important population*, it is not considered a *key location* and a minor loss of locations would still be consistent with the species conservation goals.

- The portion of the Foothill-Trabuco Specific Plan area west of the Live Oak Canyon Road (No. 3 on *Figure 4-1*) supports an *important population* in a *key location.* Although there are only about six gnatcatcher locations here, the area is important as a low elevation habitat link to gnatcatcher populations in the Central Subregion.

- The portion of the Foothill-Trabuco Specific Plan in the Rose Canyon area (No. 4 on *Figure 4-1*) supports an *important population* of the gnatcatcher. Although the gnatcatcher is sparsely distributed and there are only 14 mapped locations for this area, it represents the upper elevation limit and edge of the geographic range for the species in the Southern Subregion. This population contributes to the physiographic diversity of the species in the subregion. Birds in this population probably also disperse to the *important population* west of Live Oak Canyon Road and possibly to the *major* and *important populations* to the south.

- The population of gnatcatchers along the ridgeline between the Gobernadora and Bell Canyon sub-basins, and the scattered locations east of the northern Bell Canyon (No. 5 on *Figure 4-1*) comprise an *important population* in a *key location.* This population is physically linked to the Chiquita Canyon *major population* via the "horseshoe" north of Coto de Caza, but does not exhibit quite as high a concentration of birds despite the predominance of coastal sage scrub in the area. This population is considered important because it contains 52 gnatcatcher locations, provides dispersal areas and potentially refugia for birds in Chiquita Canyon when wildfires occur. It is also considered to be in a *key location* because it provides a north-south linkage to other gnatcatcher locations in

Caspers Wilderness Park, including scattered locations west of San Juan Creek and *important population* No. 6 (*Figure 4-1*) located east of San Juan Creek.

- The population east of San Juan Creek in Caspers Wilderness Park (No. 6 of *Figure 4-1*) is an *important population.* This population comprising 15 locations represents the eastmost extension of the gnatcatcher in the subregion and thus provides physiographic diversity for the species in the subregion.

- The population located north of Camino Las Ramblas in San Juan Capistrano (No. 7 on *Figure 4-1*) is an *important population* in a *key location.* This area supports about 35 mapped locations and is the southwesternmost cluster of gnatcatchers in the subregion. This population contributes to the physiographic diversity of the species in the subregion and provides potential refugia in case of wildfire in locations to the east.

- The population generally located north of Camino Las Ramblas and west of La Pata Avenue in San Juan Capistrano (No. 8 on *Figure 4-1*) is an *important population* in a *key location.* This population numbers about 28 locations and is in a *key location* for the north-south linkage between the Chiquita Canyon *major population*, the *important population* to the west (No. 7) and the *important population* to the south (No. 10).

- The population generally located northwest of the silica sand mining operation in Trampas Canyon (No. 9 on *Figure 4-1*) is an *important population* in a *key location.* Although this area supports only about seven locations, it contributes to the north-south linkage between Chiquita Canyon and the San Juan Capistrano populations and also provides a potential east-west linkage between the San Juan Capistrano and Chiquita Canyon populations and the upper Cristianitos population.

- The population of about 21 locations located mostly in San Clemente west of the proposed extension of La Pata Avenue and on either side of the proposed extension of Camino Del Rio (No. 10 on *Figure 4-1*) is an *important population* in a *key location.* This population provides a low elevation east-west linkage between the San Juan Capistrano populations (Nos. 7 and 8) and the *important population* along Avenida Pico (No. 12), that then connects to the population along lower Cristianitos and San Mateo creeks and other populations on Camp Pendleton.

- The population in upper Cristianitos Canyon (No. 11 on *Figure 4-1*) is an *important population* in a *key location.* While this is a small populations with only 13 mapped locations, it is located in a *key location* for connecting the Chiquita Canyon *major population* with populations in lower Cristianitos and San Mateo creeks on Camp Pendleton. It is the eastmost of the low elevation population connections.

- The population located south of Avenida Pico in San Clemente (No. 12 on *Figure 4-1*) is an *important population* in a *key location.* Although this area supports only eight locations, it is in a *key location* for the east-west linkage between populations in San Juan Capistrano and San Clemente and the population in lower Cristianitos and San Mateo creeks on Camp Pendleton. It is the only remaining southerly link for these populations.

c. Protection Recommendations

- Based on the application of the protection recommendations for overall biological resources in the Chiquita sub-basin, the goal is to protect at least 80 percent of the existing coastal sage scrub and gnatcatcher locations within the *major population* (including those sites within the Chiquita sub-basin and the Chiquadora Ridge portion of the Gobernadora sub-basin). Additional conservation of gnatcatcher habitat will be achieved by implementation of the restoration recommendations described below.

- Avoid impacts to the *important population* of the California gnatcatcher and coastal sage scrub in the portion of the Chiquita sub-basin south of San Juan Creek, as well as the locations west of Narrow Creek within the *major population* to the maximum extent feasible to maintain resident and dispersal habitat for the gnatcatcher between Chiquita Ridge and San Juan Capistrano and San Clemente.

- Protect the major north-south habitat connection for the California gnatcatcher to Central San Juan Creek by providing a habitat linkage between Chiquita Creek and the eastern edge of the Ladera Open Space.

- Maintain east-west biological connectivity for habitat linkages for the gnatcatcher between Arroyo Trabuco, Chiquita Canyon and Canada Gobernadora. Biological connectivity should be maintained between Chiquita, Gobernadora and Arroyo Trabuco by providing for connectivity at a minimum of three locations within the sub-basin: (1) via rim to rim preservation of Sulphur Canyon (approximately 2,000 to 2,500 feet wide), (2) at the "Narrows" where the canyon is only 210-244 m (700-800 ft wide) (approximately 900 m [3,000 ft] south of Tesoro High School) and connects to Sulphur Canyon; and (3) in contiguous patches of coastal sage scrub through the major canyon north and east of the wastewater treatment plant.

- Maintain connectivity between protected coastal sage scrub patches throughout Chiquadora Ridge to allow for dispersal of gnatcatchers between patches.

- Maintain a continuous upland habitat linkage for gnatcatchers along the east-facing slopes of Chiquadora Ridge between San Juan Creek and Sulphur Canyon.

- Provide floodplain and upland habitat linkages adjacent to San Juan Creek for east-west and north-south dispersal by the California gnatcatcher between the Chiquita Canyon and Cristianitos sub-basins.

- Avoid impacts to the *important populations* of California gnatcatchers and coastal sage scrub to the maximum extent feasible to maintain resident and dispersal habitat for the gnatcatcher between San Juan Creek and Cristianitos Canyon and populations on Camp Pendleton.

- Maintain upland north-south habitat linkages through the central and western portions of the Trampas Canyon subunit to convey gnatcatchers between San Juan Creek and Cristianitos Canyon, the Donna O'Neill Conservancy at Rancho Mission Viejo and other areas of the San Mateo Watershed.

- Within the Trampas Canyon subunit of the Central San Juan Creek and Trampas Canyon sub-basin, maintain upland east-west habitat linkage for gnatcatchers south of the artificial lake to link Prima Deshecha, Talega Open Space and other habitat to the west with the Donna O'Neill Conservancy and the San Mateo Watershed. This habitat linkage should allow for dispersal of gnatcatchers and other avian species, as well as provide a movement corridor for large mammals such as bobcat, coyote and mule deer.

- Maintain a north-south habitat linkage between San Juan Creek and lower San Mateo Creek for dispersal and movement of gnatcatchers and other avian species, as well as large mammals such as bobcat, coyote and mule deer, and, in particular, avoid occupied coastal sage scrub habitat in upper Cristianitos Canyon.

d. Management Recommendations

- Implement a cowbird trapping program to mitigate for impacts to existing habitat within the sub-basin and for potential impacts associated with future development. The cowbird trapping program will be evaluated on an annual basis and trap locations and trapping effort will be adjusted as part of the overall Adaptive Management Program (e.g., if the number of trapped cowbirds drops to a prescribed threshold, the trapping program may be terminated or otherwise modified).

e. Restoration Recommendations

- Implement a coastal sage scrub (CSS)/valley needlegrass grassland (VGL) restoration program to enhance habitat connectivity and mitigate for impacts to existing habitat

associated with future development. Identified restoration areas include Chiquita Ridge, Chiquadora Ridge and Sulphur Canyon.

4.1.2 Arroyo Toad

Bufo californicus - Arroyo Toad
Federal: Endangered
State: California Special Concern Species

a. Regional Status

The arroyo toad originally ranged from the upper Salinas River system in Monterey County, south through the Santa Ynez, Santa Clara and Los Angeles river basins and the coastal drainages of Orange, Riverside and San Diego counties in the U.S. and south to the Arroyo San Simeon system about 16 km (10 mi) southeast of San Quintin, Baja California, Mexico (USFWS 1999c). Although the arroyo toad primarily occurs in coastal drainages, it also is known from desert slopes of the Transverse and Peninsular ranges south of the Santa Clara River in Los Angeles County (USFWS 1999c). Population areas along the desert slope include the Mojave River in San Bernardino County and Little Rock Creek, Whitewater River, San Felipe Creek, Vallecito Creek, and Pinto Canyon in Riverside County (Jennings and Hayes 1994; Patten and Myers 1992; Stebbins 1985). As of 1994, only 22 discrete populations were thought to exist in California over an area representing about 25 percent of the historic range of the species. The final recovery plan for the arroyo toad divided the existing range into three units: the northern, southern and desert units (USFWS 1999c). The drainages within these units generally describe the existing distribution of the toad and are listed below.

Northern Unit

San Antonio River, Monterey County
Sisquoc River and tributaries, Santa Barbara County
Upper Santa Ynez River Basin (Indian, Mono, Agua Caliente), Santa Barbara County
Sespe Creek, Ventura County
Piru Creek (Upper and Lower), Ventura and Los Angeles counties
Upper Santa Clara River Basin, Los Angeles County
Upper Los Angeles Basin (Big Tujunga, tributaries, Arroyo Seco), Los Angeles County

Southern Unit

Santiago Creek, Orange County
San Jacinto River and Bautista Creek, Riverside County

San Juan basin and Trabuco Creeks, Orange and Riverside counties
San Mateo and San Onofre Creek basins, San Diego and Orange counties
Lower Santa Margarita basin (De Luz, Roblar, and Sandia creeks), San Diego County
Upper Santa Margarita basin (Temecula Creek, Arroyo Seco), Riverside and San Diego counties
Lower and Middle San Luis Rey basin (below Lake Henshaw), San Diego County
Upper San Luis Rey basin (above Lake Henshaw), San Diego County
Santa Ysabel Creek, San Diego County
San Diego Basin (including San Vicente Creek), San Diego County
Sweetwater River basin (including Viejas, Petersen creeks), San Diego County
Cottonwood Creek basin, San Diego County

Desert Unit

Little Rock Creek, Los Angeles County
Upper Mojave River basin (Mojave, Deep, Horsethief, Little Horsethief), San Bernardino County
Whitewater River basin, Riverside County

Arroyo toads are found in foothill canyons and inter-mountain valleys where rivers are bordered by low hills and the stream gradients are low (Miller and Miller 1936; Sweet 1992). The arroyo toad uses riparian environments for breeding and adjacent uplands for foraging and estivation. Arroyo toads are known to either breed, forage, and/or aestivate in aquatic habitats, riparian, coastal sage scrub, oak, and chaparral habitats. The species is restricted to medium- to large-sized, slow-moving streams. The majority of arroyo toad population studies occur within third and fourth order drainages that are characterized by decomposed granite bedrock. However, toad populations have been found in a wide range of stream orders, including lower, second order, and higher, fifth and sixth order coastal streams characterized by sedimentary rock (PCR et al. 2002). According to USFWS, streams supporting arroyo toads range from first to sixth order in the central part of the species' range (Orange, Riverside and San Diego counties) (USFWS 1999c).

Natural geomorphological processes are important for maintaining suitable breeding habitat for the arroyo toad. Periodic flooding is required to modify the stream channel, limit the proliferation of vegetation within the channel and the adjacent upland terrace, redistribute coarse sediments within the streamcourse, and redistribute breeding pools (USFWS 2001a). The flooding regime is directly responsible for the development of the appropriate number and size of breeding pools, friable soils for juvenile and adult toads to create burrows, and unvegetated lower stream terraces (Jennings and Hayes 1994; USFWS 1999c).

Breeding pools must be open and shallow with minimal current, and a sand or pea gravel substrate overlain with sand or flocculent silt (Sweet 1989). Breeding sites generally have flow rates less than 5 cm per second (cm/sec) (USFWS 1999c). Currents greater than 5 cm/sec are sufficient to displace eggs and embryos up to 82 hours post hatching (Sweet 1992). Stream bottoms composed of sand or well-sorted gravel are favored by adults for breeding (USFWS 2001a). Larval growth appears to be more rapid in pools with low silt loads (Jennings and Hayes 1994). Griffin et al. (1999) found that fine-, medium-, and coarse-grained sands are the preferred adult burrow substrate and that cobble is the least preferred, although burrow sites can be interspersed with heavier gravel and cobble.

Water persistence in natal pools is key to successful breeding by arroyo toads. Streams must have persistent water from March to mid-June in shallow, gravely pools less than 7.1 cm (18 in) deep and adjacent sandy terraces. The larval period of arroyo toads lasts about 65-85 days, so the persistence of water is crucial for successful breeding and high mortality of tadpoles can occur if breeding pools dry up too quickly.

Adjacent banks must provide open, sandy or gravely terraces with very little herbaceous cover for adult and juvenile foraging areas, within a moderate riparian canopy of cottonwood, willow, or oak. Heavily shaded pools are unsuitable for larvae and juvenile toads due to lower water and soil temperatures and poor algal mat development (Sweet 1992). Juveniles favor areas that remain damp, have midday surface temperatures of 34 to 37 degrees Celsius (C) (93.2-98.6 degrees Fahrenheit [F]) and contain less than 10 percent cover, because these sites possess the thermal and refuge characteristics required for juvenile survival and rapid growth (Sweet 1992).

Several studies have examined the instream activity of arroyo toads during the breeding season. Studies summarized by the USFWS (2001a) indicate that subadults and male adults can move anywhere from 0.8 km (0.5 mi) to more than 1 km (0.6 mi) along streamcourses during a single breeding season. In upper Piru Creek it was inferred that toads had moved as far as 8 km (5 mi) along a streambed, based on the consistent absence of toads from this area in previous surveys.

There also is some information of lateral movements from streams into uplands during the breeding season. The USFWS states that "Although the upland habitat use patterns of this species are poorly understood, activity probably is concentrated in the alluvial flats (areas created when sediments from the stream are deposited) and sandy terraces found in valley bottoms of currently active drainages." (Federal Register, 9415, 2/07/01). Upland habitat use appears to be related to rainfall amounts, availability of surface water, width of streamside terraces and floodplains, vegetative cover and topography (USFWS 2001a). For example, Griffin et al. (1999) found that lateral movements were related to topography adjacent to the stream. In coastal streams with broad floodplains, 33 males moved an average maximum of 92 m (302 ft)

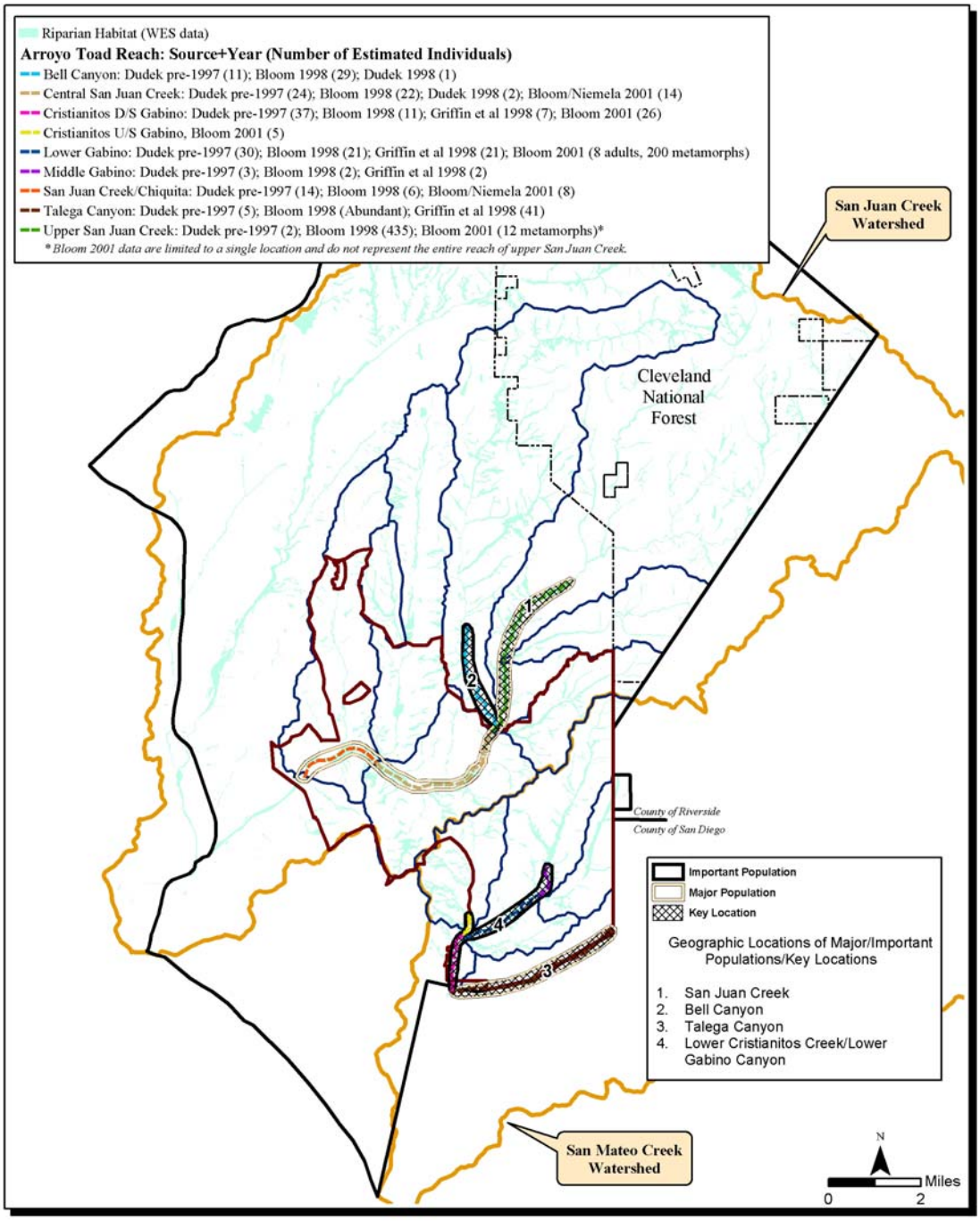
from the stream, while in a narrower canyon 13 males moved only 23 m (75 ft) from the streambed. Ramirez (2000) observed a similar pattern where 12 toads in a very narrow floodplain on a desert slope moved a maximum distance of 37 m (121 ft) and an undisclosed number of toads moved a maximum of 200 m (656 ft) in a broader floodplain. Griffin et al. (1999) noted that tall cliff faces may hinder toad movements into upland habitats, with a female struggling on a 60 degree sandstone slope along a cliff edge.

While there seems to be a general relationship between lateral movement and topography, the USFWS (2001a) concluded that there are not enough data "to characterize fully overwintering activities and habitat use in all of the systems that arroyo toads inhabit." However, they did conclude that, "Individual toads have been observed as far as 2 km (1.2 mi) from streams where they breed, but are found most commonly within 0.5 km (0.3 mi) of those streams (USFWS 1999; Griffin et al. 1999; Dan C. Holland, Camp Pendleton Amphibian and Reptile Survey, Fallbrook, California, unpublished data; Holland and Sisk 2000)." (Federal Register, 9415-9416, 2/7/01). A recent radio telemetry study of habitat use and toad movements by Ramirez on RMV property in San Juan Creek found that arroyo toads primarily utilized the broad floodplain of the creek during breeding season movements, with the most distance lateral movement about 274 m (810 ft) (Ramirez 2003). Four separate radio telemetry studies on inland populations in more mountainous areas by Ramirez showed that toads used narrower areas of 50 to 200 m (10 to 650 ft) from the stream compared to areas with broader floodplains (Federal Register, 23255, 4/28/04).

With regard to burrow use, the four Ramirez studies on inland populations in mountainous areas showed that arroyo toads utilized burrows up to 324 m (1,062 ft) from the edge of a stream, with an average of 16 m (52 ft) (Federal Register, 23255, 4/28/04). Based on a sample of 109 location, Ramirez (2003) found that burrow locations on RMV in San Juan Creek ranged from locations within the active stream channel to distances up to 274 m (810 ft) from the stream, with a mean distance of 23.9 m (78 ft); the distribution of burrow locations is heavily skewed toward locations within 50 m (164 ft) of the stream. This study supports the general finding that toad activity and estivation sites tend to be concentrated near the active stream channel.

b. Subregional Status

Within the Southern Subregion planning area the arroyo toad is associated with riparian, streamcourses with sandy benches along streams in both the San Juan Creek and San Mateo Creek watersheds (*Figure 4-2*). Different survey efforts over the past several years in association with the SOCTIIP project and other projects consistently have found toads in the San Juan Creek Watershed from about the mouth of Chiquita Canyon upstream to about Hot Springs Creek and in lower Bell Canyon. In the San Mateo Watershed in the planning area the toad occurs in Talega, lower Gabino and lower Cristianitos creeks. In addition, the USFWS (2001) cited a



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Arroyo Toad Distribution Map

FIGURE 4-2

personal communication from D. Holland that a population of the arroyo toad also occurs in upper Arroyo Trabuco, but the population size and specific location has not been confirmed (e.g., it does not appear in the 2002 CNDDB).

In 1998 Bloom conducted a study area-wide survey to assess the status of the toad, although his survey in Arroyo Trabuco only extended as far north as Oso Parkway. Since 1998, additional studies have been conducted on the arroyo toad in relation to the SOCTIIP project (Bloom 2001a; Bloom and Niemela 2001) and an independent radio-telemetry study by Griffin et al. 1999). Because these studies were conducted in different years under different environmental conditions, the absolute number of toads detected within the same reaches of drainages are variable, but relatively consistent among different drainages; i.e., areas with a small number of detections had consistently fewer detections across survey years than areas where larger numbers of toads were detected.

The planning area supports two *major populations* and two *important populations.* The two *major populations* are located in San Juan Creek from near the confluence with Chiquita Canyon north to beyond the confluence with Hot Springs Creek and in Talega Creek from the confluence with Cristianitos Creek to at least the eastern boundary of the planning area. The two *important populations* are located in Bell Canyon from the confluence with San Juan Creek north to about 3.5 km (2.2 mi) north of the confluence; and lower Cristianitos/lower Gabino Canyon extending from the confluence of Cristianitos and Talega creeks to about 3,000 feet upstream of the confluence of Gabino and La Paz creeks (i.e., into middle Gabino) and in Cristianitos Creek extending about 2,500 feet upstream of Gabino Creek.

The San Juan Creek and Bell Canyon populations probably comprise distinct, but linked populations. The San Juan Creek and Bell Canyon populations are linked because the streamcourses are directly connected by suitable habitat, allowing toads to move freely between the two areas. However, the two sub-basins are physically distinct; the Bell Canyon sub-basin is a much smaller sub-watershed and characterized by a narrower canyon. It is likely that peak flows and timing for the two sub-basins are different, thus affecting the character of toad breeding habitat.

Likewise, the Talega, Cristianitos and Gabino canyons populations probably are distinct, but linked local populations. Like Bell Canyon and San Juan Creek, they are all connected by suitable habitat within the drainages. However, these sub-basins are characterized by different geological structures and processes that likely affect the quality of toad breeding habitat. For example, as summarized in the *Baseline Conditions and Hydrologic Conditions* report (PCR et al. 2002), Talega Canyon has the highest proportion of poorer infiltrating soils of any of the other sub-basins in the San Mateo Watershed, while Gabino Canyon has a higher infiltration capacity that other sub-basins in the watershed. Although Talega has a high runoff volume, it also has a

relatively low magnitude of peak flows because of the elongated shape of the sub-basin and long routing distance of the streamcourse. In contrast, Gabino has the highest peak flows and runoff volume because of its high drainage density, position high in the watershed and steep terrain. Sediment from Gabino also contains a high proportion of cobbles and other larger particles that are less suitable for toad breeding habitat. Cristianitos is a relatively small sub-basin and has the lowest absolute runoff volume and peak flows of the sub-basins studied in the watershed. The clays in the sub-basin contribute to fine sediments discharged to the creek, which generally are an unsuitable substrate for toad breeding habitat.

An additional reason that the populations in these sub-basins should be considered linked, but distinct is that fires within the sub-basins would be expected to have different effects on the populations; e.g., a fire in the Talega sub-basin may result in temporary disruption or loss of the Talega population. In such a case the Cristianitos and Gabino populations would be important source populations for recolonization of the Talega sub-basin.

Whether the San Juan Creek and San Mateo Creek populations are linked is unknown. The minimum distance between occupied toad habitat in the San Juan and San Mateo watersheds populations is about 3.7 km (2.3 mi). Based on the observation of toads moving as far as 1.9 km (1.2 mi) from streams, it is conceivable that toads occasionally could move between the two watersheds.

Major and *important populations* were identified and are illustrated in *Figure 4-2*. Each of the population areas is described in detail below:

- The *major population* in San Juan Creek (No. 1 on *Figure 4-2*) extends from near the confluence with Chiquita Canyon north to about 0.8 km (0.5 mi) south of Hot Springs Creek in the Cleveland National Forest. (Note: Bloom [1998] mapped potential habitat to an area about 915 m (3,000 ft) downstream of Antonio Parkway bridge, but toads have not been observed this far west.) While this population can be considered continuous because toads have been observed throughout the area, the reach of San Juan Creek extending north from near the confluence with Bell Canyon supports the large majority of the toad population in San Juan Creek and provides the highest quality habitat for the species in the creek. This reach supported about 435 counted adult toads in 1998 (Bloom 1998) and is the second largest population area in the subregion. Habitat for the toad approximately 800 feet below the confluence with Bell Canyon becomes degraded by a proliferation of giant reed and the open stream channel becomes obscured by riparian vegetation by about 1,600 feet below Bell Canyon. This demarcation is consistent with Bloom's observation of 29 toads in this reach in 1998, compared to fewer toads downstream. Because it supports a large population and high quality habitat, the portion

of the *major population* in "upper" San Juan Creek from about 1,600 feet south of Bell Canyon can be considered a *key location*.

Surveys in San Juan Creek downstream of Bell Canyon on RMV property have yielded persistent, but relatively small, population counts. In the segment from near the mouth of Gobernadora Creek to about 2,000 feet south of Bell Canyon, counts were 24 individuals before 1997, 22 individuals in 1998 by Bloom and 14 individuals in 2001 by Bloom and Niemela. In the more downstream portion of this segment between Gobernadora and Chiquita, pre-1997 counts were 14 individuals, 6 by Bloom in 1998 and 8 by Bloom and Niemela in 2001. The consistent small numbers of individuals in this reach of San Juan Creek distinguish it from the *key location* of this *major population* upstream from the point about 1,600 feet south of Bell Canyon. Recent breeding in this lower reach has been limited to the area just downstream of Trampas Canyon and is maintained by artificial runoff from Trampas. The reason for fewer toad detections and apparent decline in breeding south of the confluence with Bell Canyon in recent years is not completely known, but likely is the result of a combination of natural and anthropogenic factors, including an inferred natural groundwater barrier between Chiquita and Gobernadora canyons and San Juan Creek that limits inter-aquifer exchange, groundwater withdrawals, truck traffic, other human activity, and bullfrogs in the abandoned mining pit. In contrast, upper San Juan Creek probably is naturally wetter, allowing for longer persistence of breeding pools, and is subject to fewer human uses. In addition, giant reed is proliferating in the reach below Bell Canyon, resulting in degradation of toad habitat. For recovery purposes, active management to maintain breeding pools and control giant reed in the stream likely will be needed to sustain this segment of the population on a long-term basis.

- The *important population* in Bell Canyon (No. 2 on *Figure 4-2*) extends from the confluence with San Juan Creek north about 2.2 miles up Bell Creek into Caspers Wilderness Park. In 1998 Bloom counted 29 calling males in this area. This *important population* is considered a *key location* because it is situated in a relatively undisturbed area and is directly connected to the San Juan Creek *major population*.

- The *major population* in Talega Canyon (No. 3 on *Figure 4-2*) was categorized as "abundant" by Bloom in 1998 based on presence of metamorphs. In the same 1998 study year Griffin et al. (1999) counted 41 calling toads in the same reach. Bloom (pers. comm. 2004) considers the Talega population be one of the most significant in Orange County, although not as large or important as the San Juan Creek population in Caspers Wilderness Park. In addition, this population is connected to the downstream arroyo toad populations in lower Cristianitos and San Mateo creeks on Camp Pendleton, as well as the upstream populations in Cristianitos and lower Gabino creeks. In addition to suitable

geomorphic conditions for the toad discussed above, the combination of higher precipitation in the upper watershed and presence of year-round springs provides a more reliable water source to support breeding pools.

- The *important population* in lower Cristianitos Creek and lower Gabino Creek (No. 4 on *Figure 4-2*) extends from the confluence of Cristianitos and Talega creeks upstream into Gabino Creek to about 3,000 feet north of the confluence with La Paz Creek and in Cristianitos Creek about 2,500 feet upstream of Gabino Creek.

  Over several surveys in the segment of Cristianitos Creek between its confluence with Gabino Creek in the north and Talega Creek in the south, calling males have numbered 37 before 1997, 11 by Bloom in 1998, 7 by Griffin et al. in 1998 and 26 by Bloom in 2001. The segment of lower Gabino from the confluence with Cristianitos to La Paz Creek numbered 30 before 1997, 21 by Bloom in 1998, 21 by Griffin et al. [1999] in 1998, and 8 by Bloom in 2001 (as well as 200 metamorphs observed during this survey). Bloom also observed a total of 38 adults in this reach during six survey nights in 2003, with the eight adults as maximum number of individuals observed on any single night (Bloom 2003). The portion of the *important population* within lower Gabino and lower Cristianitos creeks is considered a *key location* because it is linked along the streamcourse to the *major population* in Talega Canyon.

  The segment of Cristianitos Creek upstream of the confluence with Gabino Creek is included as part of the *important population* because it is directly connected to the populations in lower Gabino Creek and Cristianitos Creek downstream of Gabino. However, this portion of the *important population* is not considered a *key location*. This reach is considered marginal breeding habitat for arroyo toads because of the clayey sediments that are characteristic of this portion of the creek. Out of three survey years, only in 2001 were toads (5 adults) recorded along this stream segment and they were observed only adjacent to the creek. There was no evidence that toads were breeding in the creek.

c. Protection Recommendations

- Maintain and manage riparian and aquatic habitats along San Juan Creek for breeding populations of the arroyo toad.

- Provide upland foraging and estivation habitat within the upland terraces in the floodplain of San Juan Creek, with a particular focus on the south side of the creek, to maintain existing population levels of the arroyo toad.

- Maintain Verdugo Canyon hydrology to maintain sources of coarse sediment that are important for arroyo toad breeding habitat in downstream areas.

- Protect breeding and foraging habitat and movement opportunities within the lower Gabino Canyon, lower Cristianitos and Talega Canyon streamcourses and adjacent alluvial terraces for the arroyo toad. Address potential upland estivation habitat needs in the context of best scientific information regarding the influence of topography, soils and other factors that appear to influence arroyo toad lateral movement and frequency of use in upland areas away from streamcourse habitat areas.

- Protect the integrity of arroyo toad populations in Talega Canyon by maintaining current stormwater runoff patterns and hydrologic conditions.

- Protect the arroyo toad population within middle Gabino Creek upstream from the confluence with La Paz Creek by avoiding impacts to breeding, foraging and estivation habitat and protect canyons to avoid downstream impacts to the toad.

- Protect the integrity of arroyo toad populations in lower Gabino Creek, as well as downstream populations in Cristianitos and San Mateo creeks, by protecting the generation and transport of coarse sediments in La Paz Creek to downstream areas.

- Protect the *key location* of the arroyo toad upstream from the confluence of Cristianitos and Talega creeks by avoiding direct impacts to breeding, foraging and estivating habitat and avoiding indirect impacts to the Cristianitos and lower Gabino sub-basins.

d. Management Recommendations

- Within the Gobernadora, Verdugo, Cristianitos, Gabino, and La Paz sub-basins, protect the integrity of downstream habitat for the arroyo toad by maintaining hydrology, water quality and sediment delivery to San Juan and San Mateo creeks, including flow characteristics of episodic events, and minimizing additional loadings of nutrients or toxics.

- Maintain stormwater flow characteristics comparable to existing conditions from Trampas Canyon into San Juan Creek to preserve breeding habitat for the arroyo toad population in San Juan Creek.

- Attempt to identify groundwater sources that are important to breeding pools and address potential management measures.

- Implement a bullfrog eradication program within San Juan Creek to help protect arroyo toads, with a special focus on Cal-Mat Lake and other water bodies that provide source concentrations of bullfrogs.

e. Restoration Recommendations

- In coordination with upstream eradication efforts, implement a giant reed removal program for San Juan Creek within RMV boundaries to protect arroyo toad habitat.

- Implement an invasive plant species eradication effort in Cristianitos Creek between the confluences with Gabino and Talega creeks.

4.1.3 Least Bell's Vireo

Vireo bellii pusillus - Least Bell's vireo
USFWS: Endangered
CDFG: Endangered

a. Regional Status

The Bell's vireo, consisting of four subspecies, is widespread as a breeding species in the central and southwestern U.S. and northern Mexico. Its breeding range includes southern California, southern Nevada, southwestern Utah, northwestern and southern Arizona, southern New Mexico, central and southwestern Texas, eastern Colorado, central Nebraska, central South Dakota, south central North Dakota, southeastern Minnesota, southern Wisconsin, northeastern Illinois, and northwestern Indiana south to northern Baja, southern Sonora, southern Durango, Zacatecas, southern Nuevo Leon, southern Tamalpais, southern and eastern Texas, northwestern Louisiana, Arkansas, southwestern Tennessee, southwestern Kentucky, southern Indiana, and western Ohio (Brown 1993). Although the winter range of Bell's vireo is not well known, generally it appears to winter from southern Baja and southern Sonora south along the west coast of Mexico and Central America to Honduras and casually to northern Nicaragua. It is also reported from the eastern coast of Central America from Veracruz south to Honduras (Brown 1993).

Zeiner et al. (1990) summarized the distribution, abundance, and seasonality of the subspecies least Bell's vireo (*V. b. pusillus*) within California. Least Bell's vireo formerly was a common and widespread summer resident below about 600 m (2,000 ft) in the western Sierra Nevada, throughout the Sacramento and San Joaquin valleys, and in the coastal valleys and foothills from Santa Clara County south. Least Bell's vireo also was common in coastal southern California from Santa Barbara County south, east of the Sierra Nevada below about 1,200 m (4,000 ft), in the Owens and Benton valleys, along the Mojave River and other streams at the western edge of

southeastern deserts, and along the entire length of the Colorado River (Grinnell and Miller 1944). Two subspecies occur in California: *V. b. pusillus* (the least Bell's vireo described below) and *V. b. arizonae*, which is now a rare summer resident along the Colorado River from Needles, San Bernardino County, south to Blythe, Riverside County. Bell's vireo (subspecies uncertain) also breeds in at least two sites along the Amargosa River near Tecopa, Inyo County (Garrett and Dunn 1981).

As summarized in *Table 4-4*, the year 2001 distribution of confirmed territories (not necessarily confirmed breeding pairs) of the least Bell's vireo in California includes the counties of San Diego, Orange, Riverside, San Bernardino, Los Angeles, Ventura, Santa Barbara, Inyo, and Santa Clara (USFWS, pers. comm. 2002).

TABLE 4-4. REGIONWIDE SUMMARY:
2001 STATUS OF LEAST BELL'S VIREO
WITHIN KNOWN BREEDING RANGE OF SOUTHERN CALIFORNIA

County	Confirmed Territories[1]
San Diego – excluding Camp Pendleton	883
San Diego – Camp Pendleton	783
Orange	111[2]
Riverside	500
San Bernardino	14
Los Angeles	24
Ventura	124
Santa Barbara	12
Inyo	3
TOTAL CONFIRMED TERRITORIES	2,443

Notes:

1 The number of confirmed territories in 2001 is based on unpublished data provided by the USFWS in December 2002 (Terp, pers. comm. December 2002).

2 The 2001 USFWS data base included about 100 confirmed territories in Orange County but does not include the 11 breeding pairs documented in lower Arroyo Trabuco in 2000. Also, Gobernadora Creek within GERA was estimated to support about 12-15 nesting locations based on 1998 and 2001 surveys, but the USFWS 2001 data base indicates 8 confirmed territories based on surveys in 2001 by P&D. The number cited in the table reflects the additional Arroyo Trabuco data and the 2001 P&D Gobernadora survey data.

Most of the current populations of least Bell's vireo have undergone tremendous growth over the last decade. Census data collected over the past 16 years indicate that the population in southern California has increased from an estimated 300 pairs in 1986, an estimated 1,346 pairs in 1996 (USFWS 1998a) and in 2001 an estimated 2,443 confirmed territories (USFWS, pers. comm., 2002).

The two largest concentrations of confirmed territories in the 2001 data base are in the Prado Basin in western Riverside County (444 territories) and on Camp Pendleton (785 territories). San Diego County, excluding Camp Pendleton, has the greatest total number of confirmed territories, with relatively large concentrations in the San Luis Rey River between College Avenue and Interstate 15 (132 territories), the Sweetwater River with 102 territories, the San Dieguito River with 45 territories, and various drainages in Anza Borrego with 105 territories. The Santa Clara River in Los Angeles and Ventura counties also supports a large concentration of territories, with 123 total territories in 2001.

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

The breeding season for least Bell's vireo is typically mid-March to September (USFWS 1986). Males arrive a few days before females to establish breeding territories. Nests are typically built within 1 m (3.3 ft) of the ground in the fork of willows, wild rose (*Rosa californica*), mule fat (*Baccharis salicifolia*), or other understory vegetation (Franzreb 1989). Cover surrounding nests is moderately open midstory with an overstory of willow, cottonwood, sycamore, or oak. Crown cover is usually more than 50 percent and contains occasional small openings. The most critical structural component to least Bell's vireo breeding habitat is a dense shrub layer at two to ten feet above the ground (Goldwasser 1981; Franzreb 1989). The birds typically forage in riparian habitat, but also use adjoining chaparral or scrub habitat (Salata 1983). These adjacent upland foraging habitats become relatively more important late in the breeding season.

Clutch sizes of the least Bell's vireo are between two to five eggs (typically three or four) that are laid shortly after nest construction (Salata 1984; Kus 1994; USFWS 1998). Incubation is

about 14 days and young fledge about 12-14 days after hatching (Zeiner et al. 1990). Fledglings may range from established breeding territories, but remain under parental care for several more weeks (USFWS 1998). Least Bell's vireo usually produce only one brood per season, but additional broods up to four or five have also been reported (Franzreb 1989; USFWS 1998a). Vireos typically depart by mid-September, but stragglers have been observed as late as November (Zeiner et al. 1990).

During the spring and fall migration, the Bell's vireo occupies a wider range of habitats including coastal sage scrub, riparian and woodland habitats. The winter range of habitats of the Bell's vireo include thornscrub vegetation adjacent to watercourses or in riparian gallery forests along the west coast of north and central Mexico. In southern Mexico and Honduras, tropical deciduous forest and arid tropical scrub along the coast is used (Brown 1993).

Bell's vireos are known to feed primarily on insects and spiders (Chapin 1925; Bent 1950; Terres 1980). The least Bell's vireo primarily forages in willow (*Salix* spp.) stands or associated riparian vegetation, with forays into upland vegetation including chaparral, sage scrub and oak woodlands later in the breeding season (Gray and Greaves 1984; Salata 1983; Kus and Minor 1989). Least Bell's vireos forage in a variety of tree and shrub species, with a preference for black willow (*Salix gooddingii*), arroyo willow (*Salix lasiolepis*), and mule fat (*Baccharis salicifolia*). Individuals are known to travel between 3 and 61 m (9.8 and 200 ft) (mean of 15.5 m [50.8 ft]) while foraging, with the majority of these destinations occurring within 30 m (98 ft) of the edge of riparian vegetation (Kus and Miner 1989). Least Bell's vireo are known to forage in all vertical vegetation layers from ground level to 20 m (66 ft), but most feeding is concentrated above the ground surface in the lower vegetation layers from ground level to 6 m (20 ft) (Kus and Minor 1989; Salata 1983). The least Bell's vireo exhibits year-round diurnal activity; and is known to be a nocturnal migrant (Brown 1993).

The literature on the dispersal and status remains unclear. Early data suggested that least Bell's vireos are strongly site tenacious, returning to the same site in close proximity to previously occupied territories (Salata 1983; Greaves 1987, 1989). More recent data suggest that least Bell's vireo may change breeding sites, but that additional study is needed (data from Kus cited in USFWS 1998a).

Least Bell's vireo breeding territory sizes range from 0.2 to 3.0 hectares (ha) (0.5 acre [ac] to 7.4 ac) (Gray and Greaves 1984; Collins et al. 1989; Newman 1992) with most averaging between 0.3 to 1 ha (1 to 3 ac) (USFWS 1998a). Territories in Bell's vireo are maintained by threat and physical confrontation early in the breeding season, tapering to vocal warnings later in the season (Barlow 1964).

b. Subregional Status

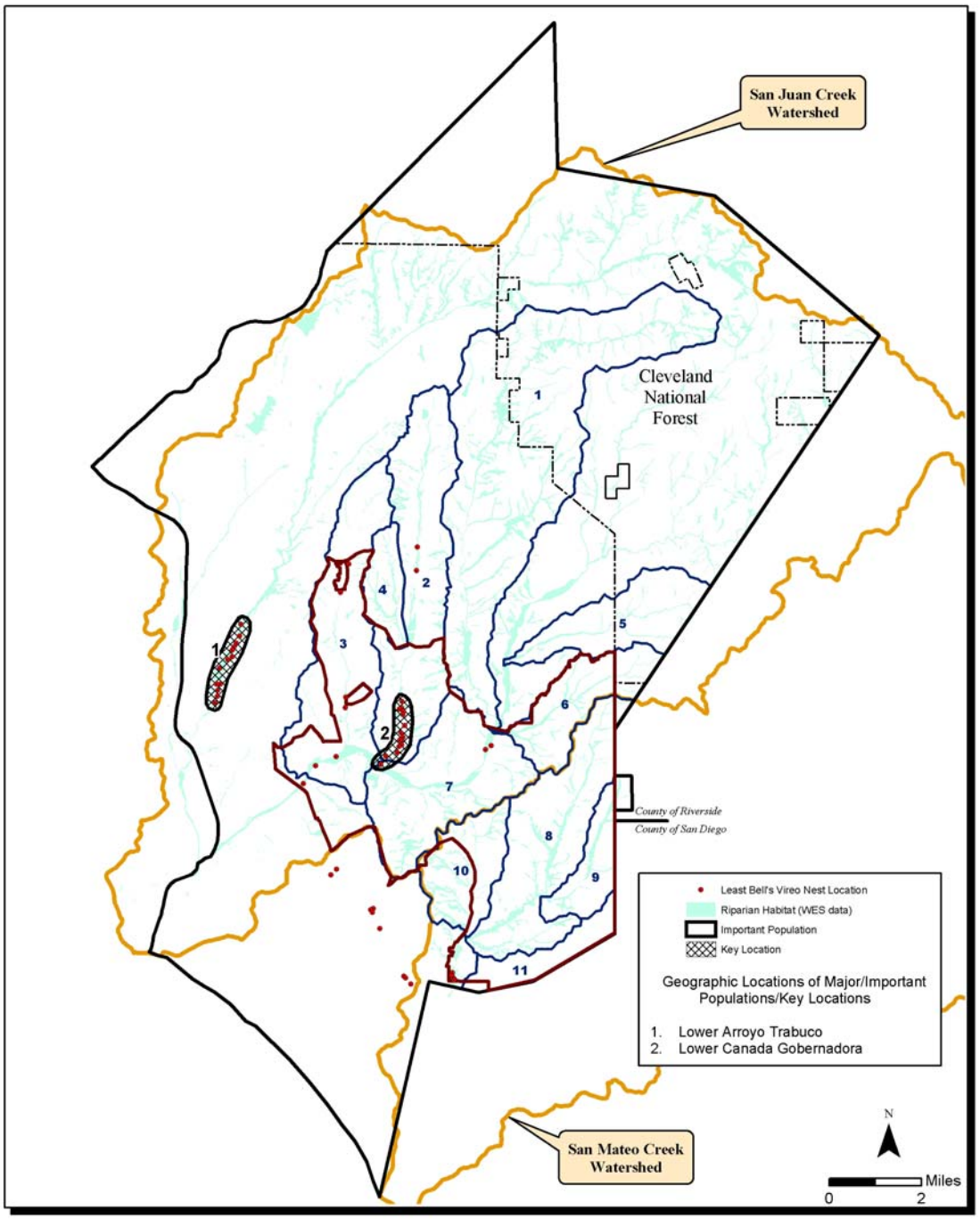
The NCCP data base includes 54 vireo nesting locations within the planning area (*Figure 4-3*). Surveys have documented nesting locations in Gobernadora Creek, middle San Juan Creek (between the Ortega Highway bridge and Casper Wilderness Park), lower Arroyo Trabuco, Chiquita Creek, lower Cristianitos Creek, and in isolated patches of willow scrub in Prima Deshecha and on the Talega development. Notably, planning area-wide surveys in 1998 failed to observe vireos in the remainder of riparian habitat in the planning area, including Gabino Canyon, La Paz Canyon, Blind Canyon, San Juan Creek above the Caspers Wilderness Park boundary, Bell Canyon, Verdugo Canyon, Lucas Canyon, Oso Creek, Tijeras Creek, upper Arroyo Trabuco, and Wagon Wheel Canyon. Much of the habitat in these areas consists of southern coast live oak riparian forest, which generally is unsuitable for the vireo. However, with the continued expansion of the breeding population of this species in southern California and changes in local habitat conditions, the future occurrence of the vireo in some of these areas is possible.

The planning area supports at least two *important populations* of the vireo in two *key locations*. These two areas combined include about 50 percent of the documented nesting locations in the planning area.

- Lower Arroyo Trabuco between Crown Valley Parkway and Avery Parkway supported 12 locations of the vireo in year 2000 surveys, of which 11 were documented breeding pairs (No. 1 on *Figure 4-3*). About the same number of nesting sites had been documented in the area in 1998 surveys (Dudek 1998). This area, which supports a well-developed stand of southern willow scrub, is included in the 90 ha (223 ac) added to O'Neill Regional Park as mitigation for the Arroyo Trabuco Golf Course.

- Lower Canada Gobernadora within GERA supports about 12-15 nesting locations based on 1998 and 2001 surveys (No. 2 on *Figure 4-3*).

It should be noted that recent observations include 10 confirmed territories and nine confirmed breeding pairs in the Prima Deshecha area (USFWS, pers. comm. 2002), but this area does not have a major, well-defined riparian system similar to Arroyo Trabuco or Canada Gobernadora. These observations suggest that vireos are opportunistic in selecting breeding sites, but whether this area should be considered an *important population* is uncertain because of the lack of a well-defined riparian system. It also should be noted that the three nesting locations in lower Cristianitos are contiguous with numerous nest sites in lower Cristianitos and San Mateo Creek on Camp Pendleton, which should be considered a *major population* outside the planning area.



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Least Bell's Vireo Distribution Map

FIGURE 4-3

c. Protection Recommendations

- Protect breeding and foraging habitat for the least Bell's vireo along Chiquita Creek.

- Protect southern willow scrub in GERA that provides nesting and foraging habitat for least Bell's vireo.

- Maintain and manage riparian habitats along San Juan Creek that provides nesting and foraging habitat for the least Bell's vireo.

- Protect breeding and foraging habitat for least Bell's vireo in lower Cristianitos Creek between the RMV boundary and the confluence with Gabino Creek.

d. Management Recommendations

- Implement a cowbird trapping program to mitigate for impacts to existing habitat within the Chiquita, Gobernadora sub-basins, as well as the "other" planning area in lower Cristianitos, and for potential impacts associated with future development. The cowbird trapping program will be evaluated on an annual basis and trap locations and trapping effort will be adjusted as part of the overall Adaptive Management Program (e.g., if the number of trapped cowbirds drops to a prescribed threshold, the trapping program may be terminated or otherwise modified).

- Protect downstream habitat in GERA, San Juan Creek, lower Cristianitos and San Mateo creeks for the least Bell's vireo by maintaining hydrology, water quality and sediment delivery and minimizing additional loadings of nutrients or toxics.

e. Restoration Recommendations

- Implement restoration efforts to address localized headcuts within Chiquita Creek, as further described in the Watershed and Sub-basin Planning Principles – Chiquita Sub-basin.

- Implement a restoration program in Gobernadora Creek which addresses **(1)** the historic creek meander above the knickpoint; and **(2)** upstream land use induced channel incision and erosion, including potentially excessive surface and groundwater originating upstream.

- Identify likely causes of erosion and potential measures to rectify causes of headcutting in the lower portion of Gobernadora Creek.

4.1.4 Southwestern Willow Flycatcher

Empidonax traillii extimus - Southwestern Willow Flycatcher
USFWS: Endangered
CDFG: Endangered

a. Regional Status

The full species willow flycatcher (*Empidonax traillii*) breeds throughout much of North America, absent only from the Central Plains and southeastern U.S. The breeding range of the subspecies southwestern willow flycatcher (*E. t. extimus*) includes southern California, Arizona, New Mexico, extreme southern portions of Nevada and Utah, far western Texas, southwestern Colorado, and extreme northwestern Mexico (USFWS 1993a). Within California, the specific breeding range for this subspecies includes the Owens Valley; the south fork of the Kern River; the Los Angeles Basin (Unitt 1987; Zeiner et al. 1990); the Santa Ynez River near Buellton; the Prado Basin riparian forest in Riverside County; the Santa Margarita and San Luis Rey rivers in San Diego County; Middle Peak in the Cuyamaca Mountains; near Imperial Beach (Small 1974); and most recently lower Gobernadora Creek in southern Orange County. This subspecies overwinters in Mexico (USFWS 1995). Areas along the Rio Grande provide important refueling sites for flycatchers as they migrate between their breeding and wintering grounds (Yong and Finch 1997).

Based on survey data collected between 1993 and 1996, a total of 549 territories was estimated for the entire breeding range of the southwestern willow flycatcher. Since that time, at least 386 of these territories have been documented as confirmed probable breeding pairs (Finch and Stoleson 2000). Within California, there are an estimated 121 breeding territories (Finch and Stoleson 2000) which appear to be scattered around southern California. The population size in the Santa Margarita River from Camp Pendleton to Fallbrook is an estimated 15-16 territories (San Diego Museum of Natural History 1995). Within western Riverside County, there are an estimated 15-20 territories, including three to five territories in the Prado Basin, three to five territories in the Santa Ana River, two to four territories at Vail Lake, and three territories in Temecula Creek (Dudek 2002).

The southwestern willow flycatcher is restricted to riparian woodlands along streams and rivers with mature, dense stands of willows (*Salix* spp.), cottonwoods (*Populus* spp.) or smaller spring fed or boggy areas with willows or alders (*Alnus* spp.) (Sedgwick and Knopf 1992). It is an insectivore that forages within and above dense riparian vegetation, taking insects on the wing or

gleaning them from foliage (USFWS 1993a). This species also forages in areas adjacent to nest sites which may be more open (USFWS 1995).

Southwestern willow flycatchers breed in relatively dense riparian habitats in all or parts of seven southwestern states from near sea level in California to over 2,600 m (8,500 ft) in Arizona and Colorado (USFWS 2001b).

The migration routes and winter destinations of the southwestern willow flycatcher are not well understood. They most likely winter in Mexico, Central America, and perhaps northern South America; however, the habitats used by willow flycatchers on the wintering grounds are unknown (USFWS 1993a). The species has been reported to sing and defend winter territories in Mexico and Central America.

The southwestern willow flycatcher nests from ground level to 4 m (13 ft) above ground in thickets of trees and shrubs approximately 4-7 m (13-23 ft) with a high percentage of canopy cover and dense foliage. The nest site plant community typically is even-aged, structurally homogeneous and dense (Brown 1988; Whitfield 1990; Sedgwick and Knopf 1992). Historically, the willow flycatcher nested primarily in willows and mule fat with a scattered overstory of cottonwood (Grinnell and Miller 1944). Although the species still nests in willows where available, with recent non-native invasions of riparian plant communities in the region, the flycatcher also is known to nest in thickets dominated by tamarisk and Russian olive (Hubbard 1987; Brown 1988). Regardless of the plant species composition or height, occupied sites always have dense vegetation in the patch interior and in most cases this dense vegetation occurs within the first 3-4 m (9-13 ft) above ground (USFWS 2001b). This species usually nests in the upright fork of a shrub but occasionally nests on horizontal limbs within trees and shrubs (Terres 1980). Typically, sites selected as song perches by male willow flycatchers show higher variability in shrub size than do nest sites and often include large central shrubs. Nest sites are distinguished by high willow density and low variability in willow patch size and bush height. Habitats avoided for either nesting or singing typically are riparian zones with greater distances between willow patches and individual willow plants (Sedgwick and Knopf 1992). Nesting willow flycatchers invariably prefer areas with surface water nearby (Phillips et al. 1966). In almost all cases, slow-moving or still surface water and or saturated soils are present at or near the breeding sites during normal precipitation years (USFWS 2001b). Suitable flycatcher habitat is most likely to develop in more extensive patches along lower gradient streams with wider floodplains, although there are exceptions to this habitat characterization (e.g., San Luis Rey River) (USFWS 2001b). Suitable habitat is less likely to occur in steep, confined streams characteristic of narrow canyons (USFWS 2001b).

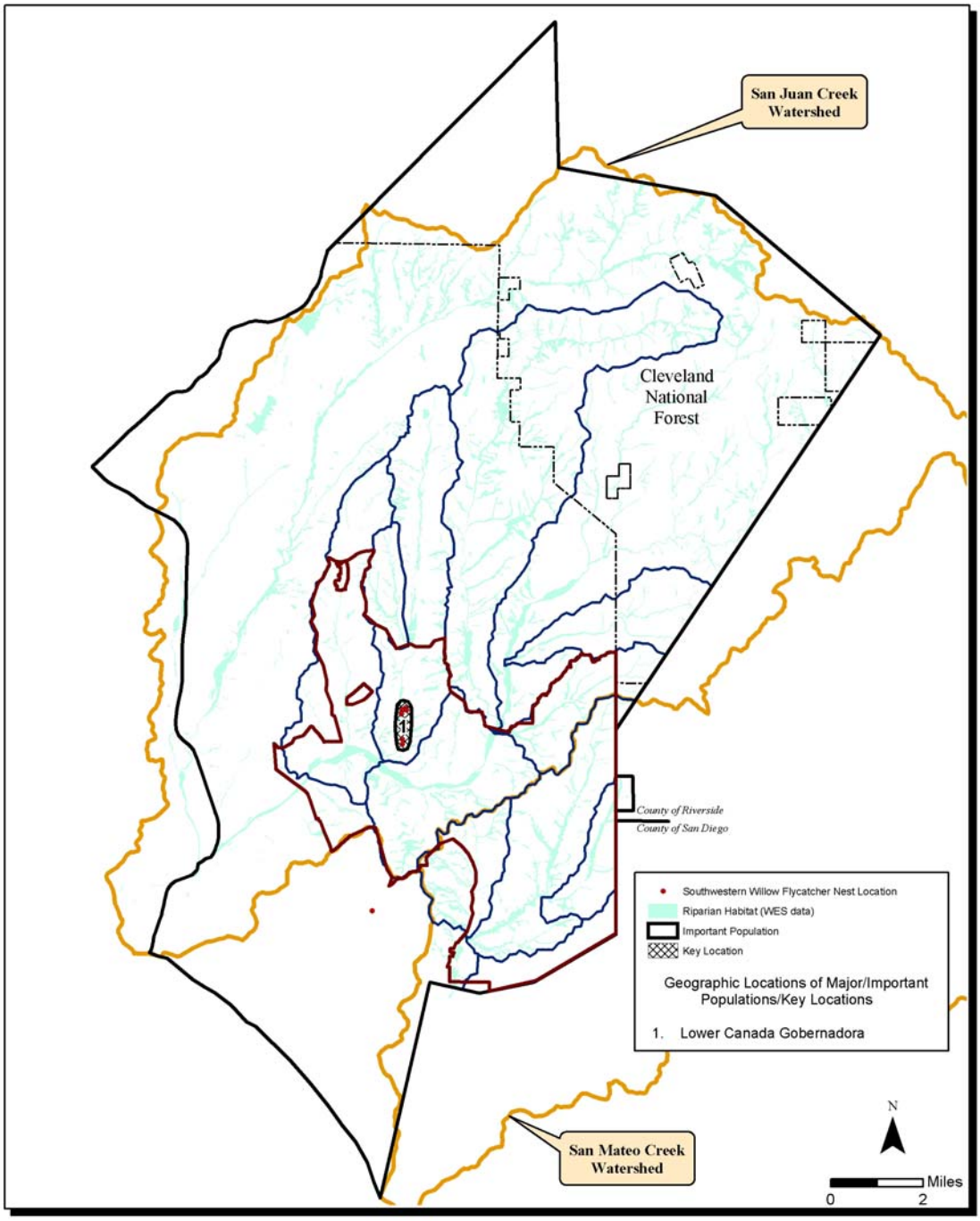
Males typically arrive in southern California at the end of April and females arrive approximately one week later. They have a home range larger than the defended territory and

territorial defense begins in late May. Territory sizes range from 0.24 to 0.45 ha (0.6 to 1.1 ac) and territories can be dense in suitable habitat; the documented maximum is six females and five males in only 4.4 ha (10.9 ac) (San Diego Natural History Museum 1995). Sogge et al. (1997) found territorial flycatchers in habitat patches ranging from 0.5 to 1.2 ha (1.2 to 3.0 ac). Two habitat patches of 0.5 (1.2 ac) and 0.9 ha (2.2 ac) each supported two territories in this study (Sogge et al. 1997). Alternatively, southwestern willow flycatchers do not always pack their territories into all available space within a habitat (USFWS 2001b). Instead, some territories may be bordered by undefended riparian habitat that could be important in attracting flycatchers to the site or in providing post-nesting use and dispersal areas.

The southwestern willow flycatcher usually is monogamous within a nesting season, but not all territorial males are mated (San Diego Natural History Museum 1995). Pairs typically raise one brood per year (USFWS 1993a). Clutch sizes range from two to five, with an average of 3.4 eggs in coastal southern California. Southwestern willow flycatcher fledglings leave the nest at age 12-15 days post-hatching (usually in early July) and disperses from their natal territory at a minimum age of 26-30 days (USFWS 1993a). About 25 percent of adults return to their territory from the previous year. At least 20 percent of juveniles return to their "natal areas" which are usually within 2 to 4 km (1.6 to 2.5 mi) of their natal territory. Although nest reuse is not common by the southwestern willow flycatcher, recent studies have reported a low percentage of nest reuse by this species (Yard and Brown 1999). Adults usually depart from breeding territories between mid-August and early September (San Diego Natural History Museum 1995).

b. Subregional Status

The southwestern willow flycatcher is known to nest in two locations in the planning area; in GERA and in an isolated patch of riparian habitat in Talega development open space in the year 2000 (*Figure 4-4*). A calling male was detected in 1998 in lower Chiquita Canyon by Harmsworth Associates but there was no evidence of breeding activity (reported in Dudek 1998). The GERA location is the only *important population* of willow flycatcher in the planning area and also is considered a *key location* for the species (No. 1 on *Figure 4-4*). Planning area-wide surveys in 1998 failed to find the willow flycatcher elsewhere in the planning area and the habitat in these areas was judged to be generally unsuitable for the species (Dudek 1998). However, as with the vireo, there is a possibility that this species could occur in other riparian areas, and the observation of a breeding pair in the isolated riparian area on Talega in 2000 suggests that occasional or sporadic breeding at other sites in the planning area is possible.



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Southwestern Willow Flycatcher Distribution Map

FIGURE 4-4

c. Protection Recommendations

- Protect southern willow scrub in GERA that provides nesting habitat for southwestern willow flycatcher.

d. Management Recommendations

- Implement a cowbird trapping program to mitigate for impacts to existing habitat within the Gobernadora sub-basin and for potential impacts associated with future development. The cowbird trapping program will be evaluated on an annual basis and trap locations and trapping effort will be adjusted as part of the overall Adaptive Management Program (e.g., if the number of trapped cowbirds drops to a prescribed threshold, the trapping program may be terminated or otherwise modified).

- Protect downstream habitat in GERA and lower Cristianitos and San Mateo creeks for the southwestern willow flycatcher by maintaining hydrology, water quality and sediment delivery and minimizing additional loadings of nutrients or toxics.

e. Restoration Recommendations

- Implement a restoration program in Gobernadora Creek which addresses (**1)** the historic creek meander above the knickpoint; and **(2)** upstream land use induced channel incision and erosion, including potentially excessive surface and groundwater originating upstream.

- Identify likely causes of erosion and potential measures to rectify causes of headcutting in the lower portion of Gobernadora Creek.

4.1.5 Riverside Fairy Shrimp

Streptocephalus woottoni - Riverside Fairy Shrimp
USFWS: Endangered
CDFG: None

a. Regional Status

Riverside fairy shrimp is restricted to southwestern California and northwestern Baja California. It occurs from southern Ventura County south and east through Orange and western Riverside counties to coastal San Diego County (primarily Camp Pendleton and Otay Mesa) and the vicinity of Baja Mar north of Ensenada in Baja California, Mexico. With the exception of the

Riverside populations, all populations are within 15 km (9.3 mi) of the coast (Eriksen and Belk 1999). All known populations lie between 30 m (98 ft) and 415 m (1,361 ft) in elevation.

The *Recovery Plan for Vernal Pools of Southern California* (USFWS 1998b) identified six Management Areas for the Riverside fairy shrimp:

1. **Los Angeles/Orange County:** This Management Area includes three areas in southern Orange County known to support the Riverside fairy shrimp – Saddleback Meadows/Foothill-Trabuco area, RMV property, and El Toro.

2. **Riverside County:** This Management Area includes three areas in western Riverside County – Temecula, Skunk Hollow, and the Santa Rosa Plateau. Recent data have revised and refined this distribution to include at least five extant populations in western Riverside County, including Skunk Hollow, Santa Rosa Plateau, Murrieta, Alberhill, and Lake Elsinore populations, plus an unnamed location that apparently includes a series of private stockponds (USFWS 2001c). Other undiscovered populations may occur in this area (Dudek 2002). The Skunk Hollow pool is protected as part of a mitigation bank and the Santa Rosa Plateau complex is on the Ecological Reserve owned and managed by The Nature Conservancy.

3. **San Diego North Coastal Mesas:** This Management Area includes MCB Camp Pendleton and Carlsbad. The Pendleton pool complexes are located in the Wire Mountain Housing Area, Cockleburr Mesa, Las Pulgas, Stuart Mesa, San Mateo and on lands leased to State Parks. The Pendleton complexes represent one of the largest populations of the Riverside fairy shrimp (USFWS 2001c). The Carlsbad pools are located at the Poinsettia Land Station and are mitigation lands.

4. **San Diego Central Coastal Mesas:** This Management Area includes the Marine Corps Air Station Miramar. Only one complex supporting the Riverside fairy shrimp is known from this Management Area. This complex is in the Miramar Marine Corps Air Station (MCAS) and is managed by the Department of Defense (DOD).

5. **San Diego South Coastal Mesas:** This Management Area includes Otay Mesa. Six complexes in the Otay area support Riverside fairy shrimp, of which five are on private property and one is on City of San Diego property. Two of the five private complexes and the City site are on mitigation land.

6. **Transverse:** This Management Area is located in inland valleys and mesas north of the Los Angeles Basin in association with the Transverse Mountain Ranges. The Riverside fairy shrimp is known from the Carlsberg Ranch vernal pool in Moorpark, on the

northern edge of the Santa Monica Mountains in Ventura County. This vernal pool represents a northern limit of the species, and is now in preserved open space under the management of the Santa Monica Mountains Conservancy.

Vernal pools that support the Riverside fairy shrimp primarily occur on mesas and other level terrain generally less than 10 percent. These areas often exhibit a characteristic microrelief called Gilgai or mima mound formation. The species may also occur in ditches and road ruts, but only in areas associated with degraded vernal pool habitat. Because of the distinctive topography supporting vernal pools, pools typically are clustered in "complexes," including dense clusters of small pools or scattered clusters of large pools that often share a common watershed (USFWS 2001c).

Vernal pools in general are associated with heavy soils that prevent the percolation of water. Southern California vernal pools are most often found in alluvial soils with clay or clay loam subsoils. Basaltic or granitic substrates or indurated hardpan layers may contribute to poor drainage and retention of water (USFWS 1998b). The size of vernal pools can vary dramatically, from just a few square meters to the size of small lakes (e.g., Skunk Hollow in western Riverside County). The size of the vernal pool is related to the watershed of the pool and the local micro-relief.

The Riverside fairy shrimp is restricted to deep seasonal vernal pools, vernal pool-like ephemeral ponds, and stock ponds and other human modified depressions (Eng et al. 1990; USFWS 1993b; USFWS 2001c). Riverside fairy shrimp prefer warm-water pools that have low to moderate dissolved solids, are less predictable, and remained filled for extended periods of time (Eriksen and Belk 1999). Basins that support Riverside fairy shrimp are typically dry a portion of the year, but usually are filled by late fall, winter or spring rains, and may persist through May (USFWS 2001c). All known vernal pool habitat lies within annual grasslands, which may be interspersed through chaparral or coastal sage scrub vegetation.

Females produce between 17 and 427 cysts over their lifetime (Simovich and Hathaway 1997). Presumably because of the ephemeral and unpredictable nature of the pool resource, few of the available cysts hatch at a time (Eriksen and Belk 1999). Cysts may hatch when water temperature is at 10 degrees C (50 degrees F) but develop slowly below 15 degrees C (59 degrees F) (Eriksen and Belk 1999). Hathaway and Simovich (1996) found that Riverside fairy shrimp hatched in seven to 12 days when water temperatures were between 10 and 20 degrees C (50 and 68 degrees F) and maturity was noted between 48 to 56 days.

Dispersal in fairy shrimp is likely mediated by vectors such as waterfowl, cattle, sheep, dogs and even off-road vehicles (e.g., rubber-tired or tracked vehicles) that move through or wallow in inhabited wet or dry pools. Wildlife and vehicles transport cysts or pregnant or mature adults

between dry depressions or extant pools. Cysts may also disperse like some plant seeds by passing through an animal's gut after it ingests pregnant females or cysts in drinking water and then eliminates in other suitable depressions or pools.

b. Subregional Status

In the planning area, the Riverside fairy shrimp is known from vernal pools on Saddleback Meadows in the northwest portion, two pools near the intersection of Antonio Parkway and the FTC-North segment, a very large population in a large pool on Chiquita Ridge and in two pools located along Radio Tower Road (pools 2 and 7) (*Figure 4-5*). Because this species is rare in the subregion, all vernal pools supporting the Riverside fairy shrimp are considered *important populations* in *key locations*.

The geology of the vernal pools in the planning area is different from that underlying mima mounds found on the mesas of San Diego County. The Chiquita Ridge and Radio Tower Road pools originate from young bedrock slides associated with the Cristianitos fault zone. The formation of these vernal pools apparently derives from the differential settling of fine-grained materials (high clay content) from San Onofre Breccia, Monterey and Topanga formations. These pools are underlain by Soper gravelley loam on 15-30 percent slopes and Alo clay on 0-15 percent slopes.

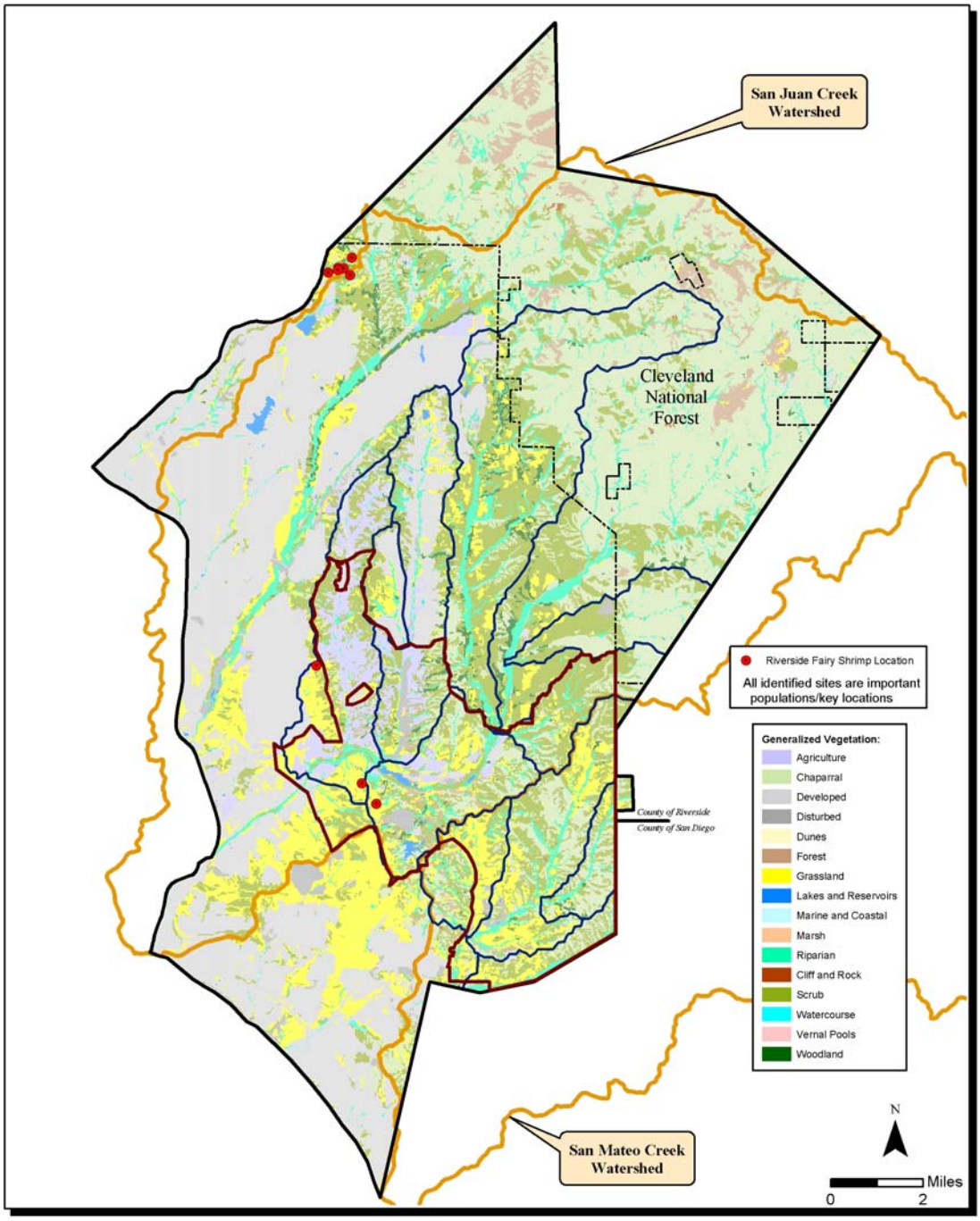
On RMV, the Riverside fairy shrimp was found in pools ranging in depth from 22 to 41.9 cm (8.7 to 16.5 in). Water temperatures of these pools ranged from 15 to 20 degrees C (59 to 84 degrees F). The percent dissolved oxygen was 0.02 to 6.0 and the total dissolved solids was 61-364 parts per million.

c. Protection Recommendations

- Protect the two vernal pools that support the Riverside fairy shrimp and their contributing hydrologic sources along Radio Tower Road. The Chiquita Ridge pools are already protected in Ladera Open Space.

d. Management Recommendations

- Implement a management program for vernal pools, including control of non-native invasive species, management of grazing and minimization of human access and disturbance as part of the Adaptive Management Program.



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Riverside Fairy Shrimp Distribution Map

FIGURE 4-5

4.1.6 San Diego Fairy Shrimp

Branchinecta sandiegonensis - San Diego Fairy Shrimp
USFWS: Endangered
CDFG: None

a. Regional Status

The San Diego fairy shrimp is restricted to vernal pools in coastal southern California and Baja California, Mexico. Its current range in coastal southern California includes western San Diego County and southern and central Orange County. All known localities of the species are below 700 m (2,300 ft) and are within 64 km (40 mi) of the Pacific Ocean (USFWS 2000). The largest concentration of vernal pools supporting the San Diego fairy shrimp is in San Diego County, with an estimated 82 ha (202 ac) of occupied vernal pool basins in the County at the time of the species' listing in 1997. Of this occupied habitat, approximately 70 percent is on military lands, including the Miramar MCAS and Camp Pendleton (USFWS 2000b). The USFWS (2000b) concluded that vernal pool habitat in Los Angeles and Orange counties has been almost completely lost.

The *Recovery Plan for Vernal Pools of Southern California* (USFWS 1998b) identified five Management Areas for the San Diego fairy shrimp:

1. **Los Angeles/Orange County:** This Management Area includes Fairview Regional Park in Orange County that supports a vernal pool complex of about eight pools on 25 ha (62 ac) inhabited by the San Diego fairy shrimp (USFWS 2000b). This park is located east of the Santa Ana River and north of Victoria Street in Costa Mesa. The other Management Area is Rancho Mission Viejo, as described below under Subregional Status. Another Orange County population is known from Newport Banning Ranch (T. Bomkamp, pers. comm. 2002).

2. **San Diego North Coastal Mesas:** This Management Area includes complexes and pools on the coastal terraces on Camp Pendleton such as the State Park lease area, San Mateo, O'Neill, Stuart Mesa, Cockleburr Mesa, Las Pulgas, Basilone and Wire Mountain. This Management Area also includes two sites in the City of Carlsbad: a complex north of Poinsettia Lane between I-5 and Highway 1 (Carlsbad Boulevard) in the vicinity of the Poinsettia Lane train station and a complex between College Boulevard and Palomar Airport Road in the vicinity of Palomar Airport. The Poinsettia Lane location is on mitigation land.

3. **San Diego Central Coastal Mesas:** This Management Area includes pools and complexes on Del Mar Mesa, Kearney Mesa, Miramesa, MCAS Miramar, and Tierrasanta associated with coastal terraces and mesas in central San Diego County from the San Dieguito River to the Sweetwater River. As of 1998, the Central Coastal Mesas were known to support 41 complexes with San Diego fairy shrimp. Of these, 29 are on DOD land, five on private lands, three on City of San Diego land, one each on Grossmont College and City of San Diego School District lands, and two on Caltrans lands. Of the 29 on DOD land, 25 are managed for biological resources, three were proposed as refuge in 1998, and one was developed. Of the five complexes on private lands, two are mitigation land. One of the three City of San Diego complexes is mitigation and both of the Caltrans complexes are mitigation.

4. **San Diego Inland Valley:** This Management Area includes a large set of complexes in the Ramona area (Santa Maria Valley). These inland complexes are generally isolated from maritime influences and are representative of pools associated with alluvial or volcanic soil types. Although some of these pools are known to support the San Diego fairy shrimp, the occupancy status of all the pools is not known (USFWS 2000b). As of 1998, six complexes were known to support the San Diego fairy shrimp, of which five are on private land and one within San Diego County's Ramona Airport boundaries.

5. **San Diego South Coastal Mesas:** This Management Area includes pools and complexes from the Sweetwater River to the Mexican border. Vernal pools with San Diego fairy shrimp are located in the Tijuana Estuary Wildlife Refuge, western and eastern Otay Mesa, the Otay Lakes area, and Proctor Valley. As of 1998, seven complexes in this Management Area were known to support the San Diego fairy shrimp (USFWS 1998b). Of these seven, five are on private land, one is on City of San Diego land, and one is on Navy land. Three of the privately owned complexes and the City of San Diego complex are mitigation lands.

Vernal pools that support the San Diego fairy shrimp primarily occur on mesas and other level terrain generally less than 10 percent. These areas often exhibit a characteristic microrelief called Gilgai or mima mound formation. The species may also occur in ditches and road ruts, but only in areas associated with degraded vernal pool habitat. Because of the distinctive topography supporting vernal pools, pools typically are clustered in "complexes," including dense clusters of small pools or scattered clusters of large pools that often share a common watershed (USFWS 2000b).

Vernal pools in general are associated with heavy soils that prevent the percolation of water. Southern California vernal pools are most often found in alluvial soils with clay or clay loam subsoils. Basaltic or granitic substrates or indurated hardpan layers may contribute to poor

drainage and retention of water (USFWS 1998b). The size of vernal pools can vary dramatically, from just a few square meters to the size of small lakes (e.g., Skunk Hollow in western Riverside County). The size of the vernal pool is related to the watershed of the pool and the local micro-relief.

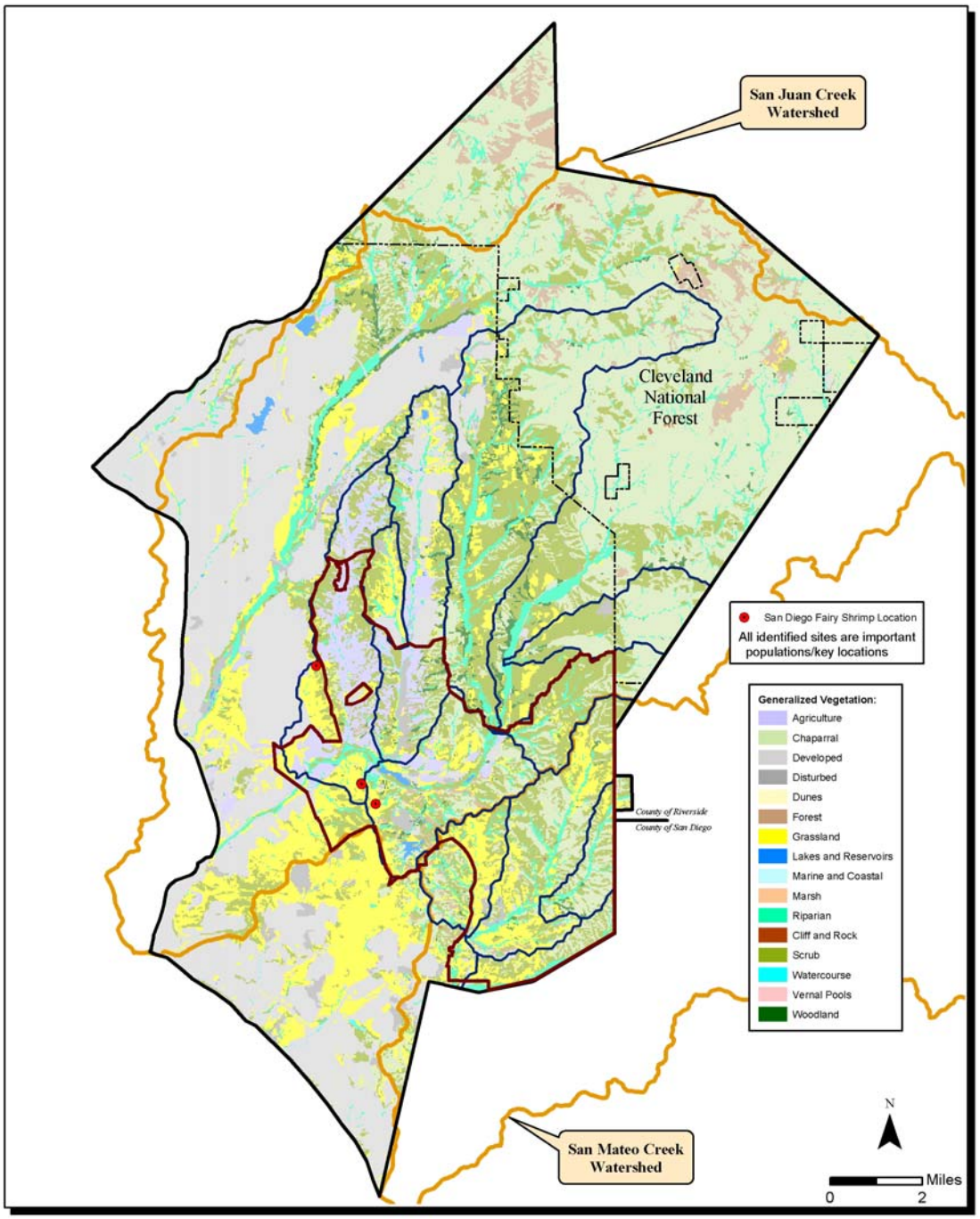
The San Diego fairy shrimp occurs in small, shallow vernal pools ranging in depth from 5.1 to 30.5 cm (2 to 12 in) and in water temperatures from 10 and 14.5 degrees C (50 to 58 degrees F). Water temperature and chemistry are important factors in the species' distribution. Adults are usually observed in January-March when pools hold water from winter rains, although the breeding season may be extended in association with early winter or mid-spring rains (USFWS 2000b). Eggs are either dropped to the pool bottom or remain in the brood sac until the adult female dies and sinks. The shrimp hatch and mature in seven days to two weeks, depending on water temperature. "Resting eggs" of cysts are capable of withstanding heat, cold and prolonged drying (USFWS 2000b). Because the high variability rainfall in southern California, and thus the success of any given breeding season, only a fraction of cysts may hatch in a given year and reproductive success can be spread out over several years (USFWS 2000b).

Dispersal in fairy shrimp is likely mediated by vectors such as waterfowl, cattle, sheep, dogs and even off-road vehicles (e.g., rubber-tired or tracked vehicles) that move through or wallowing in inhabited wet or dry pools. Wildlife and vehicles transport cysts or pregnant or mature adults between dry depressions or extant pools. Cysts may also disperse like some plant seeds by passing through an animal's gut after it ingests pregnant females or cysts in drinking water and then eliminates in other suitable depressions or pools.

b. Subregional Status

The San Diego fairy shrimp occurs in two locations in the planning area: in the large and small vernal pools on Chiquita Ridge (vernal pools 3 and 4) and in three pools located along Radio Tower Road south of Ortega Highway (vernal pools 1, 2 and 7) (*Figure 4-6*). Because this species is rare in the region, both locations are *important populations* in *key locations*.

The geology of the vernal pools in the planning area is different from that underlying mima mounds found on the mesas of San Diego County. The Chiquita Ridge and Radio Tower Road pools originate from young bedrock slides associated with the Cristianitos fault zone. The formation of these vernal pools apparently derives from the differential setting of fine-grained materials (high clay content) from San Onofre Breccia, Monterey and Topanga formations. These pools are underlain by Soper gravelley loam on 15-30 percent slopes and Alo clay on 0-15 percent slopes.



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San Diego Fairy Shrimp Distribution Map

FIGURE 4-6

The San Diego fairy shrimp was found in pools ranging in depth from 17.0 to 41.9 cm (6.7 to 16.5 in). Water temperatures of these pools ranged from 11 to 23 degrees C (52 to 73 degrees F). The percent dissolved oxygen was 2.3 to 5.36 and the total dissolved solids was 51-166 parts per million.

c. Protection Recommendations

- Avoid impacts to the three vernal pools (1, 2 and 7) that support the San Diego fairy shrimp and their contributing hydrologic sources along Radio Tower Road. The Chiquita Ridge pools are already protected in Ladera Open Space.

d. Management Recommendations

- Implement a management program for vernal pools, including control of non-native invasive species, management of grazing and minimization of human access and disturbance as part of the Adaptive Management Program.

4.1.7 Thread-leaved Brodiaea

Brodiaea filifolia - Thread-leaved Brodiaea
Federal: Threatened
State: Endangered
CNPS: List 1B

a. Regional Status

Thread-leaved brodiaea is a perennial geophyte that has a corm with a dark brown, fibrous tunic. The flowering stalk is 20.3-40.6 cm (8-16 in) high and the narrow leaves are generally shorter than the flowering stem. The flowers are dark blue to violet and have six perianth segments. There are three stamens and three staminodia (sterile stamens), which are narrow and thread-like in each flower.

The thread-like staminodia are the feature which distinguishes this species from other related brodiaea occurring in southern California. This species reportedly hybridizes with *B. orcuttii* and *B. terrestris*, but these species have different chromosome numbers, so hybridization events should be rare (chromosome counts need to be confirmed, sources are inconsistent). In Riverside County a large reported hybrid swarm occurs on Miller Mountain and Elsinore Peak and reported hybrids are also found in populations on the Santa Rosa Plateau.

Counts of flowering stalks are often used to determine the size of brodiaea populations. Although a good index, it appears that there may be higher number of corms in the ground than is indicated by the number of flowering plants. In 1998, the USFWS cited an instance where in a recorded population of 20 flowering stalks, over 8,000 corms were recovered (USFWS 1998c). Other botanists have used a general range of indices of 5 to 100 corms for every flowering stalk observed (pers. comm., Bomkamp and Elvin 2002).

In the Transverse Ranges, the thread-leaved brodiaea is known to occur in the foothills of the San Gabriel Mountains, east to Arrowhead Hot Springs in the San Bernardino Mountains. Populations are also found in southern Orange, western Riverside, and northwestern San Diego counties. In 1998, the USFWS estimated that 50 extant populations occurred in southern California, with the majority consisting of sites supporting less than 2,000 plants (USFWS 1998c). Since 1998, some of these populations have been extirpated, while additional populations have been identified in Riverside, Los Angeles, San Diego and Orange counties. The exact number of extant populations is not known, but it is likely between 40 and 50. Most of these additional populations occur in northwest San Diego County. Similarly, in 1998 the USFWS estimated that 338 ha (835 ac) of occupied habitat occur within the range of this species; however, based upon extirpations and additional occurrences identified between 1998 and 2001, an estimate of somewhat less than 338 ha (835 ac) is more likely. As shown in *Table 4-5*, the largest locality is found in San Marcos in northern San Diego County with an estimated range of 201,200 to 342,000 flowering stalks, while the largest population in Riverside County is found on the Santa Rosa Plateau with over 30,000 flowering stalks estimated to occur on the ecological reserve. The largest extant populations in Orange County occur at Aliso-Woods Regional Park, consisting of several thousand plants and on Rancho Mission Viejo (see below). The largest population in Los Angeles County occurs in Glendora, containing an estimated 2,000 to 3,000 flowering stalks.

In western Riverside County this species is known to occur on the Santa Rosa Plateau; Upper Salt Creek, west of Hemet; the San Jacinto Wildlife Area (two localities); Perris, east of the Perris Valley Airport (approximately 5,000 flowering stalks); south of San Jacinto Road (<500 individuals); and in Railroad Canyon where approximately 3,000 plants are associated with *Sporobolus*-dominated alkali grassland.

In Orange County, populations are known from Aliso-Woods Canyon Regional Park (several thousand), Rancho Mission Viejo (4,500 to 5,500 flowering stalks), Forster Ranch (approximately 5,000 flowering stalks associated with a restoration/relocation program), Prima Deshecha Landfill, and the Talega Development where one small population will be preserved in open space and a second population is slated for translocation.

TABLE 4-5
REGIONWIDE SUMMARY:
2002 STATUS OF THREAD-LEAVED BRODIAEA
WITHIN KNOWN RANGE IN SOUTHERN CALIFORNIA

Regional Major Population Area(s)	Brodiaea Population: Number of Counted/Estimated Plants
San Marcos and Northern San Diego County Excluding Camp Pendleton	350,000 to 400,000 (estimated)[1] 201,200 (estimated)[2]
Camp Pendleton and San Onofre State Park	5,000 (estimated)
San Jacinto River and Hemet, Riverside County	10,000
Santa Rosa Plateau, Riverside County	30,000
Los Angeles County (Glendora and San Dimas)	2,000 to 3,000
Orange County	16,450-18,450
APPROXIMATE TOTAL PLANTS REGIONWIDE	264,450 to 466,450
Orange County Population Summary	
Rancho Mission Viejo	Approximately 9,300
Aliso-Woods Park	Approximately 2,000 to 3,000
Talega and Forster Ranch Developments	5,000 to 6,000
Arroyo Trabuco Golf Course	150
ORANGE COUNTY SUMMARY	16,450 to 18,450+

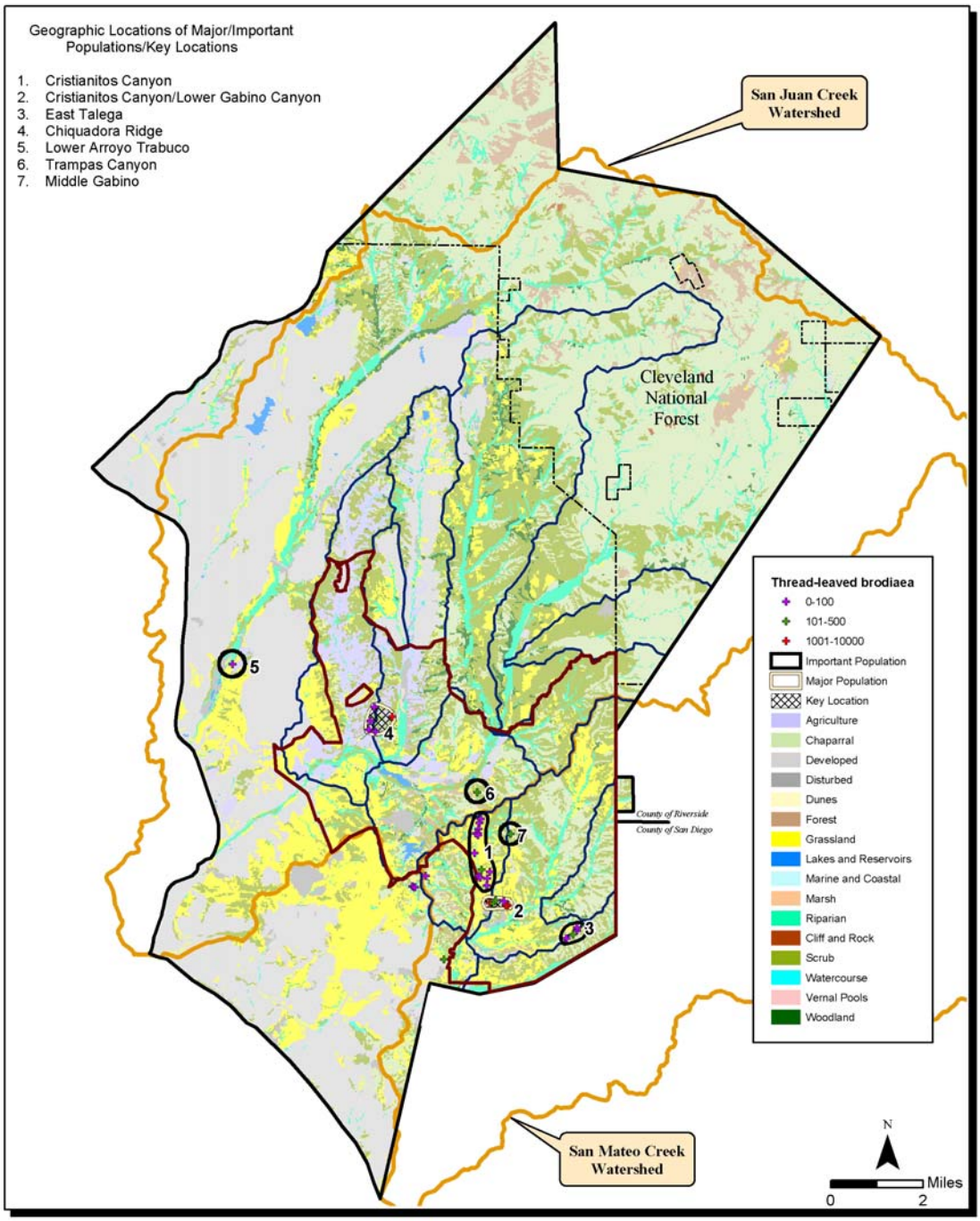
Notes:

1 USFWS 1998c

2 SANDAG GIS Database 2000. Locations of Sensitive Species Sitings (Sue Carnavale, pers. comm.)

b. Subregional Status

Thread-leaved brodiaea is found in eight general locations in the planning area (*Figure 4-7*), excluding the translocated population at Forster Ranch: Chiquadora Ridge; Trampas Canyon sub-unit; Cristianitos Canyon; lower Cristianitos 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. The approximately 9,600 flowering stalks known from the planning area, (excluding Forster Ranch) are a small percentage (about 2-3 percent) of the thread-leaved brodiaea range-wide, but represent an important geographic segment of the species. However, conservation of this species is most dependent on protection of the two largest concentrations in north San Diego County and western Riverside County (see *Table 4-5*).



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Thread-leaved Brodiaea Distribution Map

FIGURE 4-7

Within the planning area, this species is associated with purple needlegrass grasslands and grassland/sage scrub ecotone areas. In many instances, the needlegrass grasslands exhibit low densities of native bunch grasses and support non-native English ryegrass (*Lolium multiflorum*) and cardoon (*Cynara cardunculus*). In all cases, the brodiaea is associated with clay soils; often times that occur as lenses in cobbly loams, clay loams or sandy clay loams. In such instances, the brodiaea is restricted to the clay lenses.

The following summarizes the size and distribution of thread-leaved brodiaea within RMV and identifies *major* and *important populations* and *key locations*:

- About 13 separate scattered locations occur in the Cristianitos sub-basin, ranging from one to 120 flowering stalks (No. 1 on *Figure 4-7*). These are *important populations* for conservation of the brodiaea in the subregion because they potentially provide connectivity between offsite locations to the south in San Onofre State Park and Camp Pendleton with planning area locations to the north (e.g., Chiquadora Ridge). These locations could also potentially link planning area locations to occurrences to the west including the Donna O'Neill Conservancy lands, ultimately linking to the offsite Talega Development and Forester Ranch development occurrences to be preserved in open space. In addition, they occur in an area dominated by clay soils, and thus there is an opportunity to expand the population in this area through adaptive management. Some subset of these locations comprise *key locations,* but there is flexibility in which locations need to be protected to maintain population viability in the area.

- A large complex of six discrete locations totaling approximately 6,100 flowering stalks occurs on the hill outcrop adjacent to the mine pits in the southern portion of Cristianitos Canyon on the boundary between the Cristianitos and Gabino and Blind Canyons sub-basins (No. 2 on *Figure 4-7*). As one of the two largest populations on RMV, this is a *major population* in a *key location.*

- Four locations totaling 288 flowering stalks occur in the Talega sub-basin on the mesa east of Northrop Grumman near the boundary with the Gabino and Blind canyons sub-basins (No. 3 on *Figure 4-7*). Although not a large population, these locations may be considered an *important population* because they potentially contribute to connectivity and genetic exchange among the various nearby locations in the subregion.

- Five locations occur on Chiquadora Ridge southeast of the treatment plant, including the eastern portion of the Chiquita sub-basin and the western portion of the Gobernadora sub-basin (No. 4 on *Figure 4-7*). Four of the five locations are small (73, 2, 3 and 7 flowering stalks), but the easternmost location on the ridge has about 2,000 flowering stalks. These five locations together comprise a *major population* and one of the two largest on RMV.

The largest location of this population also is in a *key location* for conservation of this species in the subregion because this location is on Chiquadora Ridge, a major landscape feature that serves an important habitat connection function, and it is the only *major population* in the San Juan Creek Watershed.

- One location of about 150 flowering stalks occurs on a slope east of Trabuco Creek in open space associated with the golf course project (No. 5 on *Figure 4-7*). This disjunct location is an *important population* because as the westernmost occurrence it contributes to the geographic diversity of the species in the subregion.

- One location of about 250 flowering stalks in the southeastern portion of the Trampas Canyon subunit of the Central San Juan and Trampas Canyon sub-basin (No. 6 on *Figure 4-7*). This location is an *important population* because it contributes to the geographic diversity of the species in the subregion. **Note that this is new information since the April 2003 version of the Guidelines.**

- One location of about 183 flowering stalks occurs in the western portion of the middle Gabino subunit of the Gabino and Blind Canyons sub-basin (No. 7 on *Figure 4-7*). This location is an *important population* because it contributes to the geographic diversity of the species in the subregion. **Note that this is new information since the April 2003 version of the Guidelines.**

Other locations of thread-leaved brodiaea in the planning area include:

- The Forster Ranch population, which is a translocated/restored population. This population numbered about 5,000 flowering stalks in 2001. Only a few brodiaea flowered in 2002, attributed to the poor rainfall.

- One location (no size estimate) occurs on the Donna O'Neill Conservancy at Rancho Mission Viejo.

- Two locations where 100 and 150 plants were detected, respectively, occur within the planned Talega Development (USFWS 2001d). These locations will be lost in association with the Talega Development, but corms excavated from these locations will be translocated to help offset this loss (USFWS 2001d). Another location of about 300 flowering stalks occurs in designated Talega Open Space.

c. **Protection Recommen**dations

- Protect the large population of approximately 2,000 flowering stalks of brodiaea on Chiquadora Ridge and two of the four small populations in Chiquita Canyon south of the wastewater treatment plant. Protection of these locations would constitute protection of a *major population* in a *key location*.

- Protect the location supporting approximately 6,100 flowering stalks on the hill outcrop adjacent to the clay mine pits in the southern portion of Cristianitos Canyon. This location is the largest contiguous thread-leaved brodiaea population in the planning area and comprises a *major population* in a *key location*.

- Protect 10 of the 13 small, scattered locations in Cristianitos Canyon, totaling approximately 300 flowering stalks. Maintain a continuous habitat connection between these scattered populations to allow for interactions and genetic exchange between the populations. These locations meet the criteria of *important populations* in *key locations* because they provide a linkage between brodiaea locations in the area and because the area has good potential for enhancement and restoration.

- Protect the four locations totaling 288 individuals in the Talega sub-basin east of the Northrop Grumman facilities. The locations are considered *important populations* because they contribute to the geographic diversity and provide additional sources for genetic exchange and connectivity in this portion of the subregion.

- Protect the location of approximately 150 flowering stalks on the slope east of Trabuco Creek. This location is considered an *important population* because as the westmost occurrence in the subregion it contributes to the geographic diversity of the species in the subregion.

- Salvage and translocate individuals within development areas that cannot be avoided to areas with suitable soils. Where suitable soils are present, translocation sites should be located to the extent feasible and appropriate in key locations that maximize connectivity among locations within the subregion.

Two additional protection recommendations have been added to the May 2004 version of the Guidelines based on new information from the Spring 2003 surveys.

- **Protect the location of approximately 250 flowering stalks in the southeastern portion of the Trampas Canyon subunit of the Central San Juan and Trampas**

Canyon sub-basin. This location is considered an *important population* because it contributes to the geographic diversity of the species in the subregion.

- **Protect the location of approximately 183 flowering stalks in the western portion of the middle Gabino subunit of the Gabino and Blind Canyons sub-basin. This location is considered an *important population* because it contributes to the geographic diversity of the species in the subregion.**

d. Management Recommendations

As part of the Adaptive Management Program, the following management activities for thread-leaved brodiaea will be conducted:

- Control non-native invasive species such as cardoon, ryegrass, bromes and mustards.

- Manage grazing as part of the Adaptive Management Program in a manner that optimizes the control of non-native grasses (*Lolium*, *Bromus, Avena*) while allowing for proliferation of the native grasses and forbs.

- Protect thread-leaved brodiaea populations from human disturbance such as hiking, mountain bikes and equestrian activities.

- Collect data on pollinators to ensure that habitats (including soils) for native Halictid bees and other pollinators are preserved in the vicinity of preserved populations.

e. Restoration Recommendations

- Translocate salvaged thread-leaved brodiaea to CSS and VGL restoration and enhancement areas where feasible and appropriate. Potential restoration and enhancement areas include Chiquita Ridge, Chiquadora Ridge, upper Cristianitos Canyon, Ladera Ranch open space adjacent to the Arroyo Trabuco golf course, upper Gabino Canyon, and Blind Canyon. Receiver areas should support clay soils suitable for brodiaea and, as noted above, should be placed in locations that maximize connectivity and genetic exchange.

- Salvage clay topsoils from development areas where feasible and appropriate and transport to restoration areas. Salvaged topsoils may be used to create additional suitable brodiaea habitat.

4.2 Unlisted Planning Species

4.2.1 Cactus Wren

Campylorhynchus brunneicapillus couesi– Cactus Wren
USFWS: None
CDFG: California Special Concern Species[2]

a. Listing History and Taxonomic Status

The taxonomic status of the cactus wren and the significance of coastal southern California populations has been the subject of considerable debate in the recent past. Based on variations in plumage patterns and characters that are used to distinguish the subspecies of the cactus wren, Rea and Weaver (1990) proposed a distinct southern California/Baja California subspecies, the San Diego cactus wren (*C. b. sandiegensis*), that they argued was limited to southern Orange County, coastal San Diego County, and extreme northwestern Baja California, Mexico. This proposed subspecies was petitioned for federal listing as endangered on September 21, 1990. However, at that time this proposed subspecies was not accepted by the American Ornithologist Union (AOU) Committee on Nomenclature and Classification. Consequently the petition for listing of the "San Diego cactus wren" was no longer valid. Based on the AOU findings, the USFWS (Federal Register Vol. 59, 170, 9/2/94) made several determinations in their 1-year finding on the petition to list the Pacific coast population of the cactus wren that are particularly relevant for understanding the status of this species in southern California and establishing protection recommendations for this species for the Southern NCCP/HCP. The USFWS' findings regarding the cactus thus are cited here in detail.

pp. 45659-45660 – USFWS "announces a 1-year finding on a petition to add the Pacific coast population of the cactus wren (*C. couesi*) to the List of Endangered and Threatened Wildlife. . . . hereby transfers the petitioned entity from category 2 to category 3B of the Candidate Notice of Review. The Service concludes that the cactus wrens occupying coastal southern California do not constitute a distinct population segment."

p. 45660 – ". . . the Service concludes that the coastal population of cactus wren consists of Pacific coastal portions of *C. b couesi* and *C. b bryanti*."

[2] CDFG designated the *C.b. sandiegensis* (Orange & San Diego Counties only) as a California Special Concern species following the draft DFG Bird California Special Concern Species report. As discussed in this account, this subspecies is not accepted by the AOU as a valid taxon.

p. 45660 – ". . . it is currently evident that the cactus wrens residing in coastal sage scrub plant communities are not distinct from other wrens. Therefore, cactus wrens occupying coastal southern California do not constitute a distinct vertebrate population segment."

p. 45660 – ". . . it is apparent that the habitat preference of coastal birds (coastal sage scrub) does not readily separate them from other members of the subspecies."

p. 45660 – "The coastal sage scrub plant formation grades into coastal succulent scrub and eventually into Sonoran desert scrub. Although some gaps in the range of the species may exist, birds representing *C.b. bryanti* or *C.b. couesi*. . . likely occupy all of these 'scrub' plant communities or formations. Hence, because cactus wrens evidently occupy several plant communities and are not isolated in habitat, the Service concludes that providing protection pursuant to the Act for birds living in some (but not all) of these plant communities and habitats is inappropriate."

pp. 45660 – 45661 - "Furthermore, the cactus wrens occupying coastal southern California are not likely significant to the continued existence of a species that occurs in portions of southern California, southern Nevada, Arizona, New Mexico, Utah and Texas, in the United States, and mainland Mexico. The species is relatively common throughout much of its range. However, since the birds occupying coastal southern California are not distinct, the issue of significance need not be addressed."

p. 45661 – "This finding announced herein is not intended to discount the importance of the coastal sage scrub ecosystem in southern California, which is the subject of intense multi-species and ecosystem planning efforts. . . . Cactus wrens living in coastal southern California have declined in numbers and coastal sage scrub habitats are becoming increasingly depleted. Efforts to conserve these depleted habitats will be of benefit to cactus wrens residing in southern California."

b. Regional Status

The full species of cactus wren (*Campylorhynchus brunneicapillus***)** is a resident species ranging from southern California to southern Baja California, southern Nevada, southwestern Utah, western and central Arizona, southern New Mexico, and central Texas south to Mexico (Terres 1980). Eight subspecies of cactus wren currently are recognized, with the subspecies falling into roughly two groups, the *affinis* group (peninsular forms) and *brunneicapillus* group (continental forms) (Proudfoot et al. 2000). Within the *brunneicapillus* group, there has been considerable debate, as discussed above, about that taxonomy of the coastal Southern California populations of the cactus wren, which currently is named the *C. b. couesi*.

Historically, the coastal populations of the cactus wren were found continuously along the coastal slopes and lowlands of southern California in arid and semiarid regions with abundant cacti and directly connected to desert populations through the San Gorgonio Pass in the Banning/Beaumont and Cabazon areas. As early as 1944, however, biologists noted that loss of habitat had greatly reduced the historic range of this species (Grinnell and Miller 1944).

Solek and Szijj (1999) provide a comprehensive review and summary of the distribution of the cactus wren. Breeding populations of the cactus wren occur in Ventura, Los Angeles, Orange, San Bernardino, Riverside and San Diego counties. *Table 4-6* provides a range-wide summary of localities by county for the cactus wren (Solek and Szijj 1999).

TABLE 4-6
RANGEWIDE DISTRIBUTION OF THE CACTUS WREN
IN SOUTHERN CALIFORNIA

County	General Localities
Ventura	Camarillo, Moorpark, Newbury Park, Santa Rosa Valley, Simi Valley, Thousand Oaks
Los Angeles	Baldwin Hills, Claremont, Duarte, Glendora, Irwindale, La Puente, Laverne, Malibu, Palos Verdes, Pomona/San Dimas, Puente Hills, San Dimas, San Fernando Valley, San Jose Hills, Walnut, West Covina
Orange	Anaheim, Caspers Wilderness Park, Chino Hills, Crystal Cove State Park, Dana Point, East Orange, Costa Mesa, Fullerton, Irvine, La Mirada, Laguna Beach, Laguna Hills, Laguna Niguel, Lake Forest, Loma Ridge, Mission Viejo, Newport Beach, Placentia, Portola Hills, Rancho Mission Viejo, Rancho Santa Margarita, San Clemente, San Joaquin Hills, San Juan Capistrano, Starr Ranch, Tustin, Yorba Linda
San Bernardino	Chino Hills, Fontana, Loma Linda, Mentone, Rancho Cucamonga, Redlands, Rialto
Riverside	Aguanga, Beaumont, Cajalco, Calimesa, Corona, Lake Mathews, Lake Perris State Recreation Area, Moreno Valley, Morongo Indian Reservation, Riverside City, Sage, San Jacinto, Murrieta, Temescal Wash
San Diego	Bonsall, Camp Pendleton, Carlsbad, Chula Vista, Dennery Canyon, El Cajon, Encinitas, Escondido, Johnson Canyon, Lake Jennings, Lakeside, Lilac, Mission Hills, Mother Miguel Mountain, Otay Mesa, Otay Ranch, Paradise Hills, Pauma Valley, Poway, Proctor Valley, Rancho Santa Fe, San Pasqual Valley, Santee, Spring Canyon, Sunnyside, Sweetwater Reservoir

Range-wide estimates of the total cactus wren population are not available by county, but location counts within NCCP or multi-species conservation planning areas and on military lands in southern California are summarized in *Table 4-7*.

TABLE 4-7
CACTUS WREN SITES IN NCCP/MULTI-SPECIES
CONSERVATION PLANNING AREAS AND MILITARY LANDS

Planning Area	Number of Sites
Southern Orange County Subregion	1,410[1]
Central & Coast Orange County Subregion	994[2]
Shell HCP	45-55[3]
North San Diego County MHCP	24[4]
San Diego County MSCP	397[5]
MCB Camp Pendleton	278[6]
Western Riverside County MSHCP	100-110[7]

1 2002 Southern Subregion Cumulative Database
2 Central and Coastal Subregion NCCP/HCP, Table 1-ES, July 17, 1996
3 Shell HCP. Estimated number of sites conserved with restoration (W. Boyd, pers. comm. 2003)
4 MHCP Public Review Draft, Vol. II, pg. 4-319 (SANDAG 2000). Number of locations in the Focused Planning Area (FPA) and estimated to be 97 percent of locations in MHCP planning area.
5 San Diego Multiple Species Conservation Plan, Table 3-5, page 3-45, August 1996. This value represents the number of locations within the MSCP planning area. An estimated 268 locations are in the proposed reserve.
6 Estimated locations from 1993-1994 census conducted by Griffith Wildlife Biology.
7 Estimated number of pairs by McKernan (pers. comm., 1998), Western Riverside County Draft MSCHP, Vol. II, The MSHCP Reference Document, 2002, pg. B-90.

Table 4-8 shows the existing and proposed conservation status of the cactus wren and its habitat in the San Diego MSCP and MHCP, Central and Coastal NCCP/HCP and Western Riverside County MSHCP.

TABLE 4-8
CONSERVATION STATUS OF THE CACTUS WREN IN SOUTHERN CALIFORNIA

Conservation Planning Area	Number of Cactus Wren Locations and Percent Conserved	Potential Habitat Conserved
San Diego MSCP	397 locations, of which 68% conserved	47% of maritime succulent scrub
North San Diego County MHCP	24 locations, of which 97% conserved	95-100% conservation of major population in "critical" habitat location in San Pasqual Valley
Central/Coastal NCCP Reserve, Special Linkage and Existing Use Areas, Non-Reserve Open Space, and the Policy Plan Area	994 locations, of which 78% conserved.	Not analyzed
Shell HCP	45-55 sites conserved	60+ acres conservation of cactus scrub, including CSS restoration areas
Western Riverside MHSCP	34 "precision locations," of which 41% in public/quasi-public land and Criteria Area	77,070 acres of suitable habitat (55%) and 11 of 12 identified core areas.

The cactus wren is an obligate, non-migratory resident of the coastal sage scrub and chaparral plant communities that include substantial cover of cacti (*Opuntia* spp.). Coastal populations inhabit cactus scrubs typically occurring in a mosaic of coastal sage scrub and chaparral on mesas and lower slopes of the coast ranges at elevations up to 450 m (1,475 ft). In addition to cacti, characteristic shrubs in suitable habitat include California buckwheat, coastal sagebrush, several sages (*Saliva* spp.) and scattered shrubs approaching tree-size, such as laurel sumac and lemonadeberry. Thickets of this xeric vegetation may provide cover and thermal relief for wrens. The nest is also used as a roost site (Anderson and Anderson 1957).

Although most of the biological information collected for cactus wrens has not focused on the coastal subspecies (e.g., Anderson and Anderson's studies cited below were in Arizona), it is assumed that general life history information is applicable to the cactus wren.

Cactus wrens tend to forage on the ground or in low vegetation for insects and other small invertebrates, cactus fruits and other fruits, seeds and nectars. Fruits comprise 15-20 percent of the species' annual diet. Foraging is often regulated by heat stress (Ricklefs and Hainsworth 1968), requiring retreat from exposed sites into the shade of shrubs and tree.

The breeding season of the cactus wren extends from March into June, with two broods per season being common. The nest is usually built in cholla or other large, branching cacti, which also is used as a roost site. The nest is an intricate, woven cylinder, usually placed horizontally 1.2 to 1.5 m (4-5 ft) above the ground (Anderson and Anderson 1957). Clutch sizes typically are 4-5 eggs, with a range of 3-7 eggs (Harrison 1978). Nestlings fledge at 17-23 days, with an average of 21 days (Hensley 1959; Anderson and Anderson 1960). Young may return to roost in the nest after fledging. The young become independent at about one month after leaving the nest (Harrison 1978). There are limited data for dispersal, but birds appear to be highly sedentary and tend to return to the same territories each year (Solek and Szijj 1999). On the Palos Verdes Peninsula in Los Angeles County, for example, Atwood (1998) observed a mean dispersal distance of 1.6 km (1 mi) by juvenile cactus wrens from their natal territories. It should be noted, however, that the Palos Verdes population is a highly fragmented, isolated population and dispersal opportunities may be limited (Solek and Szijj 1999). Arizona data indicate that females disperse farther from natal territories than males (Anderson and Anderson 1973).

The home range of cactus wrens may be the same as the territory range. In Arizona, the average home range/territory is 1.9 ha (4.8 ac), varying from 1.2-2.8 ha (2.9-6.9 ac), and is maintained all year round (Anderson and Anderson 1963).

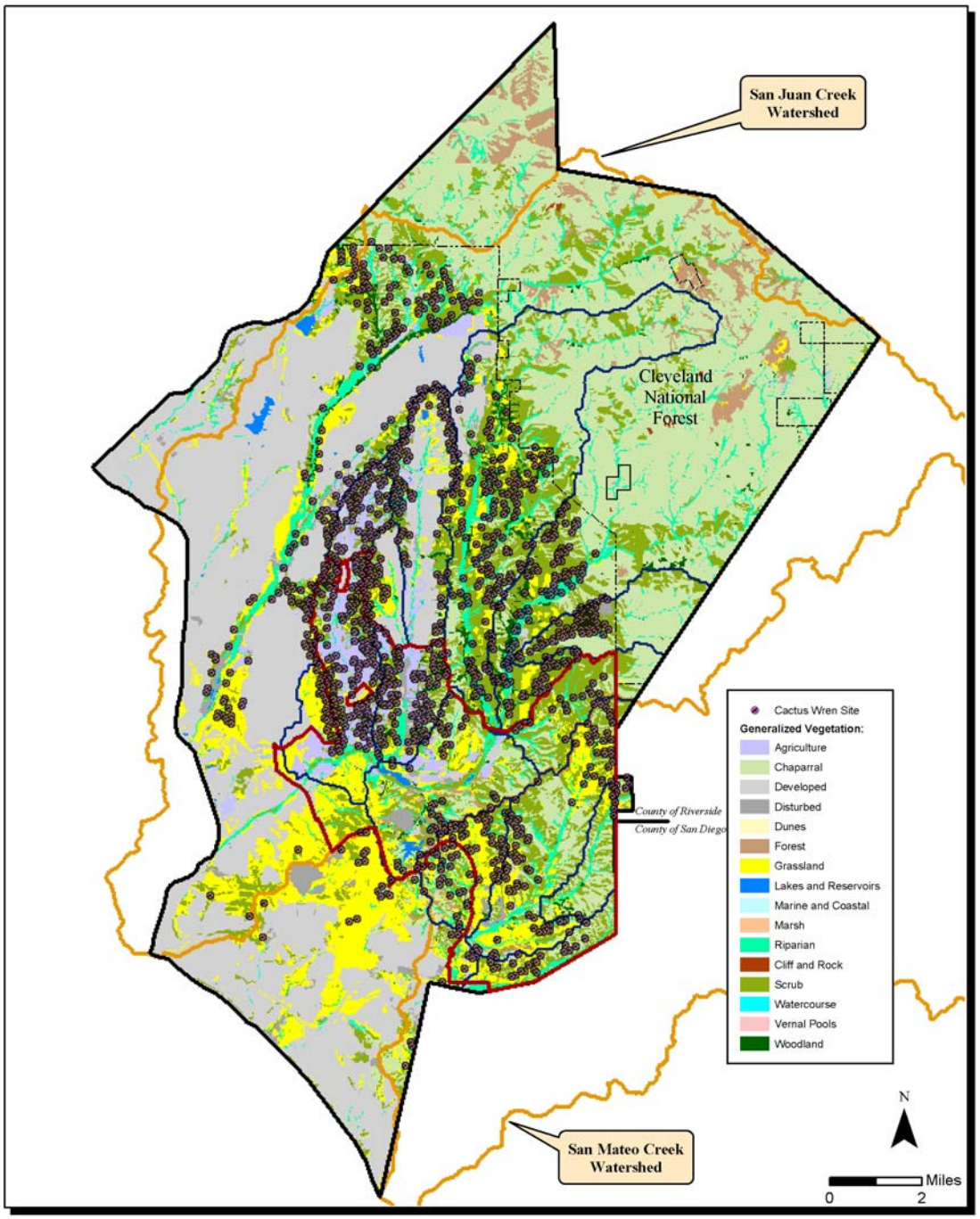
Threats to the cactus wren include habitat loss and fragmentation from urbanization and agricultural development. Domestic cats, roadrunners, snakes, and loggerhead shrikes prey on adults and nestlings (Anderson and Anderson 1973). Cactus wrens that are confined to isolated

patches of habitat in urbanizing areas are subject to increased levels of predation pressures as larger predators are replaced by greater population levels of smaller predators and domestic animals. This species is especially vulnerable to stochastic events, especially wildland fires. Because of its narrow habitat requirements, sedentary behavior, and low dispersal characteristics, cactus wren are subject to loss by fires and, if they disperse, may not find suitable habitat to survive. Intense fires may actually kill cactus plants and eliminate nesting habitat for the cactus wren (e.g., Bontrager et al.1995). Nests typically are placed in cactus at least 1 m above ground level. However, cactus patches within less intense burns that do not kill the cactus may be utilized soon after the burn (e.g., Harmsworth Associates 1997, 1998a, 2001). As a result of competition from invasive plant competition, grazing, weather patterns and other natural and human-influenced disturbances, the reestablishment of severely burned cactus patches essential to this species may take several years. An increasing pattern of habitat fragmentation and isolated populations also diminishes the dispersal ability and inter-population connections of the cactus wren, potentially reducing the overall genetic viability of the species.

c. Subregional Status

The cactus wren is widely distributed throughout the Southern NCCP/HCP planning area (*Figure 4-8*). Although population numbers are not available for the northern portions of the cactus wren's range (i.e., Ventura, Los Angeles and western San Bernardino counties), the Southern NCCP/HCP planning area clearly supports a substantial portion of the remaining cactus wren population; about 44 percent of the locations within Orange, Riverside and San Diego counties are in the Southern Subregion (*Table 4-7*).

Within the planning area the cactus wren is widely distributed in the San Juan and San Mateo watersheds with essentially continuous connectivity among occupied areas (*Figure 4-8*). Within the context of the coastal populations of the cactus wren, the population in the planning area constitutes a *major population*. Because of its widespread distribution in the planning area, however, it was not appropriate to identify specific portions of the population as *key locations* in the subregion. The population in the planning area is strategically located as a linkage between the San Diego County populations on Camp Pendleton and protected populations in the Central and Coastal Subregion Habitat Reserve. Substantial protection of this species in the planning area and maintaining connections both within the planning area and between the planning area population and protected locations in the Central and Coastal Subregion Habitat Reserve and populations located on Camp Pendleton will contribute to conservation of the species in the subregion.



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Cactus Wren Distribution Map

FIGURE 4-8

d. Protection Recommendations

- Protect at least 70 percent (about 987 mapped sites) of the cactus wren sites located throughout the planning area.

- Protect the major north-south connection to Central San Juan Creek for the cactus wren by providing a habitat linkage between Chiquita Creek and the eastern edge of the Ladera Open Space.

- Protect, to the extent feasible, patches of coastal sage scrub and southern cactus scrub in the San Mateo Watershed to maintain resident and dispersal habitat for the cactus wren between San Juan Creek and populations on Camp Pendleton.

- Maintain east-west biological connectivity for the cactus wren by protecting habitat linkages between Arroyo Trabuco, Chiquita Canyon, and Gobernadora Canyon. Biological connectivity should be maintained between Chiquita, Gobernadora and Arroyo Trabuco by protecting habitat linkages at a minimum of three locations within the sub-basin: **(1)** via rim-to-rim preservation of Sulphur Canyon (approximately 2,000 to 2,500 feet wide); **(2)** at the "Narrows" where the canyon is only 700-800 feet wide (approximately 3,000 feet south of Tesoro High School) and connects to Sulphur Canyon; and **(3)** in contiguous patches of coastal sage scrub through the major side canyon north and east of the wastewater treatment plant.

- Maintain a continuous upland habitat linkage along the east-facing slopes of Chiquadora Ridge Canyon between San Juan Creek and Sulphur Canyon for occupation and dispersal by the cactus wren.

- Provide floodplain and upland habitat linkages adjacent to San Juan Creek for east-west and north-south dispersal by the cactus wren between the San Juan Creek and San Mateo Creek watersheds.

- Maintain upland north-south habitat linkages through the central and western portions of the Trampas Canyon subunit to convey dispersal of the cactus wren between San Juan Creek, San Juan Capistrano, San Clemente, Cristianitos Canyon, the Donna O'Neill Land Conservancy at Rancho Mission Viejo and Camp Pendleton.

- Provide for cactus wren dispersal by maintaining a ridgeline east-west habitat linkage south of the artificial lake in the Trampas Canyon subunit to link Prima Deshecha, Talega Open Space and other habitat to the west in San Juan Capistrano and San Clemente with

the Donna O'Neill Land Conservancy and Gabino, La Paz and Talega canyons to the east.

- Protect a habitat linkage, consisting of the Donna O'Neill Land Conservancy and an area along the east side of Cristianitos Creek, to provide connectivity for cactus wrens in the upper portion of the sub-basin with other populations in lower Gabino Creek and Camp Pendleton along lower Cristianitos/San Mateo Creek, and to maintain habitat integrity through connectivity within the Donna O'Neill Land Conservancy at Rancho Mission Viejo.

e. Management Recommendations

- Pursuant to the Fire Management Plan, implement fire management to help protect patches of southern cactus scrub occupied by the cactus wren while protecting the public, property, and other resources, and, where appropriate reducing fuel loads for fire.

- Pursuant to the Grazing Management Plan, implement grazing management techniques to help protect patches of southern cactus scrub occupied by the cactus wren while allowing for continued cattle grazing sufficient to support cattle ranching operations, and, where appropriate reducing fuel loads for fire.

- Protect southern cactus scrub patches occupied by cactus wrens to the extent feasible from nest predation by non-native mesopredators (e.g., cats).

f. Restoration Recommendations

- Implement a CSS/VGL restoration program to enhance habitat connectivity and mitigate for impacts to existing habitat associated with future development. Identified restoration areas include Chiquita Ridge, Sulphur Canyon, Chiquadora Ridge and upper Gabino Canyon.

- Plant cacti, where appropriate, along the urban-Habitat Reserve edge to provide additional habitat for the cactus wren and to inhibit unauthorized intrusions into the Habitat Reserve by the public and domestic animals (cats and dogs).

4.2.2 Cooper's Hawk

Accipiter cooperii - Cooper's hawk
USFWS: None
CDFG: California Special Concern Species

a. Regional Status

The Cooper's hawk is a wide-ranging species in North America that breeds from British Columbia eastward to Nova Scotia and southward to northern Mexico and Florida (AOU 1998). Its nesting range includes southern British Columbia, northwestern Montana, Wyoming, eastern North Dakota, southern Manitoba, western Ontario, northern Michigan, southern Ontario, Southern Quebec, Maine, and Nova Scotia, south to Baja California, south-central Texas, Louisiana, central Mississippi, central Alabama, and central Florida (Terres 1980; Reynolds 1975).

Cooper's hawks winter from British Columbia eastward to New England and southward, primarily to Honduras (AOU 1998). Their wintering range includes Washington, Colorado, Nebraska, Iowa, southern Wisconsin, southern Minnesota, southern Michigan, southern Ontario, New York, southern Maine and Massachusetts, and south through the rest of the U.S. to Costa Rica (Terres 1980). Cooper's hawks are a large part of the great fall flights of hawks that pass over the U.S. in September, flying high and seemingly preferring to fly when the wind is from the northwest (Bent 1937).

Table 4-9 shows the distribution of the Cooper's hawk in California. For central and northern California counties the data are from the 2003 CNDDB and the more detailed information for Orange, San Diego and Riverside counties is from the conservation planning programs in those regions. As illustrated in *Table 4-9*, Cooper's hawks are widely distributed in California. The information in *Table 4-9* is intended to show the distribution in California in general and should not be interpreted as reflecting *major* or *important populations* or *key locations*. Cooper's hawks apparently may be found almost anywhere in suitable woodland habitats and a lack of information in a given area with habitat may be due to low survey effort. Also, interpretation of the occurrence data is complicated by the fact that many of the records may be for spring and fall migrating transients or a wintering population, and not just for the breeding population. However, locations in the Southern Subregion planning area are documented historic nest sites and do not include casual observations of migrants or winter visitors.

TABLE 4-9
DISTRIBUTION OF THE COOPER'S HAWK IN CALIFORNIA

County	General Location
Alameda County	Indian Joe Creek
Colusa County	Rail Canyon east of Bear Valley Road
Contra Costa County	South of Franklin Canyon Road
Fresno County	West of Baker Cutoff
Humboldt County	Maple Creek Road near Bear Creek
Imperial County	Northeast of Yuma, Bard, Potholes, Colorado River
Inyo County	Between Big Pine Creek and Baker Creek
Kern County	Walker Pass, South Fork Kern River at end of Lake Isabella

TABLE 4-9
DISTRIBUTION OF THE COOPER'S HAWK IN CALIFORNIA

County	General Location
Monterey County	Fort Hunter Liggett Military Reservation at intersection of Ruby Canyon and Old Man Canyon and Mission Creek north of Headquarters
Los Angeles County	Palmdale
Orange County Southern Subregion	Talega Canyon, Cristianitos Canyon, Gabino Canyon, La Paz Canyon, Verdugo Canyon, Blind Canyon, Chiquita Canyon, San Juan Creek, Bell Canyon, Wagon Wheel Canyon, Lower Cañada Gobernadora, Arroyo Trabuco, and Prima Deshecha
Orange County – Other Locations	Silverado Canyon
Placer County	Cedar Creek upstream of The Cedars
Riverside County MSHCP	Harford Springs County Park, Santa Rosa Plateau (Mesa de Colorado, Rancho Santa Rosa), Prado Basin-Santa Ana River, San Timoteo Canyon, Temescal Wash, Wasson Canyon, Slater Canyon, Temecula Creek, Murrieta Creek, Tucalota Creek, Vail Lake, Wilson Valley, San Bernardino and Cleveland National Forests, Box Springs Mountains, Mockingbird Canyon, Lake Mathews-Estelle Mountain, Gavilan Hills, Lake Perris-San Jacinto Wildlife Area-Mystic Lake, Quail Valley, Wildomar, Sage, Lake Skinner, Badlands, Bautista Creek, and Potrero Creek
Riverside County – Other Locations	Palm Canyon
San Bernardino County	Northeast of Granite Well, southwest of Hesperia, Victorville, Big Morongo Wildlife Sanctuary, Crystal Creek
Sacramento County	Goethe Park, White Rock Road, Mississippi Bar, Natomas East main drainage channel, Carmencita Road and Laguna Creek
San Diego County MSCP	Silverwood Wildlife Sanctuary, Sycamore Canyon, west Sycamore Canyon, on mesa north of McGinty Mountain, Loveland Reservoir, Sweetwater River, Lake Hodges, San Diego Wild Animal Park, Balboa Park, Dulzura Creek, San Ysidro Mountains.
San Diego County – MHCP	San Luis Rey River, Pilgrim Creek, San Marcos, Escondido
San Diego County – Other Locations	Scattered locations throughout western San Diego County and Borrego area, including Jacumba, Boucher Hill, Indian Canyon, Camp Pendleton, Santa Margarita River, San Diego River, Tijuana River
San Luis Obispo County	Baywood
Santa Barbara County	Botanic Garden, Upper Santa Ynez River
Santa Cruz County	East of Henry Cowell Redwoods State Park
Siskiyou County	Northwest slope of Bear Mountain
Tulare County	Eshom Creek
Ventura County	Santa Clara River east of Piru

Cooper's hawks hunt in broken woodland and habitat edges; it catches prey in the air, on the ground, and in vegetation, and sometimes runs prey down in dense thickets. It uses cover to hide, attack, and approach prey; it also soars and makes low, gliding search flights (Zeiner et al. 1990). Cooper's hawks primarily take avian prey, especially passerines. Peterson and Murphy (1992) found that avian prey made up 70 percent of the food items and 58 percent of the dietary biomass delivered to broods at two nests surrounded by a mixed grass prairie, with mammal prey making up the remainder. Cooper's hawks also prey on amphibians, reptiles and fish.

Cooper's hawks primarily breed in riparian areas and oak woodlands, and apparently are most common in montane canyons (Garrett and Dunn 1981; Hamilton and Willick 1996). They usually nest in second-growth conifer stands, or in deciduous riparian areas, usually near streams or open water (Zeiner et al. 1990). Throughout much of the west, the Cooper's hawk nests in stands of cottonwoods along stream courses, especially where the tree stands are fairly large (Call 1978). Denser stands of trees with moderate crown-depth are used for nesting. It appears that the vertical structure of the nest site tree is more important to the nest site selection than the horizontal structure (Wiggers and Kritz 1991). Nest trees tend to be taller and of greater diameter and have more canopy cover than the average tree in a given area; nest trees are often the largest tree in the nest site area (Bosakowski et al. 1992). Nests may be located on the horizontal limbs of a pine or hardwood, near the trunk or in the crotch of a hardwood tree species, usually 3-18 m (10-60 ft) above the ground (Harrison 1978). They also often nest just below the lowest live limbs (Zeiner et al. 1990). The nest is typically a platform of sticks and twigs lined with bark (Call 1978).

Cooper's hawks lay eggs from February through June, with clutch sizes of three to six eggs, but usually four or five eggs (Brown and Amadon 1968). The female primarily incubates the eggs for approximately 24 days (Terres 1980). Incubation usually begins after the third egg is laid, resulting in asynchronous hatching for later eggs. Young birds usually leave the nest at 30 to 34 days but continue to be brought food for up to seven weeks afterwards. Young may remain together near the nest for another five to six weeks (Rosenfield and Bielefeldt 1993).

Seasonal home ranges of Cooper's hawks have been estimated at about 784 ha (1,930 ac) with the daily home range averaging about 231 ha (570 ac) (Murphy et al. 1988). Cooper's hawks may require a minimum of 6 ha (15 ac) of relatively undisturbed woodland or riparian habitat for nesting (Call 1978). Nest sites of the Cooper's hawk within stands of oaks are located approximately 2.7 km (1.6 mi) apart and thus are distributed widely but sparsely within woodland habitat (Zeiner et al. 1990). Rosenfield et al. (1995) found a nesting density of 331 ha/pair (817 ac/pair) in a long-term study in rural Wisconsin. Studies of urban areas have reported a maximum density of 272 ha/pair (672 ac/pair) (Rosenfield et al. 1995). Cooper's hawks defend nesting territories of about 100 m (330 ft) around the nest.

The migratory patterns of the Cooper's hawk are complex. Although it is mostly a yearlong resident in California, some individuals from more northern areas migrate into California. Furthermore, within California, hawks may move downslope and south from areas of heavy snow and return to the general nesting area in the spring (Zeiner et al. 1990). As a result, fall and winter observations of Cooper's hawks may include local breeding residents, resident California hawks from higher elevations and migrant hawks from outside of California.

Some data are available on dispersal behavior. The mean distance from the natal site to the breeding site is 12 km (7.4 mi) for males and 14.4 km (8.9 mi) for females. Adult birds frequently reoccupy nesting areas and breeding site fidelity is assumed (Rosenfield and Bielefeldt 1993). The Cooper's hawk may reuse the same nest site for multiple years (Call 1978).

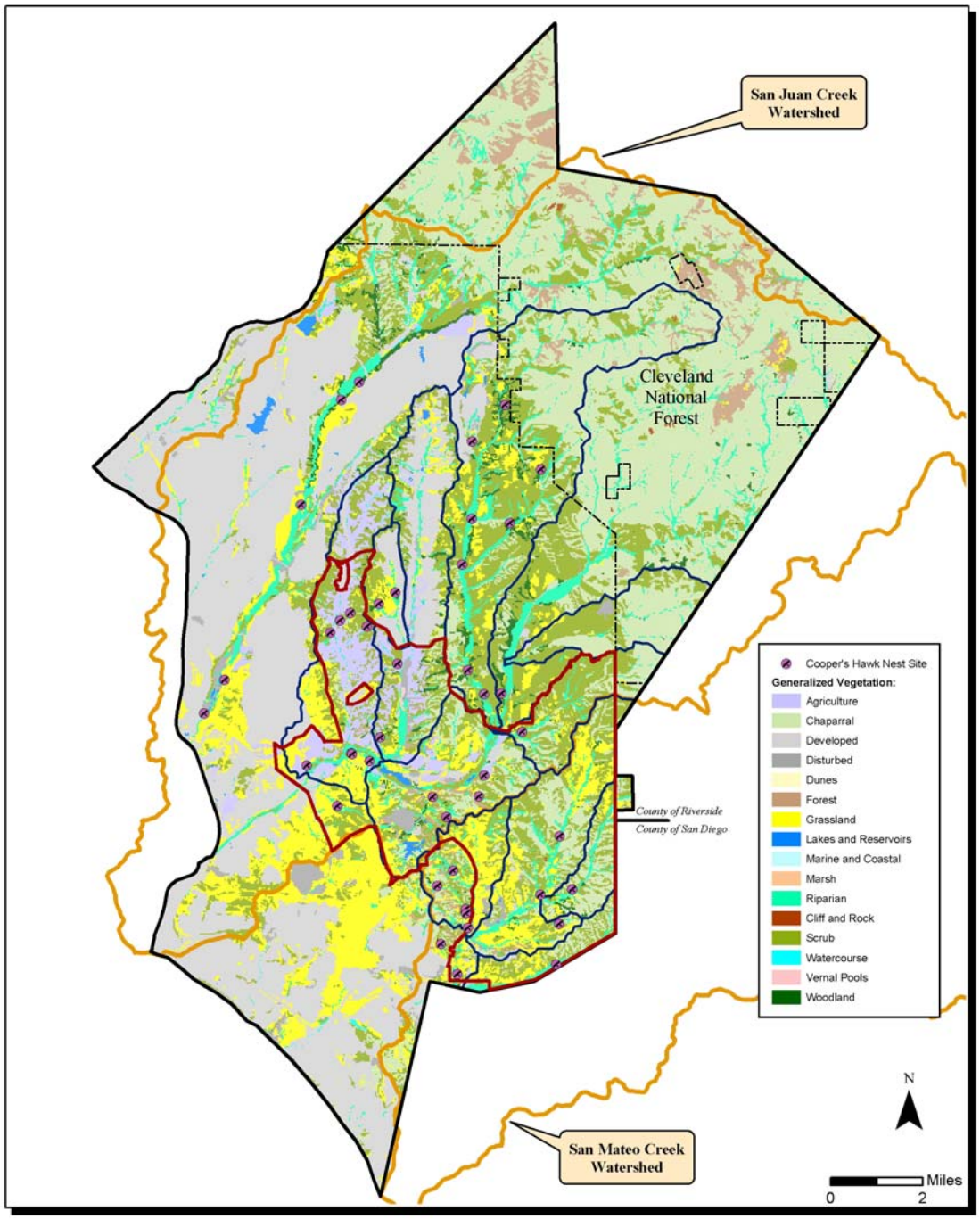
Although Cooper's hawks are relatively common in California, a decline in the population was noted by Remsen (1978). For example, approximately only 40 pairs were detected in Orange County during a breeding bird atlas survey effort (Gallagher 1996). A major decline that occurred in the 1970s during the nesting season probably was due to eggshell thinning resulting from pesticide exposure (Terres 1980; Henny and Wight 1972). However, habitat destruction, mainly in lowland riparian areas, due to urbanization and development is probably the main current threat, although direct or indirect human disturbance at nest sites may also be a factor (Remsen 1978; Boal and Mannan 1998).

Cooper's hawk appear to be somewhat tolerant of human activity in fairly urbanized areas and nest in suitable habitat within 30 m (100 ft) of residences, but their reproductive success in natural settings is substantially higher than in urban settings. Boal and Mannan (1999) recorded 50 percent nestling mortality in urban settings in southeastern Arizona compared to less than five percent in natural settings. Nestlings in urban settings primarily died from trichomoniasis (a parasitic protozoan that occurs in the digestive and urogenital tracts in many animals and humans) and adult hawks died from collisions, most often with windows.

Indirect effects on breeding success in urban settings also may have a behavioral component. The type of response and intensity of the Cooper's hawk aggressive response to human intrusion near a nest site varies among individuals and probably also varies with the stage of nesting. Many breeding birds respond to human activity by remaining inconspicuous, neither vocalizing nor behaving aggressively in the presence of humans, but some individuals may leave the immediate vicinity of the nest, possibly leading to failure of the nest (Rosenfield et al. 1995). However, distance thresholds at which hawks abandon nest sites has not been determined.

b. Subregional Status

The Cooper's hawk is still a relatively common breeding resident in riparian and woodland habitats in the Southern Subregion and occurs in most major drainages (*Figure 4-9* and *Table 4-9*). There are 44 historic nesting sites scattered throughout the planning area. While there are no apparent clusters of nesting sites, and no *major* or *important populations* or *key locations* are identified in the subregion, six drainages in the subregion account for 30 of the 44 (68 percent) of the historic nest sites: Chiquita Canyon (eight sites), Bell Canyon (eight sites), Central San Juan and Trampas Canyon (four sites), Cristianitos Canyon (five sites), and Arroyo Trabuco (five



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Cooper's Hawk Distribution Map

FIGURE 4-9

sites). These drainages support high quality riparian and woodland habitats that serve the Cooper's hawk as well as many other species, including several other raptors such as white-tailed kite, long-eared owl, red-shouldered hawk, red-tailed hawk, barn owl and great horned owl. Mapped locations of Cooper's hawk nests in the planning area occur most frequently in southern coast live oak riparian woodland, and also in coast live oak woodland and savanna, southern arroyo willow forest, southern sycamore riparian woodland, and mule fat scrub.

c. Protection Recommendations

Recognizing that no single or a few *key location(s)* can be identified for the Cooper's hawk, the Protection Recommendations listed below reflect the broad distribution of the species in the planning area.

- Protect breeding habitat and, to the extent feasible, foraging habitat for the Cooper's hawk along Chiquita Creek and substantial riparian and woodland habitat in tributaries to the creek.

- Protect the riparian habitat in GERA that provides nesting habitat for Cooper's hawk.

- Protect breeding habitat, and to the extent feasible, foraging habitat for the Cooper's hawk along San Juan Creek, Cristianitos Creek, and lower Gabino Creek.

- Protect Cooper's hawk nest sites in the middle Gabino Canyon subunit and the Verdugo, Talega and La Paz canyons sub-basins.

d. Management Recommendations

- Protect downstream habitat in GERA for Cooper's hawk.

- Implement a management program for protected Cooper's hawk nesting habitat, including the minimization of human disturbance within 30 m (100 ft) of nest sites during the breeding season.

4.2.3 Grasshopper Sparrow

Ammodramus savannarum - Grasshopper Sparrow
USFWS: None
CDFG: None

a. Regional Status

The grasshopper sparrow breeds from eastern Washington south to southern California and northernmost Mexico, and eastward to Virginia. The species has a disjunct distribution through the western portion of the United States and is not present within the mountainous and desert regions. It occurs in the areas east of the Rocky Mountains from Canada to the southern states as a breeding resident. It is a year round resident in the western states and in the southern portions of the southeastern states (Vickery 1996). Grasshopper sparrows winter from California to North Carolina, south through Middle America to Costa Rica (AOU 1998). In southern California, the species occurs locally in appropriate habitats west of the deserts and has nested at elevations up to 1,500 m (4,920 ft) in the San Jacinto Mountains in western Riverside County (Garrett and Dunn 1981). It is an uncommon and local summer resident and breeder in foothills and lowlands west of the Cascade-Sierra Nevada crest from Mendocino and Trinity counties south to San Diego County, as well as Lassen County and Siskiyou County (Zeiner et al. 1990).

Information for the distribution and breeding status of the grasshopper sparrow in southern California is poor. The grasshopper sparrow has been characterized as secretive in the winter and may occur more regularly than indicated by infrequent records (Grinnell and Miller 1944; McCaskie et al. 1979; Garrett and Dunn 1981). However, documented observations of this species in most areas primarily are anecdotal, and because the species has no state status, records generally are not available in the CNDDB – only two records from Mendocino County are in the 2003 CNDDB. General locations for the species in San Diego, western Riverside and Orange counties, based on conservation program databases and regional accounts (Hamilton and Willick 1996; Unitt 1984), are summarized in *Table 4-10*. The Southern Subregion database is relatively complete because of the extensive surveys conducted for the SOCTIIP. While there are 730 locations in the Southern Subregion database, there are only 13 locations for the San Diego MHCP, 91 locations for the San Diego MSCP, and 20 “precision” records (i.e., records with a specific x- and y-coordinate) for the Western Riverside County MSHCP. Because of the lack of comparable survey efforts, the disparity in the number of locations in the different conservation planning areas cannot be interpreted as southern Orange County supporting the vast majority of the grasshopper sparrow population in southern California.

Migration information for the grasshopper sparrow is scarce because the species is very secretive in the winter. It is thought to winter rarely, but regularly, in California, chiefly along the southern coast. It migrates from breeding grounds to weedy fields with scattered trees or abandoned crop fields dominated by grassy plant species. Summer residents arrive in March to May, and most migrate south in August or September.

TABLE 4-10
DISTRIBUTION OF GRASSHOPPER SPARROW IN SELECTED
CONSERVATION PLANNING AREAS IN SOUTHERN CALIFORNIA

Area	Specific Locations
San Diego MSCP	Otay River Valley, Sweetwater Reservoir, Rancho San Miguel to Proctor Valley, Penasquitos Canyon-Carmel Mountain, Santa Fe Valley, north of Black Mountain
San Diego MHCP	Buena Vista Lagoon, north Carlsbad, north and south San Marcos, south and east Encinitas, south Escondido
San Diego – Other Locations (Unitt 1984)	Lake Henshaw, Warner Springs, Dyche Valley-Palomar Mountain
Western Riverside County MSHCP	Prado Basin, Santa Rosa Plateau, Kabian Park, Lake Mathews-Estelle Mountain, Wasson Canyon-Lake Elsinore, Murrieta, Temecula Mystic Lake-San Jacinto Wildlife Area-Lake Perris
Orange County Southern Subregion	Chiquita Canyon, Chiquadora Ridge, Gobernadora, Radio Tower Road area, Cristianitos Canyon, lower Gabino and Blind Canyons
Orange County – Other Locations	San Joaquin Hills, Mile Square Regional Park, Upper Newport Bay, Huntington Central Park

During the breeding season in California, grasshopper sparrows occur on mesas and slopes in dense, dry or well-drained grasslands, especially native grassland with a mix of grasses and forbs for foraging and nesting (Grinnell and Miller 1944; Garrett and Dunn 1981. Apparently, thick cover of grasses and forbs is essential for concealment. They require fairly continuous native grassland areas with occasional taller stems for breeding areas (Garrett and Dunn 1981). They especially occur in grasslands composed of a variety of grasses and tall forbs with scattered shrubs for singing perches (Zeiner et al. 1990). Grasshopper sparrows use a variety of forb species for perches and choose them predominantly on the basis of their height rather than the specific plant species (Payne et al. 1998). Although shrub and forb species are used for perching, they tend to avoid grassland areas with extensive shrub cover and the presence of native grasses is less important than the absence of trees (Smith 1963; Vickery 1996). Grasshopper sparrows typically forage on the ground and in low foliage for insects (especially Orthoptera), other invertebrates, and grass and forbs seeds, with grass seeds a large percentage of winter diet. Because the species is a visual predator, bare ground is important for foraging.

Grasshopper sparrows build distinctive ground nests that are well concealed. They are constructed of grasses and forbs in a slight depression in the ground or hidden at the base of an overhanging clump of grasses or forbs. Nests usually are domed or concealed with overhanging grasses and accessed from a side entrance (Bent 1968; Zeiner et al. 1990; Vickery 1996).

Territory sizes outside of California vary from 0.3 to 1.7 ha (0.8 to 4.3 ac), but no data are available for California nesting populations.

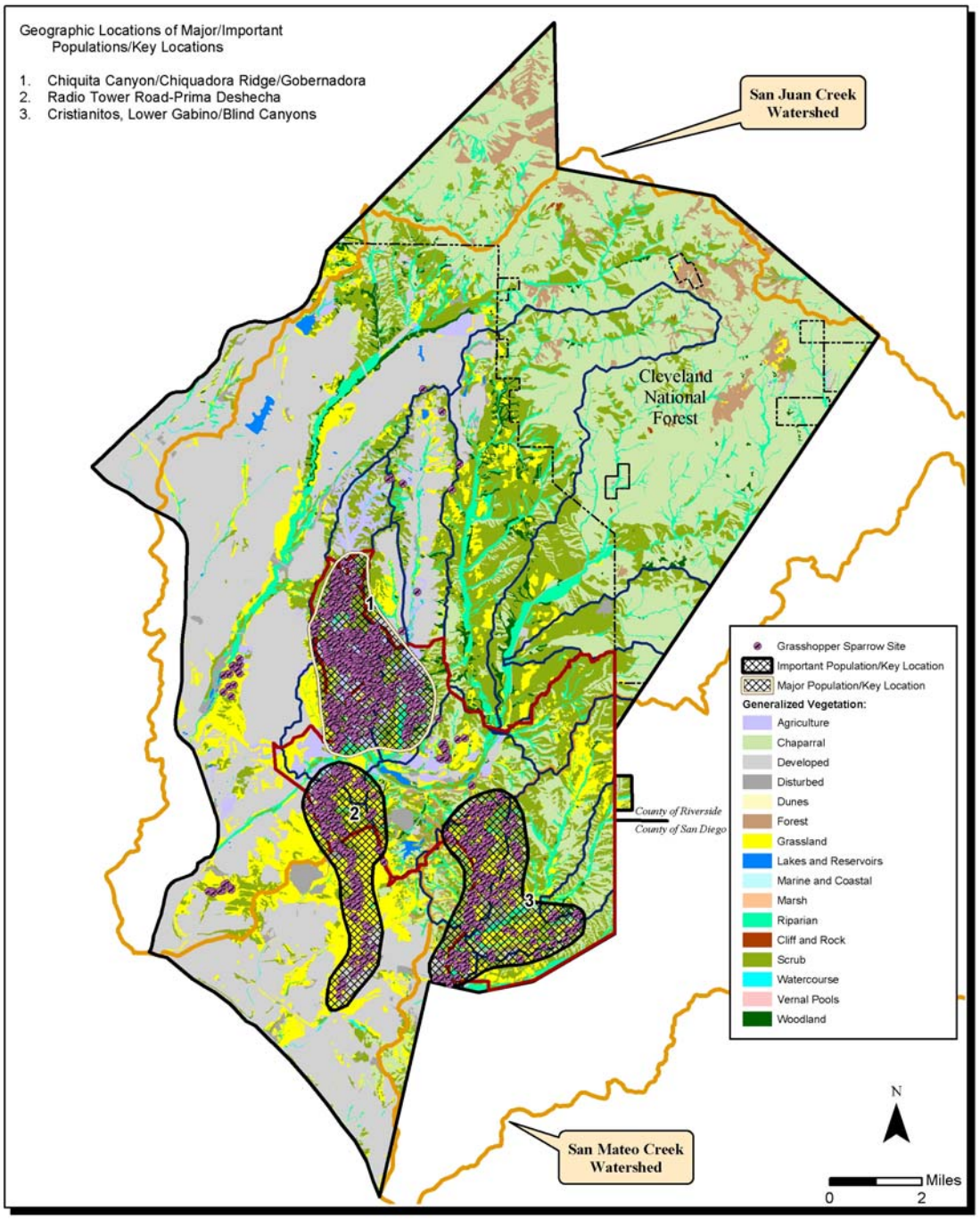
Grasshopper sparrows breed from early April to mid-July, with a peak in May and June. Clutch sizes usually are four or five eggs, but sometimes three or six. They may raise two or three broods per year, but additional clutches usually are smaller (Vickery 1996). The female incubates the eggs for approximately 11-12 days and then tends the young, which leave the nest at about nine days, although they are still unable to fly at this point (Harrison 1978). The male's role includes responding to predators near the nest and providing food for the young. Adult and juvenile non-parental attendants also are known to feed the young, and may make up to half the provisioning visits to the nests (Vickery 1996). The young of the first brood have usually dispersed from the natal territories when the adults are feeding the nestlings of the second brood (Vickery 1996). One study showed that predation was a major cause of nest failure (Perkins et al. 1998). Predation rates also appear to be highest for nests placed in grassland areas less than about 15 ha (37 ac) and for areas adjacent to wooded areas (Burger et al. 1994).

Human-related threats to the species apparently include habitat loss, degradation, and fragmentation. Extensive and intensive grazing in western North America has had a negative impact on this species (Vickery 1996). Garrett and Dunn (1981) concluded that the grasshopper sparrow has declined as a breeder in recent decades due to the development of open hilly areas that make up the grasshopper sparrow's preferred habitat. Brown-headed cowbird parasitism does occur but is generally considered low (Vickery 1996).

b. Subregional Status

The Southern Subregion planning area includes about 730 documented occurrences for the grasshopper sparrow. It should be noted that these observations are not documented nest sites and do not distinguish breeding pairs and single individuals, but they do reflect concentrations of habitat use in the planning area by the species. The planning area appears to support one *major population* and two *important populations* of the grasshopper sparrow that account for more than 90 percent of the locations in the subregion. Because these three populations account for more than 90 percent of the locations, all three are considered *key locations*.

- Middle and lower Chiquita Canyon (i.e., south of Oso Parkway), Chiquadora Ridge and Gobernadora support approximately 380 locations (No. 1 on *Figure 4-10*). These areas comprise a single *major population* because the farthest distance between any two locations is about 1,000 feet. This *major population* is also considered a *key location* because it supports approximately 52 percent of the total grasshopper sparrow locations in the planning area.



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Grasshopper Sparrow Distribution Map

FIGURE 4-10

Grasslands in the Radio Tower Road area and extending south through the grasslands of Prima Deshecha to Avenida Pico support approximately 150 locations (No. 2 on *Figure 4-10*). These locations comprise an *important population* in a *key location.*

- The grasslands within Cristianitos Canyon and lower Gabino and Blind canyons support approximately 148 locations (No. 3 on *Figure 4-10*). These locations comprise an *important population* in a *key location*.

c. Protection Recommendations

- Protect at least 60 percent of the mapped grasshopper sparrow locations of the *major population* in a *key location* in the Chiquita and Gobernadora sub-basins.

- Protect at least 60 percent of the mapped grasshopper sparrow locations of the *important population* in a *key location* in the Cristianitos and Gabino and Blind Canyons sub-basins, and extending into the unnamed sub-basin south of the Cristianitos sub-basin.

- Protect at least 90 percent of the mapped grasshopper sparrow locations of the *important population* in a *key location* along Radio Tower Road on RMV property.

- Protect the majority of native grasslands and annual grasslands to the extent feasible supporting the *important population* in a *key location* in the southern Trampas Canyon and Cristianitos sub-basins. Minimize impacts to native grasslands elsewhere in the planning area.

d. Management Recommendations

- Implement a cowbird trapping program to mitigate for impacts to existing habitat within the Chiquita and Gobernadora sub-basins and for potential impacts associated with future development. The cowbird trapping program will be evaluated on an annual basis and trap locations and trapping effort will be adjusted as part of the overall Adaptive Management Program (e.g., if the number of trapped cowbirds drops to a prescribed threshold, the trapping program may be terminated or otherwise modified).

- Pursuant to the Grazing Management Plan, implement grazing management techniques to help protect the grasshopper sparrow and its habitat, promote perennial grasses including native grasses, allow for continued cattle grazing sufficient to support cattle ranching operations, and, where appropriate reduce fuel loads for fire. Note, under the Grazing Management Plan, it is likely that grasslands in upper Gabino Canyon will provide additional suitable habitat for the grasshopper sparrow.

- Pursuant to the Fire Management Plan, implement prescribed burning techniques to promote native perennial grasses.

e. Restoration Recommendations

- Implement a CSS/VGL restoration program to enhance habitat carrying capacity and connectivity. Restoration areas that would benefit the grasshopper sparrow include Chiquita Ridge, Sulphur Canyon, Chiquadora Ridge, upper Cristianitos and upper Gabino Canyon.

4.2.4 Merlin

Falco columbarius - Merlin
USFWS: None
CDFG: California Special Concern Species

a. Regional Status

The merlin's summer breeding range includes the interior or western North America from Alaska, through most of Canada, eastward to Newfoundland southward to Washington and Maine. It winters in southern California, northern Mexico and southern Texas. Within California merlins are an uncommon winter migrant from September to May. They occur in most of the western half of the state below about 1,500 m (3,900 ft) (Zeiner et al. 1990). It is a rare winter migrant in the Mojave Desert and a few records are from the Channel Islands (Zeiner et al. 1990). Merlin numbers have declined markedly in California in recent decades.

The CNDDB does not contain any occurrence records for the merlin. In San Diego County, Unitt (1984) characterizes the merlin as a rare winter visitor that is usually seen around agricultural areas, grasslands or mudflats, where they prey on shorebirds. In San Diego they are mostly seen along the coastal slope and only once, for example, in the Anza Borrego Desert at Agua Caliente Springs.

In western Riverside County, merlins also occur locally as very rare winter visitors in suitable habitat. It is more frequently observed within western Riverside County as a spring and fall migrant/transient, but even then it is infrequently observed and there are few records for the area. The merlin has been observed in western Riverside County in and around the Mystic Lake-San Jacinto Wildlife Area, the Jurupa Hills, Prado Basin-Santa Ana River, the Lakeview Mountains, Diamond Valley Reservoir, Wilson Valley, and Skunk Hollow (Dudek 2002).

In Orange County records for the species also are sparse, with observations at Dana Point, Bolsa Chica, San Juan Capistrano, Irvine, Peter's Canyon, Silverado Canyon and Yorba Regional Park (Hamilton and Willick 1996). Bloom and Bontrager have observed the merlin on RMV land on several occasions, as described below.

Merlins use a wide variety of habitats for breeding and foraging. Range-wide, merlins breed in open country (e.g., open coniferous woodland, prairie) and winter in open woodlands, grasslands, cultivated fields, marshes, estuaries and sea coasts (AOU 1998). Within southern California, birds are often found in these same habitats and are rarely found in heavily wooded areas or over open deserts (Garrett and Dunn 1981). Merlins frequent coastlines, open grasslands, savannas, woodlands, lakes, wetlands, edges, and early successional stages where they forage while flying at low levels primarily for avian prey species (Zeiner et al. 1990). Most studies report a specialization on one or two locally abundant species of small birds. A given principal prey species in an area usually is one of the most abundant species in the area; often forages away from cover making it more vulnerable to predation; and weighs in the range of 20 to 40 g (Sodhi and Oliphant 1993). Dense tree stands may be used for cover and frequently are close to bodies of water. They may nest in small groves of deciduous trees adjacent to open areas for foraging. They frequently occur in areas with undulating topography (Sodhi et al. 1993).

The merlin breeds in Alaska and Canada and is not a breeding resident in California. It may use abandoned stick nests of crows or magpies, usually in conifers but also in deciduous trees. Occasionally it nests in cavities, on cliffs, in deserted buildings, on the ground, or in old nests of other birds (Craighead and Craighead 1956; Brown and Amadon 1968). The clutch of four to five eggs is laid from late May into June. It incubates 28-32 days, and chicks fledge at about 24 days (Trimble 1972).

The decline of merlins in California may partially be the result of the conversion of suitable open foraging habitats, and also possibly due to environmental contaminants that have affected their prey base (Remsen 1978). Most nesting merlin populations are no longer affected by pesticide contamination and appear to be reproducing well. However, the loss of suitable habitat within important nesting site areas also may be the major factor affecting merlin numbers (Cade 1982).

b. Subregional Status

Although mapped merlin locations are not in the NCCP database, they are known to occur in Chiquita Canyon and Cañada Gobernadora. Bontrager reported three sightings on RMV in February-March 1990 (Bontrager 1990). Two merlins were observed during SOCTIIP surveys in 1995 north of Ortega Highway (MBA 1996); one in Chiquita Canyon south of Oso Parkway and the other on the ridge between Chiquita Canyon and Cañada Gobernadora. Bloom indicated

that merlins are particularly apt to occur in lower Chiquita Canyon within approximately 275 m (900 ft) of the creek (*Figure 4-11*). Merlins also may be expected to forage in grasslands in Cristianitos Canyon, along Radio Tower Road, and in upper Gabino Canyon. Because this species is rare and not a resident breeding species, *major* and *important populations* are not identified. However, based on Bloom's assessment (Bloom, pers. comm.. 1998), Chiquita Canyon is considered a *key foraging location* for the merlin in the subregion (*Figure 4-11*).

c. Protection Recommendations

- Protect grassland foraging habitat to the extent feasible in the Chiquita Canyon, Cristianitos Canyon and upper Gabino Canyon sub-basins.

- Protect the major north-south connection to Central San Juan Creek by providing a habitat linkage between Chiquita Creek and the eastern edge of Ladera Open Space in order to maintain habitat integrity between the creek and the ridge.

- Protect grasslands south of San Juan Creek and Ortega Highway along Radio Tower Road to the RMV boundary with Prima Deshecha Landfill.

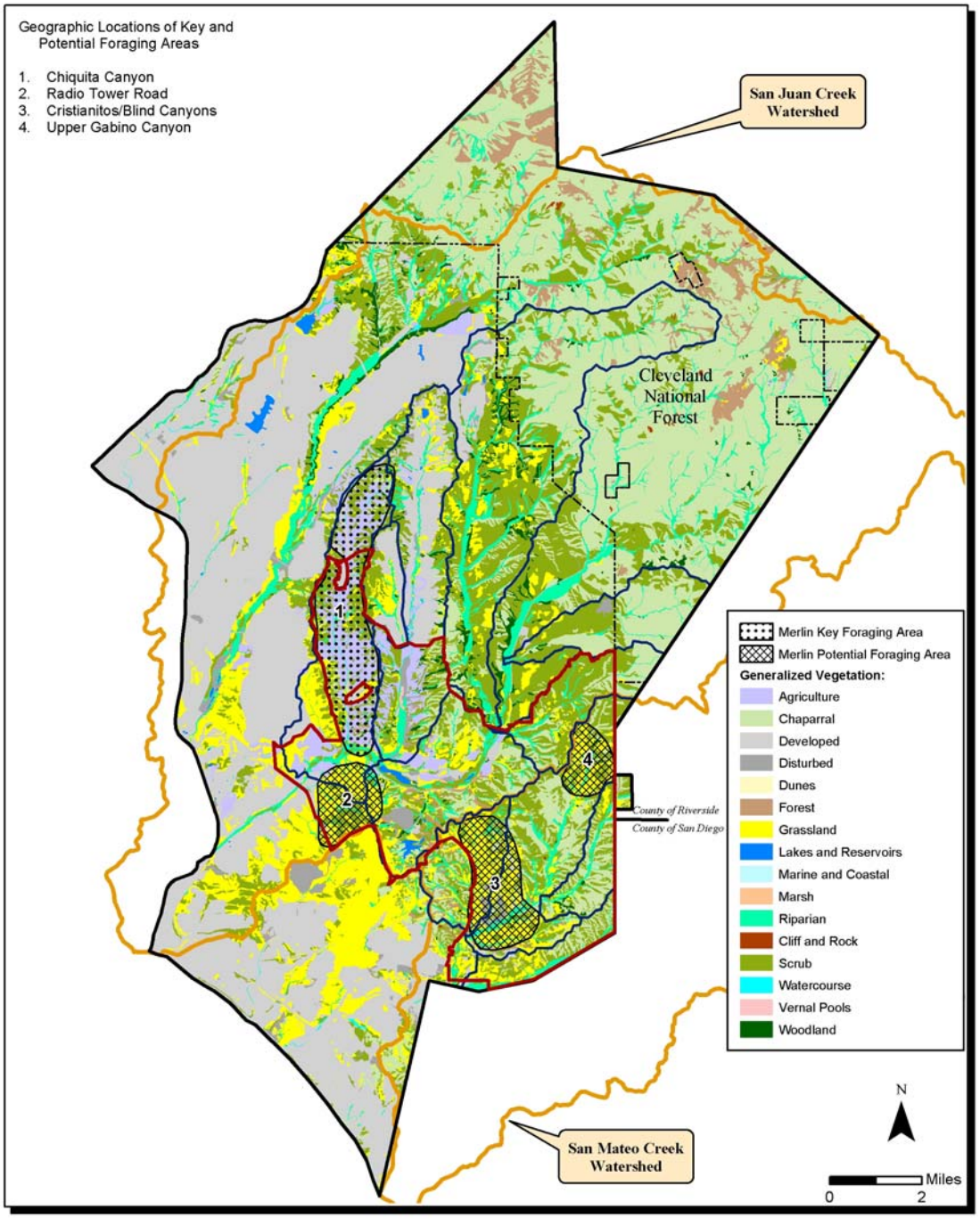
d. Management Recommendations

- Pursuant to the Grazing Management Plan, implement grazing management techniques to help protect foraging habitat for the merlin, promote perennial grasses including native grasses, allow for continued cattle grazing sufficient to support cattle ranching operations, and, where appropriate reduce fuel loads for fire.

- Pursuant to the Fire Management Plan, implement prescribed burning techniques to promote native perennial grasses.

e. Restoration Recommendations

- Implement a CSS/VGL restoration program to enhance foraging habitat value. Restoration areas that would benefit the merlin include Chiquita Ridge, Sulphur Canyon, Chiquadora Ridge, upper Cristianitos and upper Gabino Canyon.



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Merlin Key and Potential Foraging Habitat Map

FIGURE 4-11

4.2.5 Tricolored Blackbird

Agelaius tricolor - Tricolored Blackbird
USFWS: Birds of Conservation Concern
CDFG: California Special Concern Species

a. Regional Status

The tricolored blackbird has a relatively restricted breeding range that extends from southern Oregon and the Modoc Plateau of northeastern California, south through the lowlands of California west of the Sierra Nevada to northwestern Baja California (Grinnell and Miller 1944). It is estimated that 95 percent of the tricolored blackbird population is in California. The species is not migratory, but is nomadic and highly colonial, although the pattern of nomadism is poorly known (Orians 1961). Exhibiting a behavior called "itinerant breeding" (Collier 1968; Orians 1961), large flocks may appear suddenly in areas from which they have been absent for months, breed, and then quickly leave.

The tricolored blackbird is mostly a resident in California and locally common throughout the Central Valley and in coastal areas from Sonoma County south (Zeiner et al. 1990). Since 1980, active breeding colonies have been observed in 26 California counties and most of the largest colonies are in the Central Valley (Beedy and Hamilton 1999). It breeds locally west of the Cascade Range, Sierra Nevada, and southeastern deserts from Humboldt and Shasta counties south to extreme southwest San Bernardino County, western Riverside County and western and southern San Diego County. In Central California, its breeding range extends east into the foothills of the Sierra Nevada (Beedy and Hamilton 1999). It is a summer resident in northeastern California, occurring regularly only at Tule Lake, but has bred some years as far south as Honey Lake and in the marshes of the Klamath Basin in Siskiyou and Modoc counties (Zeiner et al. 1990). In the southern deserts, it is found regularly only in Antelope Valley, Los Angeles County. In winter, it becomes more widespread along the central coast and San Francisco Bay area (Grinnell and Miller 1944; McCaskie et al. 1979; Garrett and Dunn 1981).

The 2003 CNDDB contains 347 records for the tricolored blackbird, of which 211 are recent and 136 are historical. Of these records, 275 of the sites are considered extant, 58 possibly extirpated and 14 extirpated. The CNDDB suppresses the specific locations for the species because of its sensitivity.

The Point Reyes Bird Observatory coordinated a statewide survey for the tricolored blackbird in 2001 (Humple and Churchwell 2002). A total of 142,000 birds was observed at colony sites. This compared to 162,000 in 2000, 240,000 in 1997 and 370,000 in 1994, indicating a continued decline in the species. The ten largest colonies are located in the Central Valley in Merced,

Tulare, Fresno, Colusa, and Kern counties and range in size from 5,000 to 30,000 birds and account for 118,000 (83 percent) of the birds observed in 2001 (Humple and Churchwell 2002). Of the 10 largest colonies, seven are on private lands and three are on public lands (Humple and Churchwell 2002). It is important to note that prior to 1992 at least two breeding colonies numbered 120,000 (Laguna Seca) and 150,000 (Grey Hill Duck Club).

Some general locational information for the tricolored blackbird in coastal southern California is available through the various conservation planning programs and is summarized in *Table 4-11*.

TABLE 4-11
DISTRIBUTION OF THE TRICOLORED BLACKBIRD IN SELECTED CONSERVATION PLANNING AREAS IN SOUTHERN CALIFORNIA

Area	Specific Locations
San Diego MSCP	Mother Miguel Mountain, Otay River Valley, Lindo Lakes, Sweetwater Reservoir, Tijuana River Valley, San Diego River, miscellaneous small populations in other drainages
San Diego MHCP	San Luis Rey River, Pilgrim Creek, Buena Vista Lagoon, Batiquitos Lagoon, San Elijo Lagoon, Kit Carson Park
Western Riverside MSHCP	Santa Ana River, Lake Mathews, Lake Elsinore, Alberhill, Lake Murrieta, Vail Lake, Wilson Creek, Lake Riverside, Hemet Lake, San Jacinto Sewage Ponds, San Jacinto, Lakeview, Mystic Lake, San Jacinto Wildlife Area, March Air Reserve Base, Sycamore Canyon Regional Park, the Badlands, San Timoteo Creek
Orange County Southern Subregion	Chiquita Canyon north and south of the "Narrows," lower Canada Gobernadora, grassland south of Ortega Highway, CalMat in San Juan Creek, Trampas Canyon, Riverside Cement north of Gabino Canyon, mouth of Verdugo Canyon
Orange County – Other Locations	San Diego Creek, Peters Canyon Regional Park; localized nesting colonies in Carr Park, Huntington Beach and Tewinkle Park, Costa Mesa

Although the tricolored blackbird is not migratory over most of its range, it leaves Oregon, northeastern California, Santa Barbara County and eastern San Diego County in fall and winter, presumably migrating south (Zeiner et al. 1990; Beedy and Hamilton 1999). Flocks of the species become nomadic in fall, seeking food (Zeiner et al. 1990). In winter, flocks become more widespread from Marin to Santa Cruz counties and in the Sacramento River Delta (Zeiner et al. 1990).

The tricolored blackbird forms the largest breeding colonies of any North American passerine bird that relies on specific habitat requirements (e.g., up to 150,000 as noted above). Large

breeding colonies require nearby water, suitable nesting substrates, and open-range foraging habitat composed of grassland, woodland, or agricultural cropland. In winter, they often form single-species, and sometimes single-sex, flocks, but they also flock with other blackbird species. As a nomadic or "itinerant" breeding species, they often change their nesting locations from year to year. These changes may be an adaptation to exploit rapidly changing environments in ephemeral habitats, provide secure nesting sites, and provide plentiful insect food supplies (Beedy and Hamilton 1999).

While the tricolored blackbird is frequently an itinerant and opportunistic breeder, it generally is associated with wetland habitat and prefers emergent vegetation and protected habitats near wetlands for nesting. Its preferred, or primary, habitat includes freshwater marsh and cismontane alkali marsh. It may use a wide variety of habitats, including flooded agriculture lands, pastures, and grasslands in a very nomadic and unpredictable manner for foraging (Garrett and Dunn 1981). The tricolored blackbird also has been documented to use riparian forest habitats occasionally for nesting.

Primary breeding habitats of the tricolored blackbird include freshwater marsh and cismontane alkali marsh, preferably in emergent wetland with tall, dense cattails or tules, but also in thickets of willow, blackberry, wild rose, tall herbs and forages in grassland and cropland habitats (Ziener et al. 1990). The species seeks cover for roosting in emergent wetland vegetation, especially cattails and tules, and also in trees and shrubs (Zeiner et al. 1990). Although true marsh habitat with its growth of cattails and tules is favored, marshes are not necessary for the nesting of the species and it may nest in other protective vegetation, including shrubs (Neff 1937). Within the Central Valley, colonies generally are found in the rice lands of the Sacramento Valley and pasture lands of the lower Sacramento Valley and San Joaquin Valley. Colonies outside the Central Valley may occur in several different habitat types, including areas surrounded by chaparral-covered hills extending for miles, orchards, or sagebrush-grasslands adjacent to salt marsh (DeHaven et al. 1975).

An important finding for the management of this species is that it appears to respond very well to habitat manipulation. Humple and Churchwell (2002) report that a man-made bulrush wetland at the San Jacinto sewage treatment ponds in Riverside County immediately attracted a breeding colony of tricolored blackbirds in 1993 and was the largest colony (35,000 birds) in southern California in 1994. It also is important to note that these ponds are bordered by large alfalfa fields and pasture that provide substantial foraging habitat.

Nest sites usually are located a few feet over, or near, fresh water, but also may be hidden on the ground among low vegetation. The tricolored blackbird builds its nest of mud and plant materials (Zeiner et al. 1990). Because it is a highly colonial species, the nesting area must be large enough to support a minimum colony of about 50 pairs (Grinnell and Miller 1944). The

breeding territory, which includes only the vicinity of nest, is usually about 3.3 sq m (11 sq ft), or less, in dense vegetation, but may be larger in less suitable cover (Orians 1961). The usual breeding season is mid-April into late July (Payne 1969). Orians (1960) also reported active breeding in October and November in Sacramento Valley, although nesting success was low. Individual pairs in breeding colonies may initiate nesting synchronously. Even in colonies of up to 50,000 to 100,000 nests, all first eggs may be laid within one week (Orians 1961). The species is polygynous; each male may have several mates nesting in his small territory (Orians 1961). As described above, the tricolored blackbird is an "itinerant breeder." An example of this breeding strategy is a study in which in April all observed tricolored blackbirds were in the vicinity of one breeding colony, but in May and June populations declined in this area and increased in another as breeding birds moved to the new breeding area (Hamilton 1998).

Clutch size is typically three or four eggs, with clutches of two or five eggs observed occasionally (Emlen 1941). The first egg is usually laid the day after the nest is completed and even occasionally before completion. One egg is then laid per day for one to five days (Emlen 1941). The species may raise two broods per year (Terres 1980), which is consistent with the "itinerant breeding" behavior described above. Incubation lasts about 11 days and the young are tended by the female or by both parents (Lack and Emlen 1939). The young leave the nest at about 13 days (Zeiner et al. 1990). The species probably first breeds at one year (Harrison 1978).

Although percent nesting success and survival of young has not been determined in detail, the tricolored blackbird has been documented to suffer widespread nest failure. Frequently the entire colony abandons nests with eggs or nestlings (Orians 1961), often with no obvious destruction or predation of eggs (Lack and Emlen 1939). The abandonment leads to a departure of the entire colony, sometimes to an unknown area of unknown distance (Lack and Emlen 1939). Abandonment may occur for several reasons: a change in the food supply in the area due to drought; poor timing of nesting; or disturbance from harvest activities within the nesting area (Orians 1961).

Dispersal behavior of blackbirds is complex. While colonies have relatively high site fidelity (i.e., breeding colonies regularly return to the same breeding site), individual birds show relatively low fidelity to their natal areas. For example, a study of banded fledglings showed that only 39 percent returned to areas with 16 km (10 mi) of their natal colony (DeHaven et al. 1975).

Available foraging habitat within a few kilometers of the nesting area is a basic requirement of the species. Nests may be located up to 6.4 km (4 mi) from foraging areas (Orians 1961). The tricolored blackbird forages on the ground in crop lands, grassy fields, flooded land, irrigated pastures, lightly grazed rangelands, dry seasonal pools, mowed alfalfa fields, feedlots, dairies, and along edges of ponds (Zeiner et al. 1990; Beedy and Hamilton 1999). The diet of the

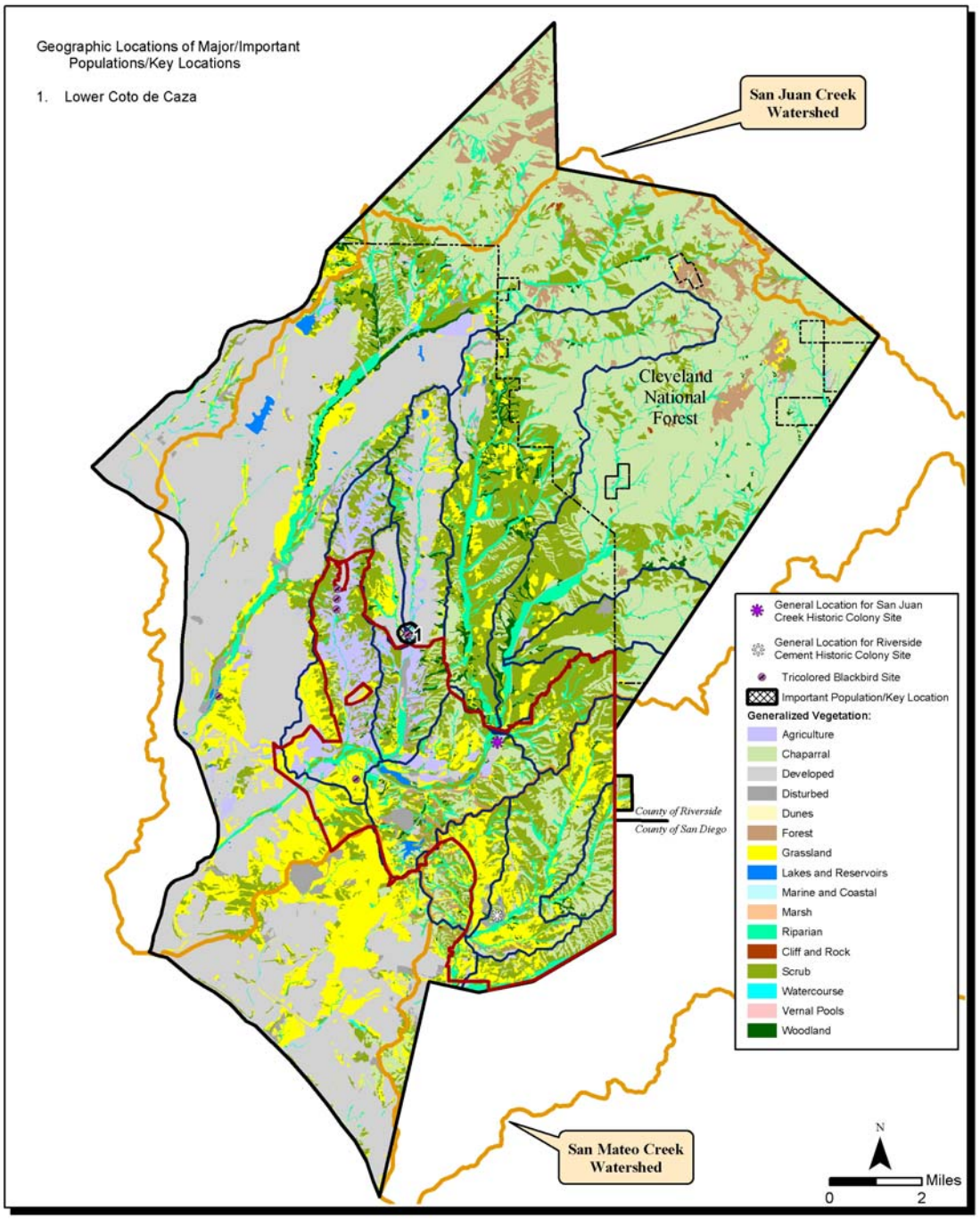
tricolored blackbird in California is predominantly animal matter. Insects and spiders make up about 86-91 percent of the nestling and fledgling diet and 28-96 percent of the adult diet in spring and summer (Skorupa et al. 1980). Seeds and cultivated grains, such as rice and oats, are other major foods, and compose most of the fall and winter diet (Martin et al. 1961).

The decline of the tricolored blackbird has been attributed to several factors. Loss of breeding and foraging habitat are a key factor, but pollutants and predation by mesopredators (e.g., opossum, feral cats) and native birds (e.g., black-crowned night heron) appear also to have contributed to the decline of this species. Poisoning, either deliberate (to control crop depredation) or indirect, and increased disturbance by humans from agriculture operations such as harvesting, have been cited as contributing to the continued population decreases (Beedy et al. 1991). Contamination by trace elements (selenium) and pesticides are a potential cause of nesting failures (Beedy and Hayworth 1987). Contaminants can have direct effects on individuals, but perhaps more importantly, may indirectly affect the food supply.

b. Subregional Status

Although the Southern Subregion does not support the large colonies reported elsewhere in western Riverside County and the Central Valley, breeding colonies of tricolored blackbirds consistently have been observed in various locations in the planning area since about 1989: upper Chiquita Canyon above the "Narrows" and in lower Chiquita just below the "Narrows;" lower Canada Gobernadora in both south Coto de Caza and in grasslands on RMV; and grasslands south of Ortega Highway south of a Ranch residence. Other locations for the tricolored blackbird observed in the past include the "CalMat" colony along San Juan Creek east of the intersection of Cristianitos Road and Ortega Highway, the "Silica Products" colony in Trampas Canyon, the "Riverside Cement" colony just north of Gabino Canyon, and east of lower Arroyo Trabuco Creek between Avery and Crown Valley parkways. (Note: mapping of the sites in the database has been inconsistent, and most of the site locations are based on narrative descriptions.) The CNDDB includes a 1992 record of a small breeding colony at the mouth of Verdugo Canyon under the Ortega Highway bridge.

Because of the nomadic behavior of this species, it is difficult to define *important populations* or *key locations*. However, at least one area seems to fit this definition. Breeding colonies of several thousand birds consistently were observed in lower Gobernadora in ponds in south Coto de Caza from 1993 to 1996 (Ortega, pers. comm. 1996) (No. 1 on *Figure 4-12*). During cowbird trapping in 1996, 1,400 tricolored blackbirds were non-target captures in lower Coto de Caza. Wintering flocks have been observed as recently as 2002 on RMV property just south of the breeding area (Behrends, pers. obs.). This area should be considered to support an *important population* in a *key location*. Other locations listed above have shown sporadic occupation by the blackbird. For example, during SOCTIIP surveys in 1994 a small colony was presumed to



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Tricolored Blackbird Distribution Map

FIGURE 4-12

have nested in Chiquita Canyon above the "Narrows" (*Figure 4-12*). This nesting colony was not observed in 1995, although a small flock was observed foraging near the nest site in 1995 (MBA 1996).

The limiting factor for the tricolored blackbird in the Southern Subregion likely is suitable nesting sites rather than foraging habitat. RMV supports 18,000+ acres of grassland and agriculture which should be adequate to support nesting populations in the 10s of thousands, compared to the largest observe population of "several" thousand birds nesting in the lower Gobernadora ponds on Coto de Caza.

c. Protection Recommendations

- Protect grassland habitat in the valley bottom in the northern portion of lower Gobernadora on RMV property to support a breeding colony of the tricolored blackbird. This colony is an *important population* in a *key location*. (The existing nesting ponds are located within Coto de Caza. Also note that tricolored blackbird nests may be up to 6.4 km [4 mi] from foraging areas [Orians 1961] so having grassland foraging habitat in immediately adjacent to breeding areas is not essential for maintaining a successful breeding population. (For the Irvine Ranch Water District Water Supply project analysis, suitable foraging habitat within a 5 km [3.1 mi] buffer area of nesting sites was determined. This buffer area was based on a species account for the tricolored blackbird prepared by K. Campbell [no date]).

- Maintain and manage aquatic habitats (bulrush and cattails) along San Juan Creek to support a breeding colony of the tricolored blackbird. The minimum size nesting area to support at least 50 pairs of the tricolored blackbird is 500-600 sq ft.

- Protect grasslands and wetland/riparian habitat at the mouth of Verdugo Canyon to provide potential breeding habitat for the tricolored blackbird colony observed in the past under the Ortega Highway bridge at this location.

- Protect additional areas where tricolored blackbirds have been observed in the past to the extent feasible, including freshwater and alkali marsh habitats and adjacent grasslands in the "Narrows" area of Chiquita Canyon, the area south of the Ranch residence south of Ortega Highway, and the "Riverside Cement" area north of Gabino Canyon.

d. Management Recommendations

- Protect potential breeding areas for the tricolored blackbird by maintaining hydrology and water quality and minimizing additional loadings of nutrients or toxics.

Protect grassland foraging habitats adjacent to breeding areas by implementing Integrated Pest Management Practices (e.g., minimizing the use of any pesticides on golf courses that could be toxic to tricolored blackbirds either directly or indirectly through prey).

- Implement a management program for breeding areas, including control of non-native predators (e.g., feral cats and opossums), management of grazing and minimization of human access and disturbance as part of the Adaptive Management Program.

e. Restoration Recommendations

- Consider establishment of suitable breeding habitat for the tricolored blackbird in association with the creation of new natural treatment systems water quality wetlands.

4.2.6 White-tailed Kite

Elanus leucurus - White-tailed Kite
USFWS: Migratory Nongame Bird of Management Concern
CDFG: Fully Protected

a. Regional Status

The current range of the white-tailed kite in North America includes California, Oregon, southern Washington, southern Texas and Florida. This species was threatened with extinction in North America during the early twentieth century, but since 1960 the population and range of this raptor in North America have improved markedly. It also has rapidly colonized habitats throughout much of Central America in regions previously uninhabited (Eisenmann 1971). The main breeding area of the kite in North America remains in California, with nearly all areas up to the western Sierra Nevada foothills and southeast deserts occupied by the species (Small 1994; Dunk 1995). It is common in the Central Valley of California and along the entire length of the coast. Breeding also has been documented regularly in the western counties of Oregon, as well as recently in southern Washington. It is a common breeder in southern Texas and a small breeding population has established in southern Florida since at least 1986, with scattered reports elsewhere in the peninsula and in the eastern panhandle (Dunk 1995). Its breeding range continues south along the coast in Mexico, into Central America and in South America from Colombia south to Buenos Aires, Argentina (Dunk 1995).

In California, the white-tailed kite is a common to uncommon year-long resident in coastal and valley lowlands. It is rarely found away from agricultural areas (Grinnell and Miller 1944). It inhabits herbaceous and open stages of most habitats in cismontane California. It has extended its range and increased numbers in California in recent decades (Eisenmann 1971). *Table 4-12*

provides a summary by county of white-tailed kite observations from the 2003 CNDDB (62 records) and other local sources, including Hamilton and Willick (1996) for Orange County, Unitt (1984) for San Diego County and Dudek (2002) for western Riverside County. It should be noted that the observations include both breeding and non-breeding records. Also, the information in *Table 4-12* should be considered only as representative of the kite's broad distribution in California and is not intended to reflect *major* or *important populations* or *key locations*. As explained below, kites appear to track prey populations and may be found almost anywhere adequate prey occur.

TABLE 4-12
DISTRIBUTION OF THE WHITE-TAILED KITE IN CALIFORNIA

County/Area	General Locations
Alameda County	Coyote Hills Regional Park, South San Francisco Bay, east of Bethany Reservoir, Berkeley Yacht Harbor area
Colusa County	Lurline Creek
Contra Costa County	Brooks Island, Wildcat Creek Marsh, Antioch
Del Norte County	Mouth of Jordan Creek
Marin County	Novato
Napa County	Napa River Ecological Reserve, Haystack Mountain
Orange County Southern Subregion	Arroyo Trabuco, Chiquita Canyon, Gobernadora, Wagon Wheel Canyon, San Juan Creek, Bell Canyon, Trampas Canyon, Cristianitos Canyon, Gabino Canyon, La Paz Canyon, and Talega Canyon
Orange County – Other Locations	San Joaquin Marsh, Bolsa Chica
Placer County	South Branch of Pleasant Grove Creek
Riverside County MSHCP	Prado Basin-Santa Ana River, Lake Mathews-Estelle Mountain, Temescal Wash, Wasson Canyon, Murrieta Creek, Temecula Creek, Santa Rosa Plateau (Mesa de Burrro, De Luz Creek, Mesa de Colorado, Rancho Santa Rosa), Vail Lake, Wilson Valley, Lake Skinner, Mystic Lake-San Jacinto Wildlife Area-Lake Perris, San Timoteo Creek, and Gavilan Peak
Sacramento County	Dillard Road/Hwy 99, Courtland, Cosumnes River, Hedge Ave., Mather Lake, Blodgett Reservoir, Coyote Creek south of Folsom, American River behind Rio Americano High School, Goethe Park, Elder Creek Road, McCoy Avenue, Snipes/Pershing Ravine, Sailor Bar, Woodbridge Park, Sacramento Bar, Folsom Blvd. in Rancho Cordova, Don Julio Creek
San Diego County	Tule Canyon, French Canyon, Cockleburr Canyon and Las Flores Creek on Camp Pendleton; northwest Carlsbad, Batiquitos Lagoon, Sycamore Canyon, Tijuana River Valley, San Felipe Valley, Sentenac Canyon, Anza Borrego, San Luis Rey River, San Dieguito River
San Luis Obispo	Camp San Luis Obispo
San Mateo County	Bair Island
Santa Clara County	South San Francisco Bay
Solano County	Batavia Road, Midway and Buckley Roads, Road 104 south Tremont Road, north of Walnut Road east of Willow Road, Lewis Road Farmstead
Sonoma County	Russian River-Healdsburg
Tehama County	North and west of Gerber
Ventura County	Santa Clara River
Yolo County	County Road 96 west of Davis, County Road 113 northwest of Davis, El Macero Road, County Road 30B east of Davis, Putah Creek

Although the white-tailed kite is a resident bird throughout most of its breeding range, non-breeding season dispersal occurs, resulting in some range expansion during the winter. For example, Hamilton and Willick (1996) comment that although uncommon during the breeding season, kites are fairly common during fall and winter in Orange County and may occur in flocks of 30 or more birds at locations such as Bolsa Chica, San Joaquin Marsh and Gen. Thomas F. Riley Regional Park.

White-tailed kite foraging habitat includes grasslands, open shrub, agricultural areas, wetlands dominated by grasses, fence rows and irrigation ditches (with residual vegetation) adjacent to grazed lands, riparian, oak woodlands, coastal sage scrub, and saltmarsh. They forage in almost any habitat with a dense population of voles (*Microtus* spp.); its main prey in coastal Southern California is the California vole (*M. californicus*). It also preys on other small, diurnal mammals, and occasionally on birds, insects, reptiles, and amphibians. It takes small mammal prey approximately 95 percent of the time and can be considered a small mammal specialist (Dunk 1995). Tall grasslands have the highest suitability because they provide good vole habitat (Faanes and Howard 1987). Kites forage from a central perch to an area as large as 486 ha (1,200 ac). However, they seldom forage farther than 0.8 km (0.5 mi) from the nest during the breeding season (Hawbecker 1942).

Kites may become nomadic during low vole abundance, and the population fluctuations appear to track vole numbers. However, in northern California it is unclear whether fluctuations are normal migration movements or nomadic responses to changes in the prey densities (Dunk and Cooper 1994).

The breeding density of the white-tailed kite varies greatly, ranging from one pair per 26-472 ha (64-1,166 ac). Vole density at the onset of breeding appears to influence the kite density and it is likely that breeding densities vary even more dramatically than reported above (Dunk 1995). Where prey density is not the limiting factor, the availability of nesting and roosting sites becomes important (Dunk and Cooper 1994). Generally kites are not territorial, but nest sites may be defended against crows, other hawks, and eagles (Pickwell 1930; Dixon et al. 1957). They also have been observed to defend foraging territories of about 0.1 sq km. (0.04 sq mi) in winter against red-tailed hawks and northern harriers (Bammann 1975). The success of nesting appears to be related to surrounding land uses. Erichsen et al. (1996) documented that successful nests were surrounded by more natural vegetation and non-urban human development (e.g., agriculture) within a 0.8-km (0.5 mi) radius circle centered on the nest site compared to failed nests.

The white-tailed kite breeding season is February to October, with the peak from May to August. Kites are monogamous through the breeding season, although some pairs remain together year-round (Dunk 1995). Nests of loosely piled sticks and twigs lined with grass, straw, or rootlets

are placed near the tops of oaks, willows, or other tree stands (more than 20 species have been documented as nest sites) from 6-20 m (20-100 ft) above ground (Dixon et al. 1957). Nests are located near open foraging areas. Nest trees may be isolated or part of a contiguous forested area and tree structure apparently is the most important determinant of use for the nest site (Dunk 1995). Communal roosts are used in the non-breeding seasons (Waian and Stendell 1970).

The average kite clutch is four or five eggs, with a range of three to six eggs. The female is responsible for incubation, which lasts about 28 days. The young fledge in 35-40 days. During the incubation and nestling period, the male feeds the female, and supplies her with food to feed the young. Kites usually produce a single brood per breeding season, but may occasionally have two broods.

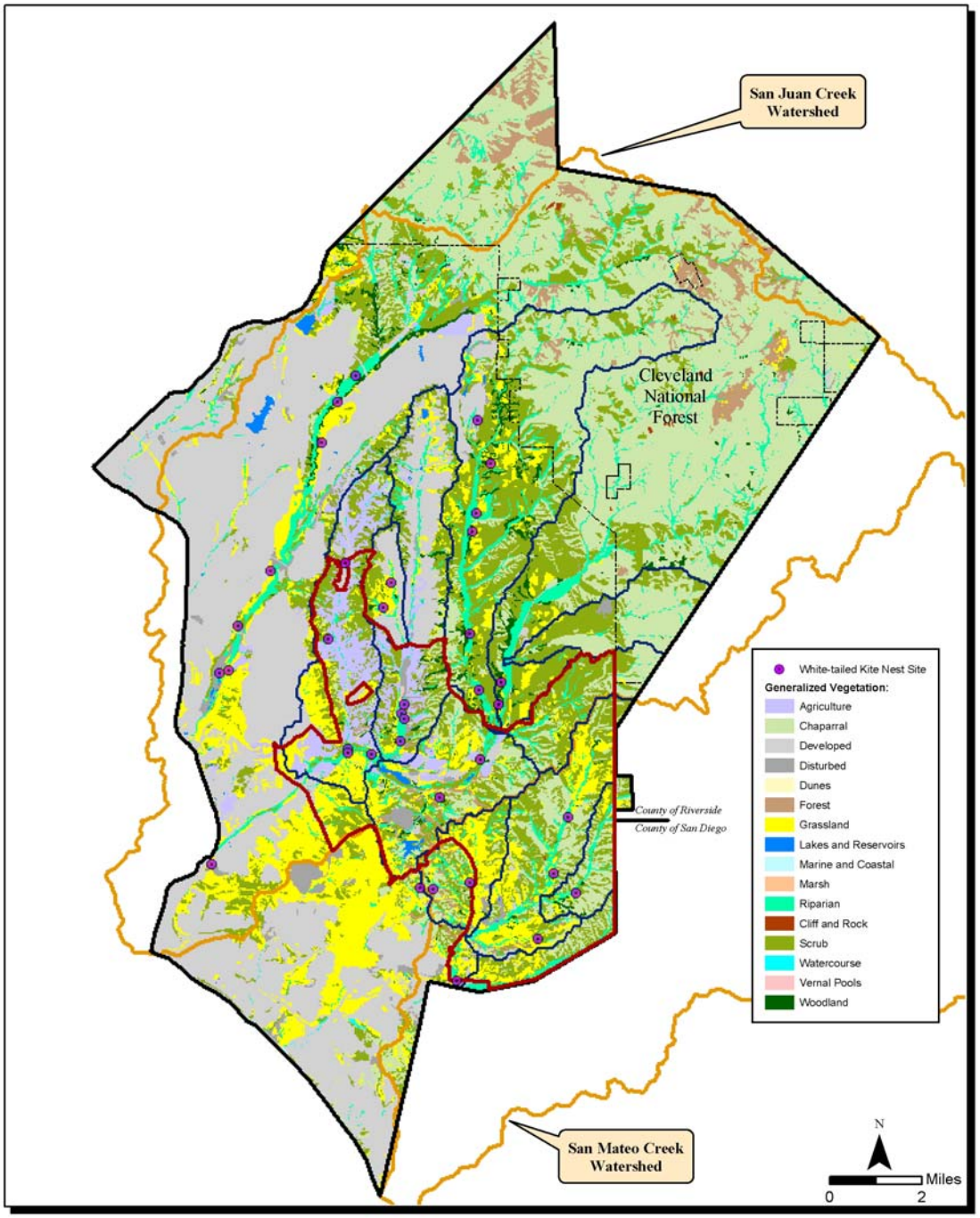
Dispersal information includes two white-tailed kites banded as nestlings that were recovered 19 km (11.8 mi) and 160 km (99 mi) from their nests (Dixon et al. 1957). Other anecdotal information indicates that kites are capable of dispersing long distances over inhospitable habitat. For example, a total of 26 kites dispersed from the California mainland over 80 km (50 mi) to San Clemente Island in 1984 over a two month period, formed a communal roost through December, and then departed the island by spring without nesting (Scott 1994).

The California population of the white-tailed kite originally was reduced by habitat loss, shooting and possibly egg collecting (Pickwell 1930). Although the population rebounded, current breeding bird surveys indicate that the population numbers are again declining in some areas (Dunk 1995). This apparent decline may be due to the conversion of natural or agricultural lands to urban or commercial property; clean farming techniques that leave few residual vegetation areas for the prey; increased competition for nest-sites with other raptors and corvids; a relatively long-term drought throughout California during much of the time from 1982 to 1991; and increased disturbances at the nest (Dunk 1995). A significant threat to the species is the degradation of habitat, especially the loss of nest trees and foraging habitat (Dunk 1995).

White-tailed kites appear to respond to habitat management. In northern California, CDFG purchased previously grazed grasslands and largely removed them from grazing. As of 1995 these areas supported large populations of voles and high densities of wintering white-tailed kites, approximately 10 times the raptor density they supported prior to the purchase (Dunk 1995).

b. Subregional Status

There is a total of 37 historic nest sites for the white-tailed kite scattered throughout the planning area (*Figure 4-13*). These nest sites are located in southern coast live oak riparian forest and woodlands, southern arroyo willow forest, southern sycamore riparian woodland, southern



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White-tailed Kite Distribution Map

FIGURE 4-13

willow scrub, and along intermittent rivers and streams. Because the nest sites are widely distributed, no single area appears to support an *important population*. However, several drainages appear to be important for this species in the planning area:

- GERA in lower Gobernadora Creek and central San Juan Creek supports nine historic nest sites.

- Arroyo Trabuco between Live Oak Canyon Road in the north and Avery Parkway in the south supports seven historic nest sites.

- Bell Canyon supports seven historic nest sites.

- Middle Gabino and lower La Paz canyons support three historic nest sites.

- Talega and lower Cristianitos canyons support five historic nest sites. All four nest sites in Talega Canyon are south of the RMV property boundary.

It is important to note that at any given time the number of breeding pairs in the planning area probably is only a small percentage of the historic nesting sites. For example, Bloom estimated that only three pairs of kites nested on RMV in 2001 (P. Bloom, pers. comm. 2002).

e. Protection Recommendations

- Protect the southern willow scrub in GERA in lower Gobernadora Creek and in central San Juan Creek that provides nesting habitat, and adjacent foraging habitat to the extent feasible, for the white-tailed kite.

- Protect breeding habitat and, to the extent feasible, foraging habitat for the white-tailed kite in the Cristianitos Canyon sub-basin, along lower Cristianitos Creek and in the lower Gabino Canyon subunit.

- Protect breeding and foraging habitat for the white-tailed kite in Middle Gabino, La Paz , and Talega canyons.

d. Management Recommendations

- Protect existing riparian habitat downstream of the knickpoint in GERA for the white-tailed kite.

- Implement a management program for protected white-tailed kite nesting habitat, including the minimization of human disturbance during the breeding season.

- Pursuant to the Grazing Management Plan, implement grazing management techniques to help protect the white-tailed kite and its nesting and foraging habitat, promote perennial grasses including native grasses (to provide vole habitat), allow for continued cattle grazing sufficient to support cattle ranching operations, and, where appropriate reduce fuel loads for fire.

- Pursuant to the Fire Management Plan, implement prescribed burning techniques to promote native perennial grasses.

e. Restoration Recommendations

- Implement a CSS/VGL restoration program to enhance habitat carrying capacity for prey. Restoration areas that would benefit the white-tailed kite include Chiquita Ridge, Sulphur Canyon, Chiquadora Ridge, upper Cristianitos and upper Gabino Canyon.

4.2.7 Yellow Warbler

Dendroica petechia - Yellow Warbler
USFWS: None
CDFG: California Special Concern Species

a. Regional Status

Yellow warblers nest from northern Alaska eastward to Newfoundland, Canada and southward to northern Baja California and Georgia. The species migrates throughout much of North America and winters from southern California, Arizona and the Gulf Coast southward to central South America (AOU 1998). In California, the yellow warbler is an uncommon to common, summer resident in the north and locally common in the south (Zeiner et al. 1990). It breeds in riparian woodlands from northern and central California generally west of the Sierra Nevada to the coastal slopes of southern California. It breeds in coastal and desert lowlands up to 2,500 m (8,000 ft) in the Sierra Nevada and other montane chaparral and forest habitats (Grinnell and Miller 1944). The yellow warbler also occurs as a migrant throughout the state and it is a common migrant on the Channel and Farallon Islands in spring and fall (DeSante and Ainley 1980; Garrett and Dunn 1981).

The patterns of yellow warbler population densities probably have changed since Europeans settled North America and altered the character of riparian systems. Although no large-scale, range-wide changes are documented for the yellow warbler, populations in the southwestern United States have declined dramatically in recent decades in many lowland areas, including the southern coast, Colorado River, and San Joaquin and Sacramento valleys (Lowther et al. 1999). It is now rare to uncommon in many lowland areas where formerly it was common (McCaskie et al. 1979; Garrett and Dunn 1981).

Available information on the state-wide distribution of the species is variable. For example, the 2003 CNDDB contains only 36 records for the species distributed among the counties and general locations shown in *Table 4-13*.

TABLE 4-13
2003 CNDDB RANGEWIDE DISTRIBUTION OF THE
YELLOW WARBLER IN CALIFORNIA

County	General Location
Alameda	Cull Creek Recreation Area
Imperial	Niland, Calexico
Fresno	Lake Thomas A. Edison/Mono Creek
Inyo	Furnace Creek, Shosone, Wild Rose Mine
Kern	S. Fork Kern River
Marin	Olema Marsh
Mendocino	Little Lake Valley
Mono	Lee Vining
Monterey	Salinas River
Placer	Soda Springs-Baker Ranch Road, Antone Meadows
Riverside	Snow Creek, Cottonwood Springs, Prado County Park, Wilson Creek
San Bernardino	Hesperia, Morongo Valley, Big Morongo Wildlife Sanctuary, Black Rock Spring
San Diego	San Diego River, Vallecito Creek, Sweetwater River
Sierra	Lower Sardine Lake
Santa Barbara	Sisquoc River
Tehama	Todd Island, Sacramento River, Bisquit Flat, Sunflower Gulch, Ventura (Santa Clara River), Nevada (Donner Lake, Dry Creek

For southern California, the Southern Subregion database includes 33 locations (described below) and the western Riverside MSHCP database includes approximately 47 recent records that were considered precise enough to be used for the conservation analysis for that program. Within western Riverside County, significant breeding populations occur in the Prado Basin (Hays 1999, pers. obs.), and other breeding areas include Temescal Canyon and its tributaries, Wasson Canyon, Temecula Creek, Murrieta Creek, Vail Lake area, Wilson Creek, San Timoteo Creek, Santa Rosa Plateau, and drainages and woodland areas within the San Bernardino National Forest. The yellow warbler was not evaluated for regulatory coverage in either the San Diego MSCP or MHCP. However, based on Unitt (1984), the known and probable breeding distribution of the species in San Diego County includes all the major coastal drainages, including the Tijuana, Sweetwater, San Diego, San Dieguito, and San Luis Rey rivers.

Throughout its range the yellow warbler most commonly breeds in wet, deciduous thickets (especially those dominated by willows) and in disturbed and early successional habitats (Lowther et al. 1999). Yellow warblers in southern California breed in lowland and foothill riparian woodlands dominated by cottonwoods, alders, or willows and other small trees and shrubs typical of low, open-canopy riparian woodland (Garrett and Dunn 1981). The yellow warbler is found at elevations from 100-2,700 m (328-8,858 ft) within riparian habitat and at higher elevations along watercourses with riparian growth (Lowther et al. 1999). The yellow warbler also breeds in montane chaparral, open ponderosa pine and mixed conifer habitats with substantial amounts of brush (Zeiner et al. 1990). Breeding in montane shrubs and conifers is perhaps a recent phenomenon (Gaines 1977).

Yellow warblers usually arrive in California in April, and generally have migrated out of the area by October. There appears to be a post-breeding, upslope movement, mostly to middle elevations (Beedy 1975); it is scarce at elevations above 2,500 m (8,000 ft) (Gaines 1977). Small numbers regularly overwinter in southern California lowlands (Garrett and Dunn 1981). During migration, they occur in lowland and foothill woodland habitats such as desert oases, riparian woodlands, oak woodlands, mixed deciduous-coniferous woodlands, suburban and urban gardens and parks, groves of exotic trees, farmyard windbreaks, and orchards (Small 1994).

Preferred nest trees of yellow warbles are willows, alders, and cottonwoods, but birds have been observed using tamarisk *(Tamarix* sp.) (Brown and Trosset 1989). The nest is an open cup placed 0.6 to 5 m (2-16 ft) above ground in a deciduous sapling or shrub. Breeding is from mid-April into early August with peak activity in June. Three to six eggs (usually four or five) are laid and incubated by the female for 11 days. Nestlings are tended by both parents until fledging at 9-12 days (Harrison 1978). The young breed the following year.

The annual adult survival rate of yellow warblers, based on returns of banded birds to the same breeding location, is estimated to be about 0.53. Nest predation has been found to be the major

cause of nest failure of yellow warblers in Alaskan wetlands (Rodgers 1995). However, causes of nest failure for other geographical locations of breeding populations of yellow warbler are unknown, but it is likely that local conditions dictate level of predation risk (e.g., abundance of predators in an area). The maximum reported longevity is almost nine years by a male yellow warbler (Klimkiewicz et al. 1983).

Territories are established as soon as males arrive (Lowther et al. 1999). Yellow warblers defend multipurpose territories, which often include tall trees for singing and foraging and a heavy brush understory for nesting (Ficken and Ficken 1966). Territorial interactions are dynamic and continue throughout the breeding season. Territories and home ranges are relatively small, varying from 0.03-0.2 ha (0.08-0.5 ac) (Ficken and Ficken 1966; Beer et al. 1956). Peak densities measured in southeast Arizona have reached 48 birds/ha (~19 birds/ac) (Skagen et al. 1998).

The yellow warbler forages for insects and spiders in the upper canopy of deciduous trees and shrubs. Occasionally it hawks insects from air, or eats berries. It gleans and hovers in the upper canopy of deciduous trees and shrubs (Bent 1953; Ehrlich et al. 1988). Summer observations of foraging showed that small limbs are preferred to large limbs, tips, and dead limbs for both deciduous and coniferous trees (Morse 1973). Foraging is typically observed between 0.3 to 16.8 m (1 to 55 ft), at the top of the vegetation, never on the ground and mostly between 6 to 8 m (20 to 26 ft).

Threats to the species include habitat destruction and fragmentation and brood-parasitism by brown-headed cowbirds (Garrett and Dunn 1981). The populations in the western United States are affected by intense grazing especially where willow growth along riparian habitats is reduced or removed. For example, an Oregon study on the effects of cattle grazing on riparian habitat found a negative correlation between shrub volume and the frequency of cattle use and a positive correlation between the time since a transect was last grazed by cattle and shrub volume (Taylor and Littlefield 1986). Photographs substantiated improvements in riparian vegetation when protected from cattle. Yellow warblers were more numerous on transects with abundant willow and few or no cattle than on transects with heavy cattle use and low shrub volume. The yellow warbler population increases coincided with a decrease in cattle and the elimination of willow cutting and spraying.

b. Subregional Status

There are 33 locations for the yellow warbler in the planning area database. The warbler distribution in the planning area generally overlaps with the least Bell's vireo distribution, but is somewhat broader because it also occurs in more open canopy riparian woodlands. In addition to areas supporting vireos such as lower Arroyo Trabuco and GERA, yellow warblers

also occur in upper San Juan Creek, Lucas Canyon, lower Bell Canyon and Arroyo Trabuco north of Crown Valley Parkway. The most common riparian habitat supporting the yellow warbler in the planning area is southern arroyo willow forest, followed by mule fat scrub, southern willow scrub, southern sycamore riparian woodland, and freshwater marsh. Other habitats supporting yellow warbler locations in the planning area are giant reed, floodplain sage scrub, intermittent rivers and streams, and southern coast live oak riparian woodland.

Four *important population* areas for the yellow warbler occur in the planning area:

- Lower Arroyo Trabuco south of Crown Valley Parkway supports at least four locations (No. 1 on *Figure 4-14*). This area also supports an *important population* of the least Bell's vireo, and thus has very high riparian habitat quality and importance in the subregion.

- GERA supports at least five locations, with a sixth just south of the dirt road below GERA in lower Gobernadora Creek (No. 2 on *Figure 4-14*). This area also supports *important populations* of the least Bell's vireo and southwestern willow flycatcher.

- Central San Juan Creek near the confluence with Chiquita Creek supports two locations, as well as about eight yellow-breasted chat locations, indicating high quality riparian habitat in this reach of the creek (No. 3 on *Figure 4-14*).

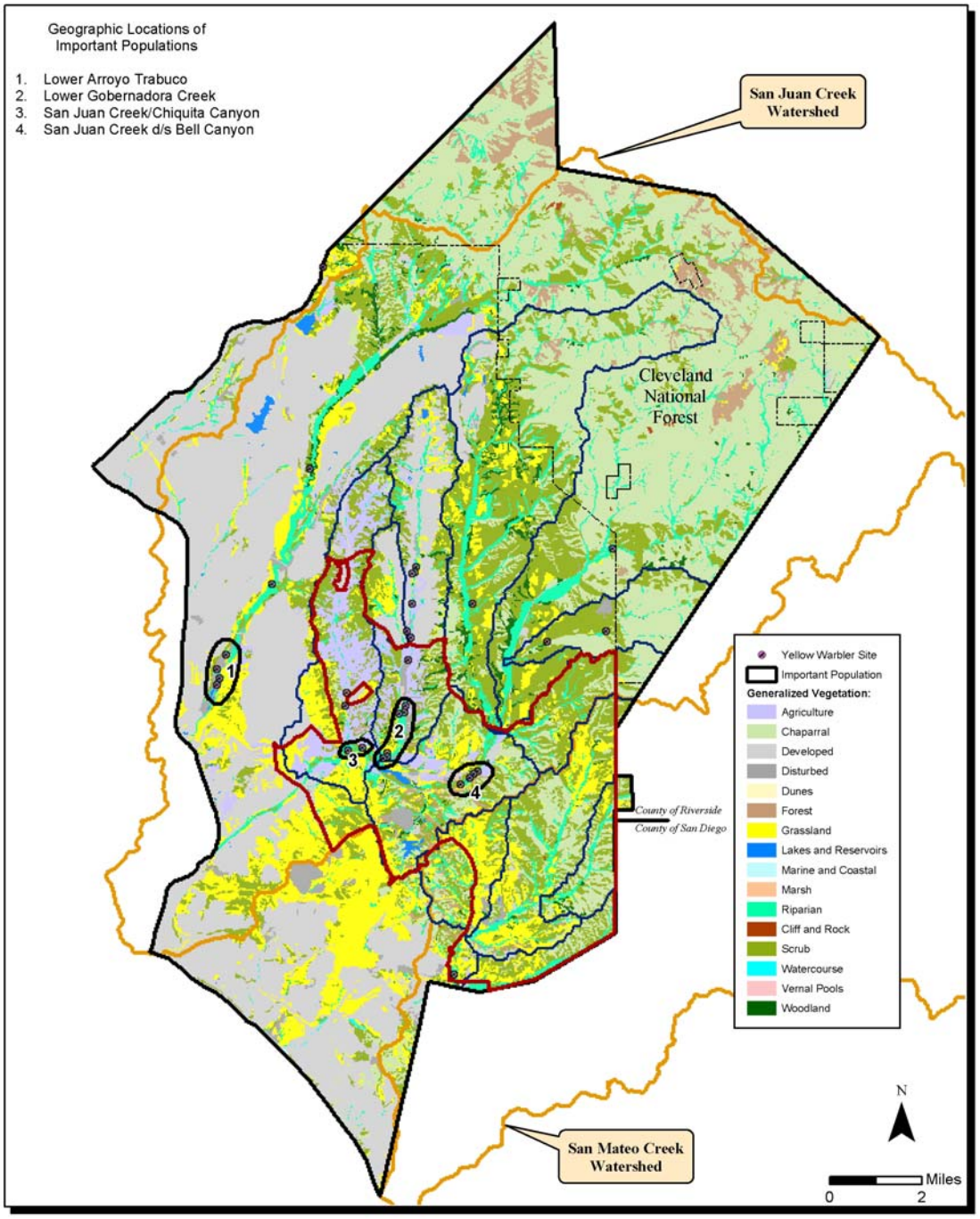
- Central San Juan Creek downstream of the confluence with Bell Creek supports four locations in association with about 10 yellow-breasted chat locations, indicating riparian habitat of sufficient quality for the yellow warbler in this reach of the creek (No. 4 on *Figure 4-14*). However, this reach of the creek currently supports extensive stands of giant reed that will need to be controlled to sustain the warbler in this area.

It is interesting to note the six locations for the yellow warbler occur in upper Gobernadora Creek within Coto de Caza. These data date back to 1997 and the current status of the habitat suitability for the warber in this area is unknown.

No *key locations* in the subregion were identified for the yellow warbler. There are no obvious locations with a high concentration of the species that would appear to be necessary for conserving this species in the subregion.

c. Protection Recommendations

- Protect the southern willow scrub in GERA in lower Gobernadora Creek that provides nesting habitat for the *important population* of the yellow warbler.



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Yellow Warbler Distribution Map

FIGURE 4-14

Maintain and manage riparian and aquatic habitats along San Juan Creek for the *important populations* of the yellow warbler.

d. Management Recommendations

- Implement a cowbird trapping program to mitigate for impacts to existing habitat within the Chiquita and Gobernadora sub-basins and for potential impacts associated with future development. The cowbird trapping program will be evaluated on an annual basis and trap locations and trapping effort will be adjusted as part of the overall Adaptive Management Program (e.g., if the number of trapped cowbirds drops to a prescribed threshold, the trapping program may be terminated or otherwise modified).

- Pursuant to the Grazing Management Plan, implement grazing management techniques to help protect riparian habitats and associated species while allowing for continued cattle grazing sufficient to support cattle ranching operations, and, where appropriate reducing fuel loads for fire.

- Protect downstream habitats (e.g., lower San Juan Creek and lower Cristianitos Creek within the planning area) for the yellow warbler by maintaining hydrology, water quality and sediment delivery and minimizing additional loadings of nutrients or toxics.

- Control Argentine ants in proximity to yellow warbler nesting habitat.

e. Restoration Recommendations

- Implement restoration efforts to address localized headcuts within the Chiquita sub-basin as further described in the Watershed and Sub-basin Planning Principles.

- Implement a restoration program in Gobernadora Creek which addresses: **(1)** the historic creek meander above the knickpoint; and **(2)** upstream land use induced channel incision and erosion, including potentially excessive surface and groundwater originating upstream.

- Identify likely causes of erosion and potential measures to rectify causes of headcutting in the lower portion of Gobernadora Creek.

- Implement an invasive species eradication program for San Juan Creek between San Juan Capistrano and Bell Canyon to control giant reed and pampas grass in conjunction with upstream eradication efforts.

- Implement an invasive species eradication program for lower Cristianitos Creek from the confluence with Gabino Creek and the RMV boundary to control tamarisk, giant reed and pampas grass.

4.2.8 Yellow-breasted Chat

Icteria virens - Yellow-breasted Chat
USFWS: None
CDFG: California Special Concern Species

a. Regional Status

Yellow-breasted chats summer and nest from British Columbia eastward to New Hampshire, and southward to Baja California and northern, mainland Mexico. The species presumably migrates throughout much of North America and winters primarily from northern Mexico to Panama (AOU 1998). Within California the chat is an uncommon summer resident and migrant in coastal California and in the foothills of the Sierra Nevada (Zeiner et al. 1990), and is found up to about 1,450 m (4,800 ft) in valley foothill riparian habitats, and up to 2,050 m (6,500 ft) east of the Sierra Nevada in desert riparian habitats (Gaines 1977; DeSante and Ainley 1980; Garrett and Dunn 1981). The yellow-breasted chat is uncommon along the coast of northern California and occurs only locally south of Mendocino County (McCaskie et al. 1979). In southern California, the species breeds locally on the coast and very locally inland at lower elevations throughout most of the region (Garrett and Dunn 1981). Once considered fairly common to common in California (Grinnell and Miller 1944), the yellow-breasted chat has been more recently considered to be uncommon and local in southern California (Garrett and Dunn 1981).

There are 63 records for the yellow-breasted chat in the 2003 CNDDB in the counties and general locations shown in *Table 4-14*.

Of note in the CNDDB database is that 26 of the 63 records for the yellow-breasted chat are from the Colorado River area.

For coastal southern California, the Southern Subregion database includes 130 locations (described below). The western Riverside MSCHP database includes approximately 23 recent records that were considered precise enough to be used for the conservation analysis for that program. Areas of western Riverside County supporting the yellow-breasted chat include a large concentration in the Prado Basin and contiguous reaches of the Santa Ana River, as well as San Timoteo Creek, Temescal Canyon (including the Alberhill Creek tributary), Canyon Lake, Temecula Creek, and Vail Lake. The San Diego MHCP database includes 47 locations for the chat, with locations in the San Luis Rey River, lower Escondido Creek in Encinitas, Pilgrim

Creek in Oceanside, and Kit Carson Park in Escondido; the San Luis Rey River and Pilgrim Creek are identified in the MHCP as supporting major populations. Although the yellow-breasted chat was not evaluated for regulatory coverage in the San Diego MSCP, Unitt's (1984) summary of the known and probable breeding distribution of the species in this region includes the Sweetwater and San Diego rivers. The species also breeds in the Santa Margarita River on Camp Pendleton.

TABLE 4-14
2003 CNDDB RANGEWIDE DISTRIBUTION OF THE
YELLOW-BREASTED CHAT IN CALIFORNIA

County	General Locations
Imperial	Potholes, Bard, Niland, Salton Sea, Picacho State Recreation Area, Colorado River
Inyo	Shoshone, Independence, Baker Meadows, Lone Pine, Olancha, Ash Creek, Hogback Creek, Wyman Creek
Kern	S. Fork Kern River, Lake Isabella
Mendocino	Little Lake Valley
Orange	San Diego Creek
Riverside	Mecca, Colorado River, Santa Ana River, Prado Basin, Temescal Wash
San Benito	San Benito River
San Bernardino	Yermo, Old Fort Piute, Baker, Colorado River, Lower Big Morongo Canyon, Soto Ranch, Cushenbury Springs, Mojave River
San Diego	4-S Ranch, Vallecito Creek, Sweetwater River, Otay Valley
Solano	SR-128 and Pleasants Valley Road
Stanislaus	Littlejohn Creek
Tehama	Todd Island, Sacramento River
Ventura	Santa Clara River

Yellow-breasted chats usually arrive in southern California in April and depart by late September for wintering grounds in Mexico and Guatemala, although there are a few late fall and winter records of the chat. Migrants are observed only rarely to uncommonly away from breeding areas.

The species has been characterized as a relative generalist in regard to nesting habitat selection within a riparian area (Brown and Trossett 1989). They nest in dense plant cover within streams, swampy ground, and the borders of small ponds. Burhans and Thompson (1999) observed that chats preferred nesting in large habitat patches, which, despite increased risk of brood-parasitism, decreased the risk of nest predation and resulted in a higher nesting success.

The chat breeding season runs from early May into early August, with a peak of nesting activity in June. Nests are usually 0.6-2.4 m (2-8 ft) above the ground in dense shrubs along a stream or river. The species appears to be monogamous, although pairs may nest near one another (Ehrlich et al. 1988). Females may lay three to six eggs, but usually three or four eggs. Incubation is 11-15 days and chicks fledge in 8-11 days. The young are tended by both parents until fledged (Harrison 1978).

Home range sizes of yellow-breasted chats vary substantially, from 0.04 ha (0.1 ac) to 1.3 ha (3.2 acres) (Brewer 1955; Dennis 1958; Thompson and Nolan 1973).

The yellow-breasted chat eats insects and spiders and also may take berries and other fruits. Mostly the yellow-breasted chat gleans prey from foliage of shrubs and low trees (Zeiner et al. 1990).

Loss and fragmentation of riparian woodlands in the coastal lowland as a result of development, agriculture, and channeling rivers has led to the decline of the yellow-breasted chat. Garrett and Dunn (1981) concluded that the clearing of dense riparian thickets and brush tangles has caused a noticeable decline in the number of breeding pairs of the chat. Cowbird parasitism may have played an additional role in the decline of the yellow-breasted chat affecting its distribution in addition to its density (Gaines 1974; Remsen 1978).

b. Subregional Status

There are 130 documented nesting locations for the yellow-breasted chat in the planning area database. As with the yellow warbler, the yellow-breasted chat co-occurs with the least Bell's vireo, but is more widespread because it has broader habitat affinities. It occurs in both willow thickets and riparian woodlands. Most of the nesting locations are located in lower Arroyo Trabuco, central San Juan Creek, lower Gobernadora Creek and lower Cristianitos Creek, but it also occurs in upper San Juan Creek, Lucas Canyon, lower Bell Canyon, and Arroyo Trabuco north of Crown Valley Parkway. There are several locations in small drainages and relatively isolated patches of riparian habitat. There are many locations along San Mateo Creek south of the planning area on Camp Pendleton.

Mule fat scrub is most common riparian habitat type associated with mapped locations of the yellow-breasted, followed closely by southern arroyo willow forest. Other habitats supporting yellow-breasted chats in the planning area include southern willow scrub, southern coast live oak riparian woodland, southern sycamore riparian woodland, freshwater marsh, intermittent and perennial rivers and streams.

Five *important population* areas for the yellow-breasted chat occur in the planning area.

- Lower Arroyo Trabuco below Crown Valley Parkway supports about 29 documented nesting sites (No. 1 on *Figure 4-15*). This area has high quality southern willow scrub habitat and also supports *important populations* of the least Bell's vireo and yellow warbler.

- GERA supports about 20 documented nesting sites (No. 2 on *Figure 4-15*). GERA also supports *important populations* of the least Bell's vireo, southwestern willow flycatcher and yellow warbler.

- Central San Juan Creek from the confluence with Chiquita Creek downstream to the Ortega Highway bridge supports about nine documented nesting sites and also an *important population* of the yellow warbler (No. 3 on *Figure 4-15*).

- Central San Juan Creek south of the confluence of Bell Creek supports about 17 documented nesting sites and also an *important population* of the yellow warbler (No. 4 on *Figure 4-15*).

- Lower Cristianitos between the confluences of Gabino and Talega creeks supports about 11 documented nesting sites and is associated with numerous nesting locations in lower Cristianitos and San Mateo creeks on Camp Pendleton (No. 5 on *Figure 4-15*).

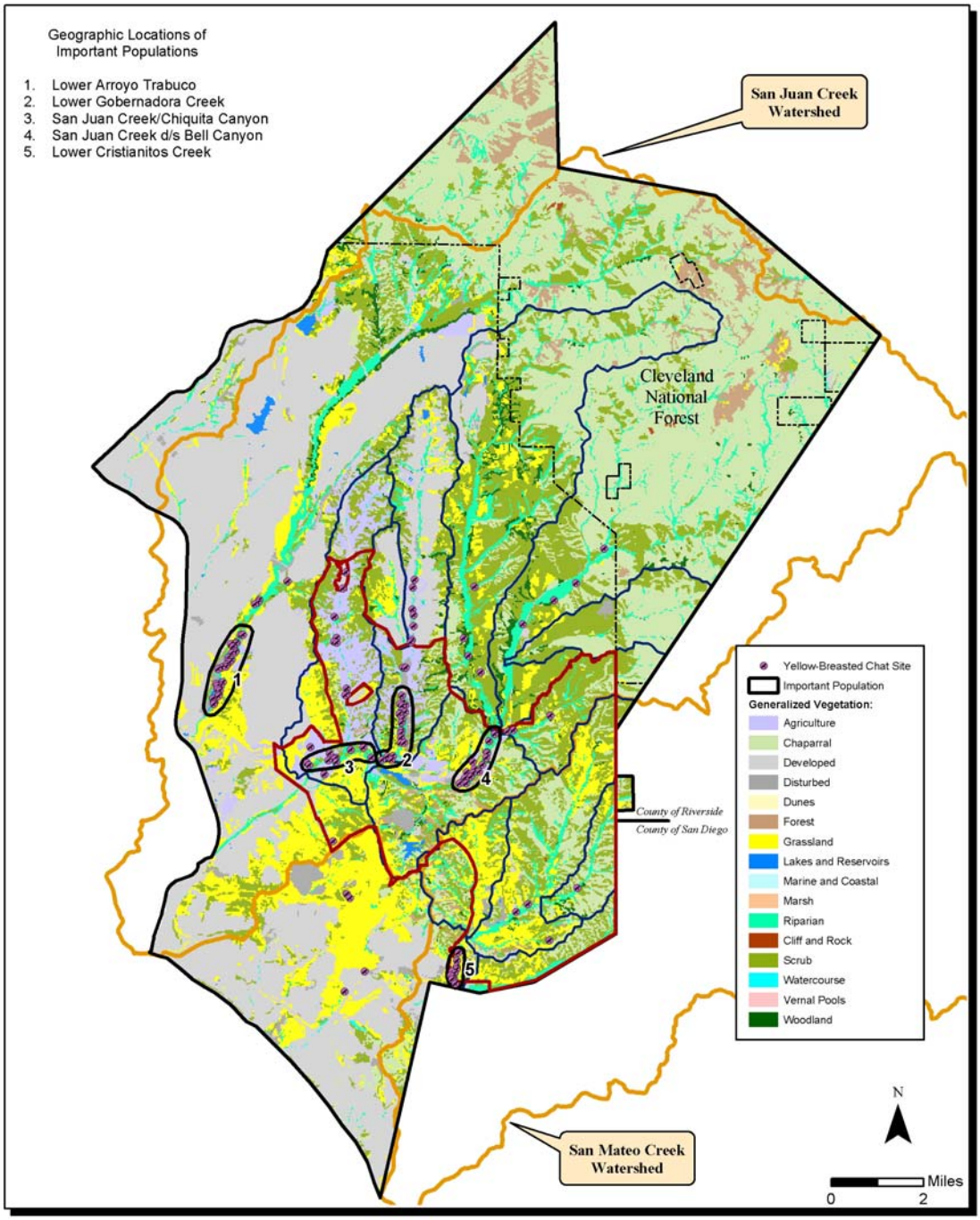
No *key locations* in the subregion were identified for the yellow-breasted chat. There are no obvious locations with a high concentration of the species that would appear to be essential for conserving this species in the subregion. Also, as with the yellow warbler, there are several records for the chat along Gobernadora Creek within Coto de Caza, but the current status of habitat suitability at these locations is unknown.

c. Protection Recommendations

- Protect the southern willow scrub in GERA in lower Gobernadora Creek that provides nesting habitat for an *important population* of the yellow-breasted chat.

- Maintain and manage riparian and aquatic habitats along San Juan Creek for the *important populations* of the yellow-breasted chat.

- Protect breeding habitat for the *important population* of the yellow-breasted chat along lower Cristianitos Creek.



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Yellow-Breasted Chat Distribution Map

FIGURE 4-15

d. Management Recommendations

- Implement a cowbird trapping program to mitigate for impacts to existing habitat within the Chiquita and Gobernadora sub-basins and for potential impacts associated with future development. The cowbird trapping program will be evaluated on an annual basis and trap locations and trapping effort will be adjusted as part of the overall Adaptive Management Program (e.g., if the number of trapped cowbirds drops to a prescribed threshold, the trapping program may be terminated or otherwise modified).

- Pursuant to the Grazing Management Plan, implement grazing management techniques to help protect riparian habitats and associated species while allowing for continued cattle grazing sufficient to support cattle ranching operations, and, where appropriate reducing fuel loads for fire.

- Protect downstream habitats (e.g., San Juan Creek and lower Cristianitos Creek in the planning area) for the yellow-breasted chat by maintaining hydrology, water quality and sediment delivery and minimizing additional loadings of nutrients or toxics.

- Control Argentine ants in proximity to yellow-breasted chat nesting habitat.

e. Restoration Recommendations

- Implement restoration efforts to address localized headcuts within the Chiquita sub-basin as further described in the Watershed and Sub-basin Planning Principles.

- Implement a restoration program in Gobernadora Creek which addresses: **(1)** the historic creek meander above the knickpoint; and **(2)** upstream land use induced channel incision and erosion, including potentially excessive surface and groundwater originating upstream.

- Identify likely causes of erosion and potential measures to rectify causes of headcutting in the lower portion of Gobernadora Creek.

- Implement an invasive species eradication program for San Juan Creek between San Juan Capistrano and Bell Canyon to control giant reed and pampas grass.

- Implement an invasive species eradication program for lower Cristianitos Creek from the confluence with Gabino Creek and the RMV boundary to control tamarisk, giant reed and pampas grass.

4.2.9 Western Spadefoot Toad

Scaphiopus (=Spea) hammondii– Western Spadefoot Toad
Federal: None
State: California Special Concern Species

a. Regional Status

The western spadefoot toad is a California near endemic ranging from Shasta County southward into Baja California (Stebbins 1985). Its known elevation range extends from near sea level to 1,500 m (4,921 ft) (Zeiner et al.1990; Ervin et al. 2001). The known range of western spadefoot toad is restricted to west of the Sierran-desert range axis (Myers 1944).

Table 4-15 summarizes the 243 records in the 2003 CNDDB database for the western spadefoot toad in California. Because there are numerous records, the table only tabulates the number of locations by county and does not include general location information. The toad is widespread in the central and southern coastal portions of the state. However, the table does not reflect the location of *major* or *important populations* or *key locations*.

TABLE 4-15
2003 CNDDB RANGEWIDE DISTRIBUTION OF THE WESTERN SPADEFOOT TOAD IN CALIFORNIA

County	No. of CNDDB Records
Alameda	1
Butte	1
Calaveras	2
Colusa	1
Fresno	11
Kern	4
Kings	7
Los Angeles	7
Madera	14
Merced	13
Monterey	22
Orange	7
Placer	4
Riverside	19

TABLE 4-15
2003 CNDDB RANGEWIDE DISTRIBUTION OF THE WESTERN SPADEFOOT TOAD IN CALIFORNIA

County	No. of CNDDB Records
Sacramento	5
San Benito	15
San Diego	7
San Joaquin	11
San Luis Obispo	25
Santa Barbara	28
Stanislaus	11
Tehama	1
Tulare	10
Ventura	1
Yolo	2

Table 4-16 provides more detailed information for western spadefoot locations in southern California based on data from the various conservation planning programs. This information also should be considered as distributional and does not identify *major* or *important populations* or *key locations*. However, it is evident from *Table 4-16* that the spadefoot toad is still relatively widespread in its distribution in Orange, Riverside and San Diego counties.

TABLE 4-16
WESTERN SPADEFOOT TOAD LOCATIONS IN SOUTHERN CALIFORNIA

Conservation Planning Area/County	General Locations
San Diego County MHCP	Buena Vista Lagoon, Page Creek in north Escondido, San Marcos Creek in southeast Carlsbad, Daley Ranch in Escondido
San Diego County – Other Locations	San Dieguito River near Rancho Santa Fe, Sycamore Canyon on Camp Elliot Naval Reservation, west-southwest of Starvation Mountain, vernal pools near Carroll Canyon, off Highland Valley Road, South Fork of Moosa Creek, Carmel Mountain, 1.3 mi south of Horno Hill on Camp Pendleton, considered relatively widespread and abundant on Camp Pendleton (Camp Pendleton AARS 1998), substantial roadkills observed (1) along Cristianitos Road between junction with San Mateo Road and Camp Talega, (2) Basilone Road east of San Onofre housing area to the 52 area, (3) Old

TABLE 4-16
WESTERN SPADEFOOT TOAD LOCATIONS IN SOUTHERN CALIFORNIA

Conservation Planning Area/County	General Locations
	Highway 101 between Las Pulgas Road and the SDGE yard.
Riverside County MSHCP	South of Temecula near Interstate 15, south and east of the Lake Mathews Reserve, north of Lake Elsinore, Diamond Valley Reservoir, Canyon Lake, Murrieta, Lee Lake, City of Corona, Banning-Beaumont, Moreno Valley, Santa Ana River; Temescal Wash, Lake Perris, San Jacinto River near Nuevo, south of Lake Skinner, Rawson Canyon, Motte-Rimrock Reserve, Santa Margarita Ecological Reserve
Orange County Southern Subregion	Vernal Pools on Chiquita Ridge and Radio Tower Road, upper Chiquita Canyon, San Juan Creek south of Chiquita Ridge and at confluence with Verdugo Canyon, upper Cristianitos Canyon, lower Gabino Canyon, upper Aliso Watershed north of El Toro Road
Orange County - Other Locations	Bee Canyon, Dana Point, near junction of Santiago Canyon Road and landfill, lower Cristianitos Creek northeast of San Clemente.

Western spadefoot toads inhabit coastal sage scrub, chaparral, and grasslands habitats, but are most common in grasslands with vernal pools or mixed grassland/coastal sage scrub areas (Holland and Goodman 1998). For reproduction and successful metamorphosis, western spadefoot toads require rain-filled pools ranging between 9 and 30 degrees C (48-86 degrees F) (Brown 1966, 1967) that hold standing water for more than three weeks (Feaver 1971). Riparian habitats with suitable water resources also may be used for reproduction (Holland and Goodman 1998). Breeding pools must lack fish, bullfrogs, and crayfish in order for western spadefoot toad to successfully reproduce and metamorphose (Jennings and Hayes 1994).

Breeding efforts probably are tied to the amount of rainfall (Holland and Goodman 1998), but artificial irrigation may elicit advertisement (reproductive) vocalizations during any month (Zeiner et al. 1990). After periods of warm rains, spadefoot toads emerge from burrows and form explosive, and sometimes large (>1,000 individuals) aggregations (Jennings and Hayes 1994). This typically occurs in late winter and early spring, but also may occur during the fall (Storer 1925; Feaver 1971; Jennings and Hayes 1994).

Because the critical thermal minimum is 9 degrees C (48 degrees F) (Brown 1966), spadefoot toads wait until water temperature is at least 10 degrees C (50 degrees F) before egg deposition (Jennings and Hayes 1994). Eggs are deposited in irregular small clusters about 25-30 cm (9.8-11.8 in) in diameter (Holland and Goodman 1998). They are attached to vegetation or debris (Storer 1925) in shallow temporary pools or ephemeral streamcourses (Stebbins 1985; Jennings

and Hayes 1994). Egg clusters rarely number more than 42 eggs (Jennings and Hayes 1994). The rate of egg hatching is water temperature-dependent (Brown 1967); however, eggs usually hatch within six days. Complete development can rapidly occur within three weeks (Holland and Goodman 1998), but may last up to 11 weeks (Burgess 1950; Feaver 1971; Jennings and Hayes 1994).

Water temperature, water evaporation, water chemistry, and food resources regulate the rate of development of western spadefoot toad (Holland and Goodman 1998; Denver 1998; Denver et al. 1998; Newman 1998; Morey and Reznick 2003). Tadpoles experimentally subjected to water volume reduction showed significant acceleration of metamorphosis (Denver et al. 1998), but the rate of accelerated development was determined by rate of water reduction and was reversible (decelerated development) by replacement of water. An accelerated metamorphosis appears to be a response to reduced swimming volume and proximity to water surface (Denver et al. 1998). Morey and Reznick (2003) found that western spadefoots breed synchronously in relation to heavy spring rains. Also, they found that spadefoots vary both in age and size at metamorphosis in relation to food resources, with larger sizes and reduced age at metamorphosis under good resource conditions. Spadefoot tadpoles exhibit several other adaptations for breeding in temporary pools, including cannibalism, production of growth inhibitors (to affect other tadpoles), and high heat tolerance (Low 1976).

After metamorphizing in the late spring, juvenile toads disperse after a short period of time (Zeiner et al. 1990). Western spadefoot toads apparently do not move far from their breeding pool during the year, with movements within a few hundred meters of breeding pools (Zeiner et al. 1990), and it is likely that their entire post-metamorphic home range is situated around a few pools. Toads estivate in upland habitats adjacent to potential breeding sites in burrows approximately 1 m (3.3 ft) in depth (Stebbins 1972). Although not observed specifically for this species, soil characteristics of burrow refuge sites likely become fairly hard and compact during the period of summer estivation (Jennings and Hayes 1994; Ruibal et al. 1969).

About 80 percent of the habitat once occupied by western spadefoot toad in southern California has been developed or converted to uses incompatible with successful reproduction or recruitment (Jennings and Hayes 1994). In addition, planting of mosquito fish for mosquito abatement programs in rain pools threatens some populations (Jennings and Hayes 1994) and bullfrogs emigrating into rain pool breeding sites also may pose a threat to this species as a predator (Hayes and Warner 1985; Morey and Guinn 1992). Finally, cattle grazing may have an impact on this species if cattle trample eggs masses and tadpoles and lower water levels when they drink at pools

b. Subregional Status

There are 22 records for spadefoot toads from about 10 distinct areas in the Southern Subregion database (*Figure 4-16*). Bloom's pre-1998 data include four spadefoot locations: near the RMV headquarters above San Juan Creek; along San Juan Creek approximately 0.5 mile east of the headquarters; near the confluence of Bell Canyon and San Juan Creek; and in grassland along Avenida Pico approximately 1 mile west of Cristianitos Canyon. Subsequent SOCTIIP surveys found spadefoot toads in San Juan Creek and upper Cristianitos Canyon. Other surveys by Bloom in 1998 documented several new locations. Several individuals and their larvae were found on RMV land within 0.75 mile of a Ranch residence south of the Ortega Highway. Four individuals were found near the confluence of Gabino Creek and Cristianitos Creek in the "Roundup/BBQ" area. Larvae also were found in vernal pools within Ladera Open Space on Chiquita Ridge. In addition, one spadefoot individual was found within Caspers Wilderness Park near the entrance. Pete DiSimone, in a personal communication to Pete Bloom, reported several larvae in a small pool on Starr Ranch. A spadefoot toad location from upper Chiquita Canyon was reported by Harmsworth Associates. The CNDDB includes records from Aliso Creek (not shown on map) and Bell Canyon at San Juan Creek. None of these locations numbered more than four adult individuals, suggesting relatively small populations in the subregion. Based on the existing database, no *major populations* occur in the Southern Subregion. However, five *important populations* are identified:

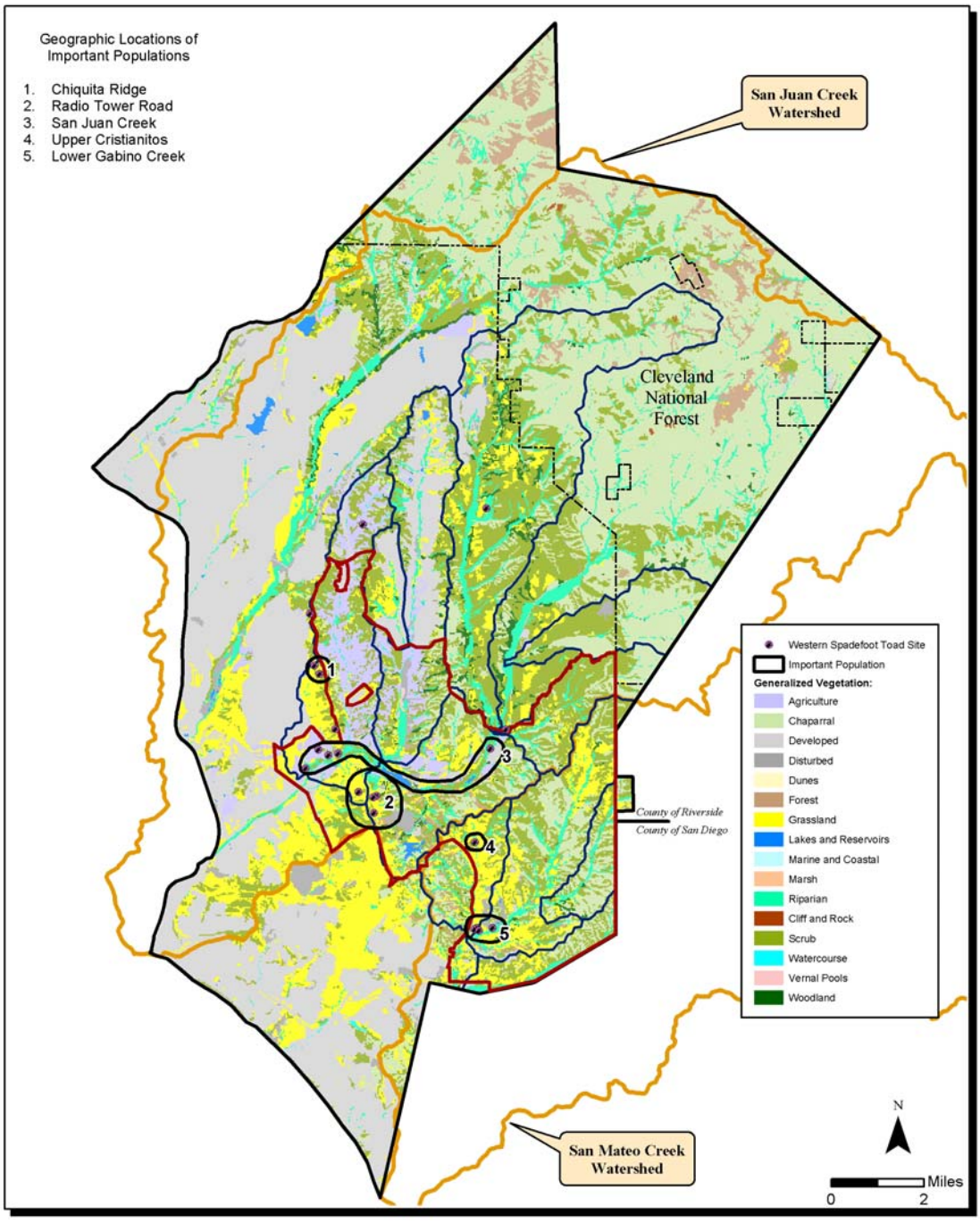
- Vernal pools on Chiquita Ridge in Ladera Open Space support an *important population* (No. 1 on *Figure 4-16*). These pools also support the Riverside and San Diego fairy shrimp and the special status plant mud nama.

- Vernal pools on Radio Tower Road support an *important population* (No. 2 on *Figure 4-16*). These pools also support the Riverside and San Diego fairy shrimp and mud nama.

- San Juan Creek from the RMV Headquarters to the confluence with Verdugo Canyon support an *important population* (No. 3 on *Figure 4-16*). These sites overlap with occupied and potential arroyo toad habitat.

- A stock pond in upper Cristianitos Canyon supports an *important population* (No. 4 on *Figure 4-16*). This site overlaps with an *important population* of the southwestern pond turtle.

- Lower Gabino Canyon supports an *important population* (No. 5 on *Figure 4-16*). This site overlaps with an *important population* of the arroyo toad.



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Western Spadefoot Toad Distribution Map

FIGURE 4-16

Because all of these scattered locations appear to support small populations and none appear to be crucial for maintaining the species in the planning area, no *key locations* were identified.

The 1998 surveys began somewhat late in the spadefoot toad breeding season and some breeding sites may have been missed. Bloom believes that the toad is more widespread in the planning area than indicated in the database. However, it seems unlikely that any new locations would constitute a *major population* or a *key location*. Even though the survey probably was too late in the season to find all the locations, it seems unlikely that a *major population* would have been missed.

c. Protection Recommendations

- Avoid impacts to vernal pools and their contributing hydrological sources along Radio Tower to support all life stages of the western spadefoot toad. The Chiquita Ridge pools are already protected in Ladera Open Space.

- Maintain and manage riparian and aquatic habitats along San Juan Creek to support all life stages the western spadefoot toad.

- Protect wetlands and adjoining upland habitat within 200 m (650 ft) of breeding sites in upper Cristianitos Canyon to support all life stages of western spadefoot toad.

- Protect the western spadefoot toad breeding population near the confluence of Gabino and Cristianitos creeks by avoiding direct impacts to breeding, foraging and estivating habitat (within 200 m [650 ft] of breeding sites), and avoiding indirect impacts to the watershed.

d. Management Recommendations

- Protect downstream habitat for the western spadefoot toad by maintaining hydrology, water quality and sediment delivery in San Juan Creek and minimizing additional loadings of nutrients or toxics.

- Implement a bullfrog eradication program for the Cal-Mat Lake within San Juan Creek and in the ponds north of lower Gabino Creek to help protect western spadefoot toads. Identify other bullfrog breeding areas that may pose a risk to western spadefoot and implement a bullfrog eradication program where necessary.

- Maintain stormwater flow characteristics comparable to existing conditions from Trampas Canyon into San Juan Creek to preserve breeding habitat for the western spadefoot toad.

- Implement a management program for vernal pools and other ephemeral breeding sites for the western spadefoot toad, including control of non-native species, management of grazing, and minimization of human access and disturbance as part of the Adaptive Management Program.

- Protect the integrity of the western spadefoot toad population in lower Gabino and Cristianitos creeks by implementing the Watershed and Sub-basin Planning Principles.

e. Restoration Recommendations

- In coordination with upstream eradication efforts, implement an invasive species eradication program for San Juan Creek between San Juan Capistrano and Bell Canyon to control giant reed and pampas grass.

- Implement an invasive species eradication program for lower Cristianitos Creek from the confluence with Gabino Creek and the RMV boundary to control tamarisk, giant reed and pampas grass.

- Implement a native grasslands restoration program in conjunction with the grazing techniques described above for the upper portion of the Cristianitos sub-basin that would benefit the western spadefoot toad.

4.2.10 Belding's Orange-throated Whiptail

Cnemidophorus hyperythrus (Aspidoscelis hyperythra) beldingi - Belding's Orange-throated Whiptail
USFWS: None
CDFG: California Special Concern Species

a. Regional Status

The Belding's orange-throated whiptail (*Cnemidophorus hyperythrus [Aspidoscelis hyperythra] beldingi*) is one two subspecies of orange-throated whiptail, the other being the cape orange-throated whiptail (*C. h. hyperythrus*) which is limited to the extreme southern portion of Baja California, Mexico. The Belding's orange-throated whiptail is simply called the orange-throated whiptail in this account since it is the only member of the taxon in the U.S. The current range of the orange-throated whiptail includes southwestern California and Baja California. In California,

this species is described as ranging from the southern edges of Orange (Corona del Mar) and San Bernardino (near Colton) counties southward to the Mexican border (Jennings and Hayes 1994). However, the CNDDB includes a single record from Tujunga Wash in Los Angeles County south of Interstate 210 near Sunland. This disjunct record suggests that the species is more common than described in the literature. They are located on the coastal slope of the Peninsular Ranges and extend from near sea level to 1,040 m (3,412 ft) northeast of Aguanga in Riverside County (Jennings and Hayes 1994).

The geographic distribution the orange-throated whiptail coincides with that of the subterranean termite (*Reticulitermes hesperus)*, the whiptail's primary prey item. For example, the Peninsular Mountain Range in Riverside and San Diego counties, where the termite is limited to its slopes, possibly restricts eastward and altitudinal expansion of orange-throated whiptail populations. Similarly, in San Bernardino County, the restriction of subterranean termites to the lower slopes of the Transverse and Peninsular ranges, and their local scarcity, possibly prevents eastward expansion of whiptails in that county. On the other hand, termites are abundant in Los Angeles and northern Orange counties, but orange-throated whiptails are considered to be absent from these areas (see description of range above) despite the availability of ostensibly suitable whiptail habitat. It is possible that urban, suburban and agricultural development activities may be effective dispersal barriers, but reason(s) for the absence of this species from habitat islands (e.g., the Palos Verdes Peninsula) is(are) unknown.

Table 4-17 shows the distribution of the orange-throated whiptail lizard in California based 233 records in the 2003 CNDDB. The records are too numerous to include the general locations. Almost 88 percent of the occurrences are from San Diego and Riverside counties, with less than 10 percent from Orange County.

TABLE 4-17
DISTRIBUTION OF THE ORANGE-THROATED
WHIPTAIL IN CALIFORNIA

County	No. of CNDDB Records
Los Angeles	1
Orange	23
Riverside	82
San Bernardino	4
San Diego	123

The orange-throated whiptail has been a focus of conservation planning programs in southern California. *Table 4-18* provides more detailed information on the conservation status of this species and its habitat in these programs.

TABLE 4-18
CONSERVATION STATUS OF THE ORANGE-THROATED WHIPTAIL

Conservation Planning Area	Number of Orange-throated Whiptail Locations and Percent Conserved	Potential Habitat Conserved
San Diego MSCP	514 locations, of which 62% conserved	56% of CSS and chaparral habitats and riparian scrub
Central/Coastal NCCP Reserve, Special Linkage and Existing Use Areas, Non-Reserve Open Space, and the Policy Plan Area	Number of locations not analyzed for conservation purposes	NA
North San Diego County MHCP	33 locations 55% proposed conservation	Proposed conservation of 11,691 acres (64%) of suitable habitat, including coastal sage scrub, maritime succulent scrub, chaparral, southern maritime chaparral, coastal sage scrub/chaparral mix.
Western Riverside MHSCP	140 locations 45% proposed conservation	Proposed conservation of 226,313 acres (59 %) of suitable habitat in the Plan Area, including chaparral, coastal sage scrub, desert scrub, Riversidean alluvial fan sage scrub, riparian scrub, woodland and forest.

The orange-throated whiptail inhabits coastal sage scrub, chaparral, non-native grassland, oak woodland, alluvial fan scrub and riparian areas. This species is presumably tied to perennial vegetation because its major food source, termites, requires perennial plants as a food base (Bostic 1966a). California buckwheat appears to be an important indicator of suitable habitat for the orange-throated whiptail because it generally is associated with habitats with 10-40 percent bare ground (McGurty 1981). Substantial bare ground apparently is required for foraging and thermoregulatory behavior by this species (McGurty 1981). California buckwheat commonly occurs in coastal sage scrub and chaparral and often is associated with other perennial species such as coastal sagebrush and sages (*Salvia* spp.) that may be food sources for termites. Friable soils also appear to be necessary for excavating burrows and hiding eggs (Bostic 1965).

Analyses of soil grain size preferences indicate that orange-throated whiptail select only the two finest grain sizes for bury (Brattstrom 1989). However, these findings are complicated by the fact that lizards sometimes bury in larger grains in loose soil aprons brought up from the sub-surface by rodents (Brattstrom 1989).

Unlike several species in the whiptail genus *Cnemidophorus*, the orange-throated whiptail does not reproduce through parthenogenesis (development of an individual from a female gamete without fertilization by a male gamete). Based on examining reproductive structures throughout the year, Bostic (1966b) inferred from the presence of enlarged testes that males are reproductively active from the first week of April through the first week of July. The male cycle begins with regressed testes as they emerge from hibernation. By late April, maximum testicular volume is achieved, followed by a decrease throughout the rest of the summer and complete regression by August. Orange-throated whiptails generally were found to reach maturity in the spring following hatching in the previous summer based on examination of the gonads and accessory reproductive structures of male and female dissected lizards.

The average clutch size for the orange-throated whiptail is approximately 2.3 eggs (Bostic 1966b). Reproductive potential is lower in yearlings than in adults of two years of age or older, with a recorded a maximum clutch size of two eggs for yearlings and three for older lizards (Bostic 1966b). The number of egg clutches deposited each season by orange-throated whiptails in not known; however, multiple clutches may be laid, one in June and again in mid-July (Milstead 1957a; Bostic 1966b; Parker 1972; Crews et al. 1986). Rainfall may influence clutch size (Mitchell 1979; Crews et al. 1986; Pianka 1986). Incubation of hatchlings appears to be approximately 50-55 days based on the time interval between the last record of females with oviducal eggs (mid-July) to dates hatchlings were last observed in the field.

Bostic (1965) recorded an average home range of 0.04 ha (0.10 ac) for adult orange-throated whiptails. Female ranges were slightly larger than male ranges at 0.06 ha (0.15 ac) versus 0.03 ha (0.07 ac), respectively. Female home ranges overlap extensively with other females' ranges as well as male ranges. Bostic (1965) also noted some overlap among male home ranges, but not as extensive as for females.

Termites comprise 72-92 percent of the orange-throated whiptail's diet (Bostic 1966a). In late summer, however, when termites migrate deep into the soil to avoid high surface temperatures, alternate prey items dominate the whiptail's diet. Orange-throated whiptails feed primarily on prey of a secretive nature and low activity, and depend primarily on chemoreception when hunting such prey (Bostic 1966a). When hunting prey of intermediate or high activity (e.g., lepidopterans), vision is most often employed.

The daily activity cycle of whiptails is dominated and controlled by thermoregulatory needs (e.g., Cowles 1940; Carpenter 1961; Bogert 1949; Fitch 1958). Through thermoregulatory behaviors, whiptails are able to maintain their body temperatures within a narrow range. Most of the year whiptails are active throughout the day when near-surface temperatures are between 36-41 degrees C (96-106 degrees F). They become bimodally diurnal on hot summer days, meaning that their surface activity peaks twice a day when temperatures are appropriate; otherwise they spend the warmest part of the day in shade or an underground retreat (Milstead 1957b; Mitchell 1979; Pianka 1986). Whiptails usually only emerge when near-surface temperatures reach about 28 degrees C (82 degrees F). During low early morning temperatures, they move slowly while foraging and frequently stop to bask in open or sparsely covered grass areas between bushes. As mid-morning temperatures increase, basking becomes infrequent and of shorter duration and foraging largely occurs in shaded or semi-shaded areas around bushes. Movements between bushes are very rapid. Few whiptails are observed foraging as midday temperatures increase and as they retreat to cooler areas (e.g., rodent burrows, shade beneath bushes, or they excavate shallow retreats in the substrate). Additional thermoregulatory behavioral patterns may include arboreal behavior to aid in the dispersal of heat to the cooler upper air strata, although Bostic (1966c) found that substrate temperatures appear to be more important role in regulating body temperature than do air temperatures. Adult orange-throated whiptails usually enter into hibernation in late July through most of September, and immatures in December (Bostic 1966c). Favored hibernation, and likely oviposition sites, appear to be on well-isolated, south-facing slopes (Jennings and Hayes 1994).

The main threat to the orange-throated whiptail has been habitat loss and fragmentation to development in recent decades. The CDFG estimated in 1990 that the orange-throated whiptail had been extirpated from 75 percent of its historic range (Jennings and Hayes 1994). The lower coastal floodplains have been developed, leaving the smaller, higher elevation and relatively isolated drainages and terraces as habitat for the whiptail. Because these areas are smaller and isolated, thus limiting dispersal opportunities, local populations have a greater risk of local extinction. The CDFG (2003) also suggests that the drought of 1986-1990 may have depleted the orange-throated whiptail's prey base, which poses a particular problem to a dietary specialist than cannot easily shift to another prey. As with the horned lizard, Argentine ants, that displace many native insects, also may influence the prey base of orange-throated whiptail (Jennings and Hayes 1994). Finally, McGurty (1981) suggested the frequent fires resulting in type conversion from scrub to grassland habitat reduces woody shrubs and food sources for termites. Lack of cover cause by fires may also affect thermoregulation by the whiptail.

b. Subregional Status

The NCCP database includes 174 locations for the orange-throated whiptail broadly distributed throughout the planning area, ranging from the Saddleback Meadows area in the northwest to the Talega sub-basin in the southeast (*Figure 4-17*). Areas with clusters of locations include Saddleback Meadows; lower Arroyo Trabuco; Starr Ranch in upper Bell Canyon (from pitfall trapping data of 23 captures in six of 17 pitfall traps); Chiquita Ridge below Oso Parkway; lower Chiquita Ridge just north of San Juan Creek; the ridge between Chiquita Canyon and Wagon Wheel Canyon; Chiquadora Ridge; the Gobernadora/Central San Juan Creek sub-basins north and east of the Colorspot Nursery; the lower Trampas Canyon subunit/upper Cristianitos sub-basin; and the lower Cristianitos sub-basin. Scattered locations also occur in the eastern portion of the Talega sub-basin, middle Gabino Canyon and west of Radio Tower Road.

The orange-throated whiptail occurrences are widely scattered, but there appear to be three clusters of occurrences that may be considered *important populations* in *key locations*.

- A cluster of 58 occurrences in coastal sage scrub along the ridge between Chiquita Canyon and Wagon Wheel Canyon south of Oso Parkway (No.1 on *Figure 4-17*).

- A cluster of 22 occurrences along Chiquadora Ridge (No. 2 on *Figure 4-17*).

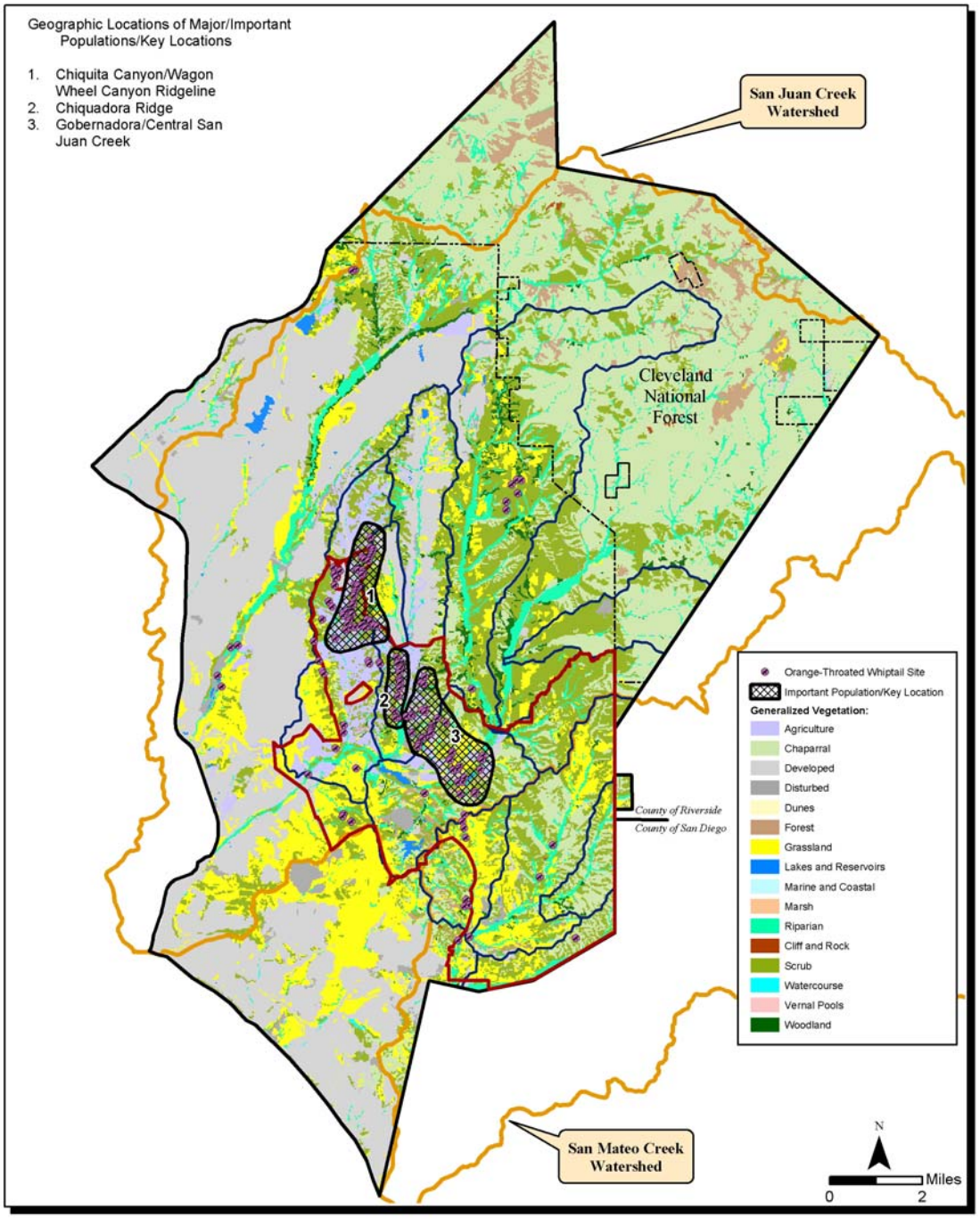
- A cluster of 35 occurrences in the Gobernadora/Central San Juan Creek sub-basins north and east of the Colorspot Nursery (No. 2 on *Figure 4-17*).

As with the San Diego horned lizard, identifying these three areas as *important populations* in *key locations* must be qualified. These clusters occur within survey areas for the SOCTIIP project and thus probably reflect the greater survey effort in this portion of the planning area. Given the wide distribution of this species in the planning area, and its fairly general habitat requirements, it is likely to occur in many other locations within the planning area. The Science Advisors considered the orange-throated whiptail a Group 2 species that can be conserved at a habitat or landscape level. For that reason, the protection recommendations below reflect conservation of these *important populations* as well as broader habitat and landscape protection.

c. Protection Recommendations

- Protect the orange-throated whiptail locations on the ridgeline between Chiquita Canyon and Wagon Wheel Canyon that comprise an *important population* in a *key location*.

- Protect the orange-throated whiptail locations on Chiquadora Ridge that comprise an *important population* in a *key location*.



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Orange-throated Whiptail Distribution Map

FIGURE 4-17

Protect the major north-south connection to Central San Juan Creek by providing a habitat linkage between Chiquita Creek and the eastern edge of the Ladera Open Space and by restricting new impervious surfaces west of Chiquita Creek in order to maintain habitat integrity between the creek and Chiquita Ridge.

- Maintain east-west biological connectivity by protecting habitat linkages and wildlife corridors between Arroyo Trabuco, Chiquita Canyon, and Gobernadora Canyon. Biological connectivity should be maintained between Chiquita, Gobernadora and Arroyo Trabuco by protecting habitat linkages at minimum of three locations within the sub-basin: **(1)** via rim-to-rim preservation of Sulphur Canyon (approximately 2,000 to 2,500 feet wide); **(2)** at the "Narrows" where the canyon is only 700-800 feet wide (approximately 3,000 feet south of Tesoro High School) and connects to Sulphur Canyon; and **(3)** in contiguous patches of coastal sage scrub through the major canyon north and east of the wastewater treatment plant.

- Maintain a continuous upland habitat linkage along the east-facing slopes of Chiquadora Ridge between San Juan Creek and Sulphur Canyon.

- Provide floodplain and upland linkage habitat adjacent to San Juan Creek for "live-in" and dispersal habitat for the orange-throated whiptail.

- Maintain upland north-south habitat linkages through the central and western portions of the Trampas Canyon subunit to provide "live-in" and dispersal habitat for the orange-throated whiptail.

- Protect a habitat linkage, consisting of the Donna O'Neill Land Conservancy and an area along the east side of Cristianitos Creek, to provide dispersal opportunities for the orange-throated whiptail in the upper portion of the sub-basin with other populations in lower Gabino Creek and Camp Pendleton along lower Cristianitos/San Mateo Creek, and to maintain habitat integrity through connectivity within the Donna O'Neill Land Conservancy at Rancho Mission Viejo.

- Maintain an east-west habitat linkage from Gabino Creek to the confluence with Cristianitos Creek as "live-in" habitat and dispersal opportunities for the orange-throated whiptail between Gabino Canyon and the Donna O'Neill Conservancy at Rancho Mission Viejo.

- Protect, to the extent feasible, patches of coastal sage scrub in the Verdugo Canyon sub-basin with a focus on maintaining contiguous habitat patches that provide "live-habitat" and north-south dispersal opportunities for the orange-throated whiptail between the

Lucas Canyon sub-basin to the north, and the Gabino Canyon/Blind Canyon and La Paz sub-basins to the south.

- Maintain contiguity and connectivity of coastal sage scrub in the upper Gabino Canyon subunit to provide "live-in" and dispersal habitat for the orange-throated whiptail.

- Protect a north-south habitat linkage through Middle Gabino to provide "live-in" habitat and dispersal opportunities for the orange-throated whiptail.

- Maintain contiguity and connectivity of coastal sage scrub in the Talega Canyon sub-basin to provide "live-in" habitat and dispersal opportunities for the orange-throated whiptail.

d. Management Recommendations

- Implement a management program for protected habitat suitable for the orange-throated whiptail, including control of non-native species such as the Argentine ant, management of fire and grazing and minimization of human access and disturbance (e.g., collecting), as part of the Adaptive Management Program.

e. Restoration Recommendations

- Implement a CSS/VGL restoration program to enhance habitat value and connectivity. Potential restoration areas that would benefit the orange-throated whiptail include Chiquita Ridge, Sulphur Canyon, Chiquadora Ridge, upper Cristianitos Canyon and upper Gabino Canyon.

4.2.11 San Diego Horned Lizard

Phrynosoma coronatum blainvillei - San Diego Horned Lizard[3]
USFWS: None
CDFG: California Special Concern Species

a. Regional Status

The full species coast horned lizard (*Phrynosoma coronatum*) occurs throughout much of California west of the Sierra Nevada and Cascade ranges (Stebbins 1985). It is absent from the

[3] The CDFG January 2004 Special Animals list specifies coast horned lizard (*Phrynosoma coronatum*) blainvillei, population as a California Special Concern species. However, for the purpose of continuity with all previous documents prepared for the NCCP, this species account will continue to use the common name San Diego horned lizard.

humid rainforests of northwest coastal California. The range of the subspecies San Diego horned lizard (*P. c. blainvillei*) includes the Transverse Ranges in Kern, Los Angeles, Santa Barbara, and Ventura counties southward through the Peninsular Ranges of southern California to Baja California (Jennings 1988). The known elevation range of this species is from 10 m (33 ft) at the El Segundo dunes in Los Angeles County to approximately 2,130 m (6,988 ft) at Tahquitz Meadow in the San Jacinto Mountains in Riverside County. The San Diego horned lizard was once common on coastal plains and in riparian and coastal sage scrub habitats on the old alluvial fans in southern California (Hayes and Guyer 1981; Bryant 1911; Van Denburgh 1922), but appears to have been extirpated from about 45 percent of its former range in southern California (Jennings 1988). The San Diego horned lizard is thought to intergrade with the subspecies *P. c. frontale* in extreme southern Kern County and northern Santa Barbara, Ventura, and Los Angeles counties (Reeve 1952; Montanucci 1968; Jennings 1988). It should be noted that recent taxonomic studies find no evidence based on scale characteristics to separate the two subspecies of *P. coronatum* (Grismer and Mellink 1994; Brattstrom 1997). The CDFG January 2004 Special Animals list currently specifies the coast horned lizard (*Phrynosoma coronatum*) blainvillei, population as the California Special Concern species that replaces the old designation San Diego horned lizard. However, for the purpose of continuity with all previous documents prepared for the NCCP, this species account will continue to use the common name San Diego horned lizard.

Table 4-19 provides distributional information for the San Diego Horned lizard by county based on 350 records in the 2003 CNDDB. Records are too numerous to include general locations within the counties. These data do not identify *major* or *important populations* or *key locations*. *Table 4-19* shows that the vast majority of the San Diego horned lizard observations are in the five Southern California counties, with San Diego having the greater number of occurrences, followed by Riverside, Los Angeles, San Bernardino and Orange.

TABLE 4-19
2003 CNDDB RANGEWIDE DISTRIBUTION OF THE
SAN DIEGO HORNED LIZARD IN CALIFORNIA

County	No. of CNDDB Records
Kern	1
Los Angeles	70
Orange	26
Riverside	82
San Bernardino	45
San Diego	124
Ventura	2

The San Diego horned lizard has been the focus of conservation planning programs in southern California. *Table 4-20* provides detailed information on the conservation status of this subspecies in these programs.

TABLE 4-20
CONSERVATION STATUS OF THE SAN DIEGO HORNED LIZARD

Conservation Planning Area	Number of Horned Lizard Locations and Percent Conserved	Potential Habitat Conserved
San Diego MSCP	291 locations 63% conserved	56% of coastal sage scrub and chaparral habitats and riparian scrub
Central/Coastal NCCP Reserve, Special Linkage and Existing Use Areas, Non-Reserve Open Space, and the Policy Plan Area	Number of locations not analyzed for conservation purposes	NA
North San Diego County MHCP	30 locations 38% proposed conservation	Proposed conservation of 13,992 acres (57%) of potential habitat, including chaparral, southern maritime chaparral, coastal sage scrub, coastal sage scrub/chaparral mix, grassland, oak woodlands
Western Riverside MSHCP	135 locations 42% proposed conservation	Proposed conservation of 407,036 acres (56%) of suitable habitat in the Plan Area including coastal sage scrub, desert scrub, Riversidean alluvial fan sage scrub, grassland, and chaparral

The San Diego horned lizard is found in a wide variety of vegetation types, including coastal sage scrub, annual grassland, chaparral, oak woodland, riparian woodland and coniferous forest (Klauber 1939; Stebbins 1985). In inland areas, this species is restricted to areas with open microhabitats, often created by natural or anthropogenic disturbances (e.g., floods, fire, roads, grazed areas, fire breaks) (Jennings and Hayes 1994).

In southern California, the male reproductive cycle begins during mid- to late-March and ends in June (Goldberg 1983). Female horned lizards lay a clutch of 6 to 17 eggs between May and July each year (Stebbins 1954; Howard 1974; Goldberg 1983). Goldberg (1983) found that *P. coronatum* has the potential to produce multiple clutches during the spring. Hatchlings appear in late July to early August, and require two to three years to reach reproductive age (Howard 1974;

Pianka and Parker 1975; Goldberg 1983). San Diego horned lizards emerge from hibernation in March, and become surface active in April through July, after which most adults estivate (summer hibernation) (Hagar 1992). The adults reappear again briefly in late summer and return to overwintering sites between August and early October depending upon elevation (Klauber 1939; Howard 1974; Hagar 1992).

Horned lizards in general (i.e., the genus *Phrynosoma*) primarily are ant-eating reptiles with relatively well-known dietary habits (Montanucci 1981; Pianka and Parker 1975; Powell and Russell 1984; Rissing 1981; Turner and Medica 1982). Up to 90 percent of the diet of San Diego horned lizard consists of native harvester ants (*Pogonomyrmex* spp.) (Pianka and Parker 1975). However, the San Diego horned lizard does not appear to eat non-native Argentine ants (*Linepithema humile*) (Jennings and Hayes 1994), which displace native ants wherever they are introduced (Suarez et al. 2001), and as described in more detail below. In addition, other slow moving insects, such as beetles, flies, and caterpillars are consumed opportunistically by horned lizards when encountered (Presch 1969; Pianka and Parker 1975).

The daily diurnal activity of San Diego horned lizards is tied closely to surface temperatures. As surface temperatures reach at least 19 degrees C (66 degrees F) just prior to sunrise lizards emerge from burial sites in the substrate into a position that allows them to bask in the first rays of the sun (Heath 1965; Hagar 1992). Although horned lizards emerge at relatively low temperatures, the optimum temperature range for horned lizard activity is 29-39 degrees C (84-102 degrees F). Midday temperatures over 40 degrees C (104 degrees F) are avoided as San Diego horned lizards bury themselves in the substrate, reemerging in the later afternoon when its cooler to resume activities of foraging and reproduction. High site fidelity appears to be related to effective thermoregulation, because maintaining optimum temperatures requires familiarity with their surroundings (Heath 1965).

There are no specific data for the home range of San Diego horned lizards. However, Whitford and Bryant (1979) study of the closely related *P. cornutum* and found that individuals moved an average of only 46.8 m (53.5 ft) per day (range = 9-91 m [29.5-298.5 ft]). They also found that an individual horned lizard moved over a zigzag course during a day but rarely crossed its own trail. Tollestrup (1981) suggested that olfactory cues are important in the horned lizard's daily activities, including courtship, feeding, sex recognition, and conspecific interactions. In addition, they apparently mark sites by partially extruding their cloaca and rub it back and forth on the substrate.

Horned lizards are prey for a variety of natural predators, such as coyotes, badgers, foxes, small raptors (kestrels, falcons, shrikes, burrowing owls), roadrunners, and several other lizards and snakes (Zeiner et al. 1990). Their main defenses against predators are their cryptic appearance and freezing behavior (Jennings and Hayes 1994). Klauber (1939) observed changes in body

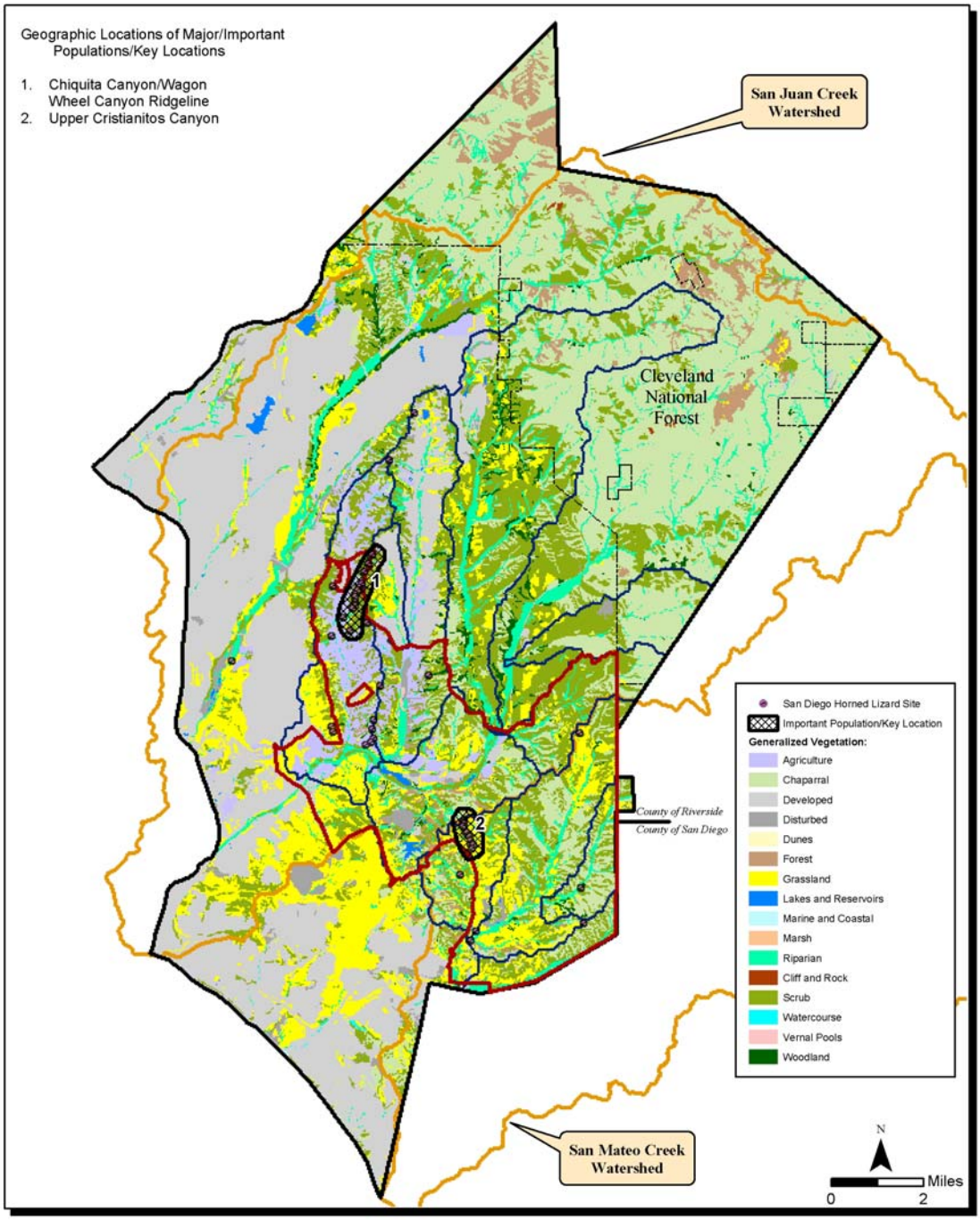
coloration to match the soil or sand on which they were found. If discovered or disturbed horned lizards defenses include hissing, inflating their lungs to increase apparent size (Pianka and Parker 1975; Munger 1984; Sherbrooke 1981), raising their horns by lowering their snout (Pianka and Parker 1975; Sherbrooke 1981), squirting blood from the corner of the eye (which seems to repel dogs and cats) (Presch 1969; Pianka and Parker 1975), tilting the body when irritated (Milne and Milne 1950; Smith 1946; Tollestrup 1981), presenting a bristling of scales of the back while standing well up on the legs (Bryant 1911), and running a short distance before flattening out or burrowing several centimeters under the ground (Presch 1969). When a horned lizard flattens its body, it usually tucks its head down, exposing its horns, and often charges the enemy (Winton 1916).

Habitat loss is one of the main threats to the San Diego horned lizard, with approximately 45 percent of habitat extirpated as of 1988 (Jennings 1988). In addition to habitat loss, Jenning and Hayes (1994) identified several other threats to the San Diego horned lizard, including collection by humans, off-road vehicles, livestock grazing, conversion of habitat to agriculture, invasion by Argentine ants, firebreaks and prescribed burning (although the latter two may actually create open microhabitats used by horned lizards).

The invasion of habitat by Argentine ants in California recently has become a high profile threat, not only to the horned lizard, but also to other native species. Although Argentine ants have been in California for at least 93 years (Holway 1995), studies of the species date back only to the 1970s. It is now clear that Argentine ants disrupt natural communities by displacing native ants and other arthropods and disrupting ant-plant and ant-aphid mutualisms (evolved interdependent associations) (Holway 1995). Argentine ants spread by two mechanisms: diffusion and jump-dispersal. Diffusion involves typically slow, continuous spreading often along riparian corridors. Jump-dispersal can transport ants quickly and across long distances and can be human-mediated (e.g., potted plants, foodstuffs) or natural (e.g., floating wood rafts along streams).

a. Subregional Status

The NCCP database for the San Diego horned lizard includes 50 occurrence records, with virtually all in coastal sage scrub. The San Diego horned lizard is found in the following locations within the planning area: lower Arroyo Trabuco; the northern portion of the Upper Chiquita Canyon Conservation Area; in the "Narrows" area of Chiquita Canyon and along ridgeline separating the Chiquita Canyon and Wagon Wheel Canyon sub-basins; the southern portion of Chiquita Ridge; Chiquadora Ridge south and southeast of the wastewater treatment plant; upper Cristianitos Canyon; the confluence of Cristianitos and Gabino creeks; La Paz Creek; upper Blind Canyon; and upper Gabino Canyon (*Figure 4-18*). Although there is wide



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San Diego Horned Lizard Distribution Map

FIGURE 4-18

scattering of horned lizard occurrences, there appear to be two clusters of occurrences that may be considered *important populations* in *key locations*:

- A cluster of 16 occurrences in coastal sage scrub along the ridge between Chiquita Canyon and Wagon Wheel Canyon south of Oso Parkway (No.1 on *Figure 4-18*).

- A cluster of 14 occurrences in the upper Cristianitos and southern Trampas Canyon sub-basin located between Cristianitos Road and Cristianitos Creek (No. 2 on *Figure 4-18*).

Identifying these two areas as *important populations* in *key locations* must be qualified. These clusters occur within the survey area for the SOCTIIP project and thus probably reflect the greater survey effort in this portion of the planning area. On the other hand, even within the SOCTIIP survey area, these two locations stand out as having exceptionally high numbers of horned lizards. Given the wide distribution of this species in the planning area, and its fairly general habitat requirements, it is likely to occur in many other locations within the planning area, but perhaps not in the concentrations found in these two areas. The Science Advisors considered the San Diego horned lizard a Group 2 species that can be conserved at a habitat or landscape level. For that reason, the protection recommendations below reflect conservation of these *important populations* in *key locations* as well as broader habitat and landscape protection.

b. Protection Recommendations

- Protect the San Diego horned lizard locations on the ridgeline between Chiquita Canyon and Wagon Wheel Canyon that comprise an *important population* in a *key location*.

- Protect the San Diego horned lizard locations in the upper Cristianitos Canyon and southern Trampas Canyon sub-basins between Cristianitos Creek and Cristianitos Road that comprise an *important population* in a *key location*.

- Protect the major north-south connection to Central San Juan Creek by providing a habitat linkage between Chiquita Creek and the eastern edge of the Ladera Open Space and by restricting new impervious surfaces west of Chiquita Creek in order to maintain habitat integrity between the creek and Chiquita Ridge.

- Maintain east-west biological connectivity by protecting habitat linkages and wildlife corridors between Arroyo Trabuco, Chiquita Canyon, and Gobernadora Canyon. Biological connectivity should be maintained between Chiquita, Gobernadora and Arroyo Trabuco by protecting habitat linkages at minimum of three locations within the sub-basin: **(1)** via rim-to-rim preservation of Sulphur Canyon (approximately 2,000 to 2,500 feet wide); **(2)** at the "Narrows" where the canyon is only 700-800 feet wide (approximately 3,000 feet south of

Tesoro High School) and connects to Sulphur Canyon; and **(3)** in contiguous patches of coastal sage scrub through the major canyon north and east of the wastewater treatment plant.

- Maintain a continuous upland habitat linkage along the east-facing slopes of Chiquadora Ridge between San Juan Creek and Sulphur Canyon.

- Protect Sulphur Canyon rim-to-rim to maintain a functional biological connection from Gobernadora to Gen. Thomas F. Riley Regional Park in Wagon Wheel Canyon and upper Chiquita Canyon.

- Provide floodplain and upland linkage habitat adjacent to San Juan Creek for "live-in" and dispersal habitat for the San Diego horned lizard.

- Maintain upland north-south habitat linkages through the central and western portions of the Trampas Canyon subunit to provide "live-in" and dispersal habitat for the San Diego horned.

- Protect a habitat linkage, consisting of the Donna O'Neill Land Conservancy and an area along the east side of Cristianitos Creek, to provide dispersal opportunities for the San Diego horned lizard in the upper portion of the sub-basin with other populations in lower Gabino Creek and Camp Pendleton along lower Cristianitos/San Mateo Creek, and to maintain habitat integrity through connectivity within the Donna O'Neill Land Conservancy at Rancho Mission Viejo.

- Maintain an east-west habitat linkage from Gabino Creek to the confluence with Cristianitos Creek as "live-in" habitat and dispersal opportunities for the San Diego horned lizard between Gabino Canyon and the Donna O'Neill Land Conservancy.

- Protect, to the extent feasible, patches of coastal sage scrub in the Verdugo Canyon sub-basin with a focus on maintaining contiguous habitat patches that provide "live-habitat" and north-south dispersal opportunities for the San Diego horned lizard between the Lucas Canyon sub-basin to the north, and the Gabino Canyon/Blind Canyon and La Paz sub-basins to the south.

- Maintain contiguity and connectivity of coastal sage scrub in the upper Gabino Canyon subunit to provide "live-in" and dispersal habitat for the San Diego horned lizard.

- Protect a north-south habitat linkage through Middle Gabino to provide "live-in" habitat and dispersal opportunities for the San Diego horned lizard.

- Maintain contiguity and connectivity of coastal sage scrub in the Talega Canyon sub-basin to provide "live-in" habitat and dispersal opportunities for the San Diego horned lizard.

c. Management Recommendations

- Implement a management program for protected habitat suitable for the San Diego horned lizard, including control of non-native species such as the Argentine ant, non-native mesopredators (cats and dogs), management of fire and grazing and minimization of human access and disturbance (e.g., collecting), as part of the Adaptive Management Program.

d. Restoration Recommendations

- Implement a CSS/VGL restoration program to enhance habitat value and connectivity. Potential restoration areas that would benefit the San Diego horned lizard include Chiquita Ridge, Sulphur Canyon, Chiquadora Ridge, upper Cristianitos Canyon and upper Gabino Canyon.

4.2.12 Southwestern Pond Turtle

Clemmys (Emys) marmorata pallida - Southwestern Pond Turtle
USFWS: None
CDFG: California Special Concern Species

a. Regional Status

The historic range of the full species of the pond turtle (*Clemmys [Emys] marmorata*) extended along most of the west coast of North America, primarily west of the Cascade-Sierra crest, from western British Columbia to northern Baja California (Ernst et al. 1994). The subspecies southwestern pond turtle (*C. m. pallida*) ranges south of San Francisco Bay to northern Baja California, Mexico, and intergrades with the northwestern pond turtle (*C. m. marmorata*) over a large area in central California (Bury 1970; Stebbins 1985). Isolated populations of the southwestern pond turtle are known to exist as far into the Mojave Desert in Afton Canyon and in the Amargosa River (Lovich 1999). The elevational range for the species is from brackish estuarine waters at sea level to over 2,000 m (6,562 ft), but it is uncommon over 1,530 meters (5,020 ft) (Stebbins 1954; Bury 1963; Holland 1994).

Table 4-21 illustrates the distribution of the southwestern pond turtle by county in California based on 277 records in the 2003 CNDDB. Specific locations for pond turtles are suppressed in

the CNDDB to prevent collection from the sites. These data illustrate the general distribution of the southwestern pond turtle and do not identify *major* or *important populations* or *key locations*.

TABLE 4-21
2003 RANGEWIDE DISTRIBUTION OF THE
SOUTHWESTERN POND TURTLE IN CALIFORNIA

County	No. of CNDDB Records
Alameda	1
Kern	19
Los Angeles	30
Monterey	19
Orange	26
Riverside	10
San Bernardino	7
San Diego	30
San Luis Obispo	75
Santa Barbara	35
Santa Clara	2
Santa Cruz	3
Ventura	22

Harmsworth Associates (1998b) conducted visual, seine netting and funnel trapping surveys for the pond turtle in all natural and semi-natural watercourses, artificial lakes and reservoirs, and channelized culverts and flood control channels in the Central and Coastal NCCP Subregion in 1997 (excluding MAS Tustin, the North Ranch Policy Plan Area and Cleveland National Forest). Of about 123 separate study sites the pond turtle was observed at 17 locations (locations are not described in detail here), with most occurring in the Central Subarea. The Southern Subregion NCCP planning area supports approximately seven discrete locations, as described in more detail below.

Southwestern pond turtles inhabit slow-moving permanent or intermittent streams, small ponds, small lakes, reservoirs, abandoned gravel pits, permanent and ephemeral shallow wetlands, stock ponds, and sewage treatment lagoons (Rathbun et al. 1992; Holland 1994). Pools within streams are the preferred habitat (Bury 1972). Abundant logs, rocks, submerged vegetation, mud, undercut banks, and ledges are necessary habitat components for cover, as well as a water depth greater than 2 m (6.6 ft) (Brattstrom and Messer 1988; Holland 1994). Additionally, emergent

basking sites, emergent vegetation and the availability of suitable terrestrial shelter and nesting sites are characteristic of occupied habitat. Adjacent upland areas provide overwintering and estivation sites that are used for 1-2 months in southern California (Holland 1994).

Reproductive activity by southwestern pond turtles has been observed from February through November (Holland1988; Buskirk 1991; Goodman 1997a). Depending on latitude, peak nesting season is from late May through early July, but extends from late April through August (Holland 1994). Goodman (1997a) found that females begin laying eggs at a carapace length greater than 11 cm (4.3 in) and Holland (1994) suggests that females first reproduce at age 6 to 7 years.

Availability and selection of suitable nesting sites is a key factor in pond turtle distribution. If suitable nesting sites are not available, females have been observed to travel up to 1.9 km (1.2 mi) along a waterway to lay their eggs (Rathbun et al. 1992). Nests typically are located along stream or pond margins, but may be located over 100 m (328 ft) from water on adjacent hillsides, apparently with a southern exposure. Six terrestrial nest locations inspected by Rathbun et al. (1992) were all found in open, grassy areas with a southern exposure. Goodman (1997a) observed a similar pattern at two study sites in southern California: Aliso Creek in Chino Hills State Park and along the West Fork of the San Gabriel River. Nest sites were generally on south-facing slopes ranging from 2-60 degrees and an average of 16.2 m (53.1 ft) from the watercourse (range: 1.5-48.2 m [4.9-158.1 ft]) at Aliso Creek and an average of 28.7 m (94.1 ft) from the watercourse (range: 18.3-47.3 m [60.0-155.2 ft]) at the San Gabriel River. A southern exposure likely is important for thermal regimes related to egg development. Goodman also noted dominant vegetation at nest sites. At the Aliso Creek site the dominant vegetation was non-native grasses, usually in association with black mustard. The average percent cover at the Aliso Creek nest sites was a 17 percent (range: 5-33 percent). At the San Gabriel River site, there was more variability in the dominant vegetation communities at nest sites, and included moss, buckwheat, scrub oak, chamise, yucca and non-native grasses. The average percent cover at the San Gabriel River nests sites was 28 percent (range: 0-80 percent). Goodman (1997a) did not analyze whether there was specific nest site selection based on vegetation or soils. Holland (1991) noted that most nests sites discovered up to that time were on dry, well-drained soils with significant clay/silt content and low (<15 degrees) slope.

Nesting forays onto land may require several days (Holland 1994), and Rathbun et al. (1992) reported an overnight trip. In the Rathbun et al. (1992) study, nest cavities were pear-shaped and measured 6.5-8.0 cm (2.6-3.1 in) deep with a 2.6-2.8 cm (6.5-7.0 in) wide egg chamber and a 1.4-1.6 cm (3.5-4.0 in) mouth. Usually nest excavation occurs in the morning or evening (Storer 1930).

Average clutch sizes are about 6 eggs, with a range of 1 to 13. Clutch size, and possibly egg width, appear to be correlated with body size (Holland 1994; Goodman 1997a). Double-

clutching was observed in 3 of 7 females in San Bernardino County (Goodman 1997b). First clutches were laid between May 4 and 14 and second clutches between June 10 and 20.

Incubation is typically 80 to 126 days and varies with latitude and temperature (Goodman1997a; Holland 1994; Lardie 1975; Feldman 1982). As is common in turtles, incubation temperature is a factor in sex determination in pond turtles. Ewert et al. (1994) found that males are produced below 30 degrees C (86 degrees F) and females above this temperature.

Complete failure of pond turtle nests is not uncommon in some years or locations (Holland 1994). Goodman (1997a) observed an 80 percent hatchling success rate for 15 eggs in three nests; however, Holland (1994) reports an overall average of 70 percent. In the northern portions of their range, hatchlings remain in the nest through the winter, although in southern California, most emerge in the early fall (Holland 1994). Also, many females do not lay eggs every year (Goodman 1997a).

The southwestern pond turtle is an omnivore with a broad feeding niche (Bury 1986). It is an opportunistic forager, both scavenging and taking live prey. Pond turtles prefer live or dead animal food, but ingest plants as part of their diet to provide nutrients when live prey are unavailable. Food items eaten by pond turtles include aquatic plants such as the pond lily (*Nuphar polysepalum*), water beetles, mallard duck carrion, adult larval insects, coyote scat, and snails (Pope 1939; Evenden 1948; Carr 1952; Holland 1988; Bury 1986; Goodman and Stewart 1998).

Pond turtles aggressively compete for spatially limited habitat resources (e.g., basking sites) that result in aggregated distributions of turtles around pools (Bury 1972). For example, an aggregation of 19 southwestern pond turtles located in a single crevice of granitic rock near a stream was reported by Holland and Goodman (1996). Agonistic behaviors to secure preferred basking sites include biting, ramming and pushing.

In a radiotelemetry study by Rathbun et al. (1992), daily movements of four females during one month from May 20 to June 21, 1989, averaged 28 m (91 ft), 55 m (108 ft), 61 m (200 ft), and 87 m (285 ft), respectively.

Longer-term home range sizes vary between age and sex classes. Bury (1972) studied a population in a northern California stream and found that adult males had the largest home range, averaging a mean linear length (i.e., point to point) of 976 m (3,202 ft). Adult female home ranges averaged 248 m (814 ft), while juveniles had home ranges with a mean length of 363 m (1,190 ft). While moving between pools within the stream system, average distances were 354 m (1,161 ft) for males, 169 m (554 ft) for females, and 142 m (466 ft) for juveniles. Goodman (1997a) conducted radiotelemetry studies of pond turtles in Aliso Creek in Chino Hills State Park

and the West Fork of the San Gabriel River from 1992 to 1994. In the Aliso Creek population, the minimum linear range for nine females averaged 1,273 m (4,176 ft) (range: 708-4,263 m [2,323-13,986 ft]) and two males had ranges of 319 m and 709 m (1,046 and 2,326 ft), respectively. In contrast, the minimum linear ranges for turtles on the San Gabriel River were significantly shorter for females, with an average of 335 m (1,099 ft) (range: 48-966 m [157-3,169]) for 11 females and a range of 1,610 m for a single male. Goodman suggested that the relative lack of water in the Aliso Creek study area compared to the San Gabriel River may account for the longer movements of the Aliso population because individuals may have had to move farther to obtain the resources necessary for survival.

For the most part, overwintering sites in the Goodman (1997a) study were relatively close to water. At the Aliso Creek site, the mean distance of overwintering sites from water for seven turtles was 7.3 m (23.9 ft) (range: 1.5-10.7 m [4.9-35.1 ft]). At the San Gabriel River site the mean distance of overwintering sites for 20 turtles was 32.7 m (107.3 ft) (range: 12.8-60.2 m [42.0-197.5 ft]). However, Holland (1994) reports overwintering sites up to 500 m (1,640 ft) from the watercourse. In addition Holland (1994) reports that pond turtles have been found up to 1 km (3,280 ft) from watercourses and are capable of moving up to 5 km (3.1 mi) between drainages. Although pond turtles are capable of moving long distances, they generally are characterized as relatively sedentary animals. Holland and Goodman (1996) state that "most animals appear to remain within a given watercourse for extended periods of up to several years."

Overwintering sites appear to have more cover than nesting sites. Dominant vegetation at seven overwintering sites at the Aliso Creek studied by Goodman (1997a) included mule fat, willows, black mustard and tree tobacco, with cover ranging averaging 65 percent (range: 25-90 percent). At 20 overwintering sites the San Gabriel River study area dominant vegetation consisted of scrub oak, yucca, chamise, ceanothus, laural sumac, bay tree, canyon oak, white sage, black sage, poison-oak, Douglas-fir, monkeyflower, giant rye grass, ash (dead), and non-native grasses. Percent cover at the 20 sites averaged 64 percent (range: 20-100 percent).

A number of threats have been identified for the southwestern pond turtle. Loss and alteration of aquatic habitat is the greatest threat to the southwestern pond turtle. Over 90 percent of wetland habitat within its historic California range has been eliminated by agricultural development, flood control, water diversion projects, and urbanization (USFWS 1992, 1993c). Additionally, predation on young by introduced aquatic species (*e.g.*, bullfrogs, bass, and catfish), collection for pets, urban-related predation pressures (e.g., dogs raccoons, skunks), competition with non-native turtles (Holland 1991), contaminant spills, grazing, off-road vehicle use and vehicle strikes on roads (Holland 1994) have all contributed to the sharp decline this species has experienced in recent decades. Dams and channelization have greatly reduced the availability of suitable habitat (Brattstrom and Messer 1988). Reese and Welsh (1988) determined that the

quality of western pond turtle habitat has been reduced by alteration of channel morphology and flow rates associated with dam construction. Invasion of exotic vegetation species such as tamarisk (*Tamarix* sp.) is another threat to the pond turtle. Establishment of tamarisk results in changes to hydrology and channel morphology which degrades pond turtle habitat.

b. Subregional Status

There are currently 21 individual pond turtle occurrences from seven discrete locations in the NCCP database (*Figure 4-19*). The largest population is in the stock pond and adjacent grassland habitat in upper Cristianitos Canyon. A total of 14 pond turtles have been observed in this area since the early 1990s, with the most recent observation during SOCTIIP surveys of two individuals basking in the stockpond in 2001. There are five observations of single pond turtles associated with San Juan Creek; two just east of Antonio Parkway: one in Cal-Mat Lake; one in uplands between the creek and Ortega Highway; one in uplands north of the creek in a tributary drainage surrounded by disturbance and development. One individual was observed in a small pond within the Colorspot Nursery north of the creek. There also is an observation of a single individual in grassland just west of Jerome's Lake in upper Gabino Canyon The CNDDB also includes a 1993 record in the planning area at an urbanized site disjunct from the main reserve study area; Oso Creek between La Paz and Jeronimo Road in Mission Viejo.

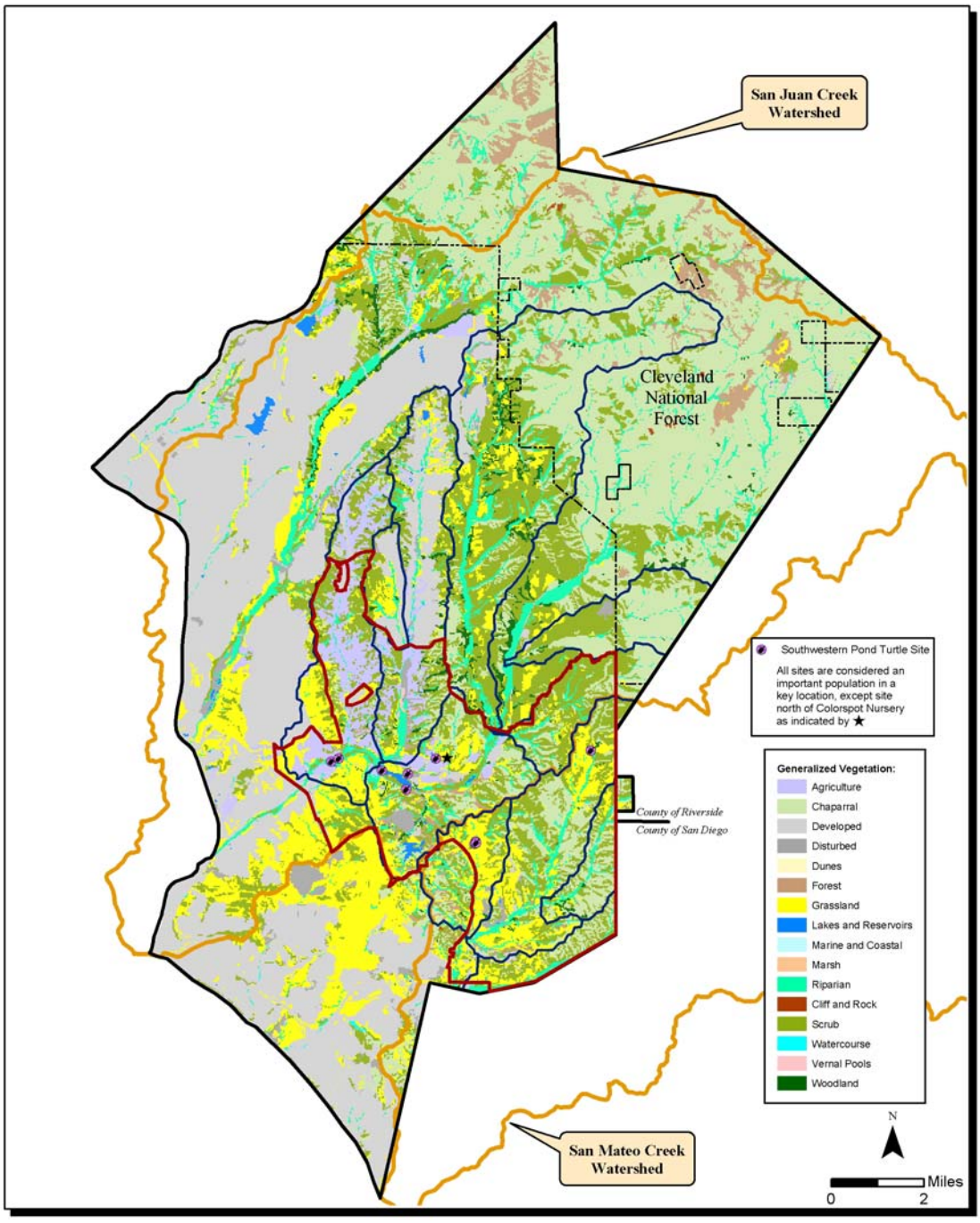
The size of the pond turtle populations at these localities is uncertain since the observations were visual and detected only turtles basking or above ground in uplands (as opposed to focused trapping surveys). Although there is a significant positive correlation between trapping studies and visual surveys, visual surveys may miss turtles and cannot be relied upon as presence/absence surveys (Germano and Bury 2001). Because the pond turtle is relatively rare in the planning area, all occupied sites except the location next to Colorspot Nursery are considered *important populations* in *key locations*.

c. Protection Recommendations

- Maintain and manage riparian and aquatic habitats along San Juan Creek for breeding populations of the southwestern pond turtle.

- Protect the stockpond and other wetlands in the upper Cristianitos Watershed to support the nesting population of the southwestern pond turtle.

- Protect Jerome's Lake in upper Gabino Canyon to support the nesting population of the southwestern pond turtle.



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Southwestern Pond Turtle Distribution Map

FIGURE 4-19

- Protect upland habitat within 100 m (328 ft) adjoining occupied aquatic and riparian habitats and on southern exposures along San Juan Creek, upper Cristianitos and Jerome's Lake to support nesting and overwintering sites for the southwestern pond turtle.

d. Management Recommendations

- Within Gobernadora Creek, protect downstream habitat for the southwestern pond turtle by maintaining hydrology, water quality and sediment delivery in San Juan Creek and minimizing additional loadings of nutrients or toxics.

- Implement a bullfrog eradication program in southwestern pond turtle breeding areas where necessary, including Cal-Mat Lake, the stock pond in upper Cristianitos, and Jerome's Lake.

- Maintain flow characteristics comparable to existing conditions from Trampas Canyon into San Juan Creek to preserve breeding habitat for the arroyo toad population and other aquatic species in San Juan Creek.

- Protect occupied nesting locations of the southwestern pond turtle from human disturbance and collection.

- Manage, to the extent feasible, the impact of potential mesopredators on southwestern pond turtle nesting areas, including raccoons, skunks, and feral dogs.

- Pursuant to the Grazing Management Plan, implement grazing management techniques to help protect the southwestern pond turtle and its habitat, promote perennial grasses including native grasses, allow for continued cattle grazing sufficient to support cattle ranching operations, and, where appropriate reduce fuel loads for fire.

e. Restoration Recommendations

- In coordination with upstream eradication efforts, implement a giant reed removal program for San Juan Creek within RMV boundaries to protect southwestern pond turtle habitat and other riparian areas.

- Implement a restoration program in Gobernadora Creek which addresses **(1)** the historic creek meander above the knickpoint; and **(2)** upstream land use induced channel incision and erosion, including potentially excessive surface and groundwater originating upstream.

- Identify likely causes of erosion in Gobernadora Creek and potential measures to rectify causes of headcutting in the lower portion of the creek.

4.2.13 Chaparral Beargrass

Nolina cismontana – Chaparral Beargrass
Federal: None
State: None
CNPS: List 1B

a. Regional Status

Chaparral beargrass (aka chaparral nolina and cismontane nolina) is a shrub species of the Liliaceae family that is endemic to cismontane southern California. It occurs in the coastal foothills in xeric coastal sage scrub and chaparral on sandstone and gabbro soils in San Diego, Orange, Riverside and Ventura counties. Some locations in San Diego and Orange counties lie on the boundary with Riverside County, and locations in Ventura County are close to the borders with Los Angeles and Santa Barbara counties, so it would not be surprising for this species to occur in additional areas in those counties as well. The known elevation range of chaparral beargrass is 140 to 1,275 m (460 to 4,180 ft).

The Jepson Manual (Hickman 1993) does not recognize *Nolina cismontana* as a distinct species and mentions it as "undescribed" in the description of *Nolina parryi*. However, based on an examination of "*N. parryi*" specimens from desert and coastal areas Hess and Dice (1995) determined that the desert and coastal specimens differed in certain morphological traits such as leaf number and width, stem length, panicle length and diameter and bracht size. Hess and Dice (1995) proposed the name *Nolina cismontana* for this "undescribed" species to reflect its occurrence west of the mountain ranges. The CNPS and CNDDB have adopted this taxon and designated the species as sensitive. The CNPS considers the species to be "fairly endangered in California."

Table 4-22 summarizes the known occurrences of chaparral beargrass.

The chaparral beargrass is a yucca-like perennial succulent with a 1-1.5 m (3.3-4.9 ft) flower stalk that blooms from April to June. No published literature on the life history of this species is available.

TABLE 4-22
DISTRIBUTION OF CHAPARRAL BEARGRASS IN SOUTHERN CALIFORNIA

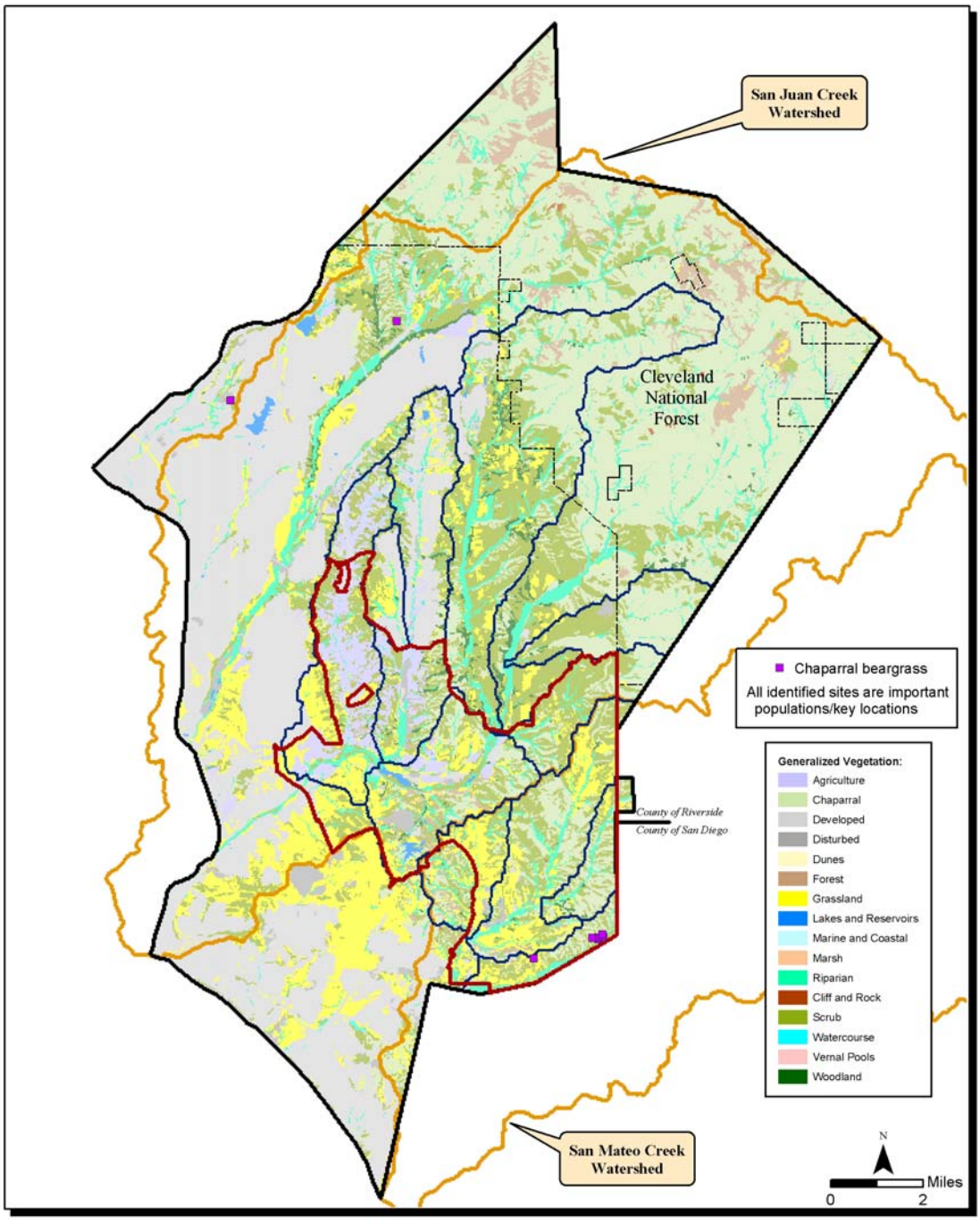
County	General Locations
Orange	East of Live Oak Canyon Road; south of Hamilton Truck Trail; several locations along western flank of the Santa Ana Mountains; Hot Springs Canyon/western San Juan Trail; Claymine Canyon; south-facing slopes in Talega Canyon east of Northrop Grumman
Riverside	Cleveland National Forest in Corona area
San Diego	Northeast of Gregory Canyon on south-facing slopes above San Luis Rey River; Hwy S-16 north of Pala; upper Borrego Canyon; Magee Truck Trail northeast of Mt. Olympus; west of Trujillo southwest of Magee Truck Trail; east of Ranchita; western slope of Viejas Mountain
Ventura	Medea Creek south-southeast of Simi Peak; foothills of Santa Ynez Mountains near head of Santa Ana Valley

According to Rieser (1994) chaparral beargrass often occurs on eroded Cieneba soils in Orange County, on Los Posas soils at the San Luis Rey River site, and on the Lodo, Calleguas-Arnold complex, and Anaheim soils at other sites.

Reiser (1994) states that chaparral beargrass is declining in the Pala region from conversion of habitat to agriculture and residences, and in the Santa Ana Mountains from residential development. The USFS identified protection of the species from too-frequent fire as a management issue.

b. Subregional Status

The NCCP database for chaparral beargrass includes two general areas for the planning area. A single location is located in the Foothill-Trabuco Specific Plan area between Live Oak Canyon Road and Trabuco Oaks Drive. Two locations are in the Talega sub-basin, one individual just east the Northrop Grumman facility and a cluster of five individuals in the eastern portion of the sub-basin (*Figure 4-20*). These five individuals in the Talega sub-basin are an *important population* in a *key location* because of the rarity of this species. Survey data for the Foothill-Trabuco Specific Plan Area are incomplete and, based on general habitat conditions in the area, it is likely that chaparral beargrass is present in other areas. If the species occurs in this area in an substantial populations, they may be considered *major* or *important populations* in *key* l*ocations*.



Draft NCCP/HCP Planning Guidelines

Chaparral Beargrass Distribution Map

FIGURE 4-20

c. Protection Recommendations

- Protect the location with five individuals of chaparral beargrass in the eastern portion of the Talega sub-basin.

d. Management Recommendations

- As part of the fire management program, protect chaparral beargrass from too-frequent fire.

4.2.14 Coulter's Saltbush

Atriplex coulteri – Coulter's Saltbush
Federal: None
State: None
CNPS: List 1B

a. Regional Status

Coulter's saltbush is a decumbent to ascending perennial growing to 0.5 m in length. This species occurs on coastal bluffs and on alkali or saline flats in interior areas such as western Riverside County. The leaves are subsessile, elliptic to lanceolate, somewhat greenish, sparsely fine-scaly and detate. The blades are 7-20 mm in length. The plants are monecious (male and female flowers on the same plant) with the inconspicuous female flowers subtended by bracts and the male flowers in panicles. The seeds are found within a fruiting bract, which in this species is sharply dentate, 2-3 mm long, and with small tubercles (sometimes smooth) covering the surface of the bract.

This species occurs from Baja California, extending northward to Ventura County and also on the Channel Islands. Extant locations on the mainland include: Rancho Mission Viejo (approximately 3,000 plants); San Clemente State Park; San Onofre State Park; Whispering Hills in San Juan Capistrano; Dana Point Headlands; Bommer Canyon (two small populations of about 20 plants each); San Joaquin Freshwater Marsh (less than 25 plants observed); Laguna Beach; MacArthur Boulevard and Pacific Coast Highway; behind Newport Beach Public Library (observed by Dave Bramlet in 1998); Pelican Hill; and the east slope above Los Trancos Canyon, where it is common along the dirt road passing through coastal sage scrub on hill top in sandy clay soil.

b. Subregional Status

Coulter's saltbush is known from three general locations in the planning area (*Figure 4-21*): 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. Because this species is relatively rare within its range, all populations on Rancho Mission Viejo constitute *major* or *important populations*. Specific occurrences are described below.

- In upper Gabino Canyon a small population of about 100 individuals occurs west of and adjacent to the creek (No. 1 on *Figure 4-21*). This is an *important population* because of the rarity of this species in the region.

- Upper Cristianitos Creek supports two small locations numbering three and 12 individuals, respectively (No. 2 on *Figure 4-21*). This is an *important population* because of the rarity of this species in the region.

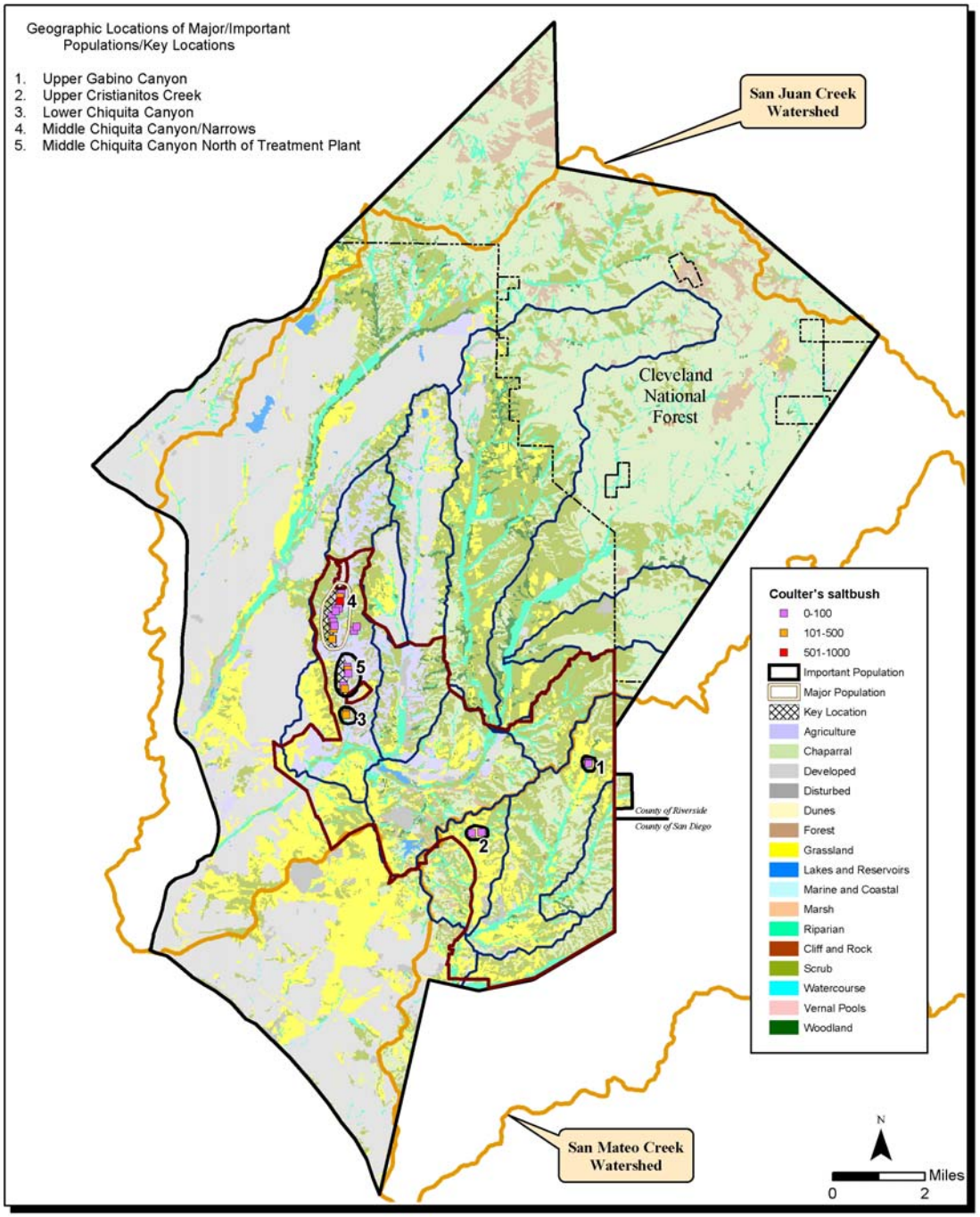
- Lower Chiquita Canyon west of the creek supports two locations numbering 200 and 400 individuals, respectively (No. 3 on *Figure 4-21*). This is an *important population* because of the rarity of this species in the region.

- Middle Chiquita just above and below the Narrows supports numerous locations ranging from the 10s to 600 individuals (No. 4 on *Figure 4-21*). 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. This location overlaps substantially with the largest southern tarplant population. This group of locations east and west of the creek is a *major population* in a *key location.*

- Middle Chiquita just to the northwest of the treatment plant supports five locations, of which four are west of the creek (No. 5 on *Figure 4-21*). The locations west of the creek number 25, 50, 150 and 360 individuals, and the location east of the creek has 100 individuals. These five locations constitute an *important population*. The locations west of the creek constitute a *key location.*

- Two small locations are located in a major side canyon southeast of the Narrows. These locations number six and 10 individuals, respectively.

- One small population of less than 20 individuals occurs with southern tarplant (noted above) at a wetland seep between Gobernadora and Chiquita.



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Coulter's Saltbush Distribution Map

FIGURE 4-21

c. Protection Recommendations

- Protect the *key locations* of Coulter's saltbush in Middle and Lower Chiquita Canyon. Minimize impacts to *important populations* within the sub-basin and mitigate unavoidable impacts in the sub-basin.

- Protect the two known *important populations* of Coulter's saltbush in the Cristianitos sub-basin.

- Protect the *important population* of Coulter's saltbush in the Upper Gabino Canyon subunit.

d. Management Recommendations

- Implement a management program for Coulter's saltbush, including control of non-native invasive species, management of grazing and minimization of human access and disturbance as part of the Adaptive Management Program**.**

e. Restoration Recommendations

Translocate salvaged Coulter's saltbush to suitable restoration and enhancement areas in the same sub-basin as where impacts occur to the extent feasible. Receiver areas should support alkali soils suitable for the species and should be placed in locations that maximize connectivity and genetic exchange.

4.2.15 Intermediate Mariposa Lily

Calochortus weedii var. *intermedius* – Intermediate Mariposa Lily
Federal: None
State: None
CNPS: 1B

Note: This species account has not been revised for the May 2004 version of the Guidelines due to unresolved issues regarding the taxonomic status of populations in the planning area.

a. Regional Status

The intermediate mariposa lily is a perennial geophyte in the lily family (Liliaceae) that occurs in coastal sage scrub, chaparral and grassland/scrub ecotones. Stems heights are variable, reaching

to 0.8 to 2.0 m (M. Elvin, pers. obs.). The plant typically produces from 3 to 4 campanulate flowers ranging from 2.5 to 3 cm long. The petals are broadly cuneate-obovate and light yellow tinged (sometimes with purple) and usually fringed with yellow hairs. The intermediate mariposa lily is distinguished from *C. w. weedii* by petal shape and color with bright yellow petals on *C. w. weedii*, and from C. *w. vestus* by the abruptly pointed anthers on C. *w. vestus*.

The intermediate mariposa lily is known from Orange, Riverside and Los Angeles counties and at least one putative occurrence in Ventura County.

In Riverside County, occurrences are known from the Winchester quadrangle, in the hills west of Crown Valley and northwest of Rawson Canyon; the Vail Lake Quadrangle approximately one-half mile southwest of Vail Lake dam; the Corona South near the mouth of Hagadoor Canyon.

Orange County supports the majority of the extant populations with significant populations found in the Central/Coastal Subregion. Up to 83,000 individuals are reported from the Central/Coastal Subregion, including approximately 46,535 from within the NCCP Reserve and 6,209 in the North Ranch Policy Plan Area that is also dedicated open space. The Southern Subregion supports about 12,800 individuals, or about 12 percent of the known individuals in the County.

b. Subregional Status

Intermediate mariposa lily generally occurs in four main areas on RMV (*Figure 4-22*): Chiquita Canyon/Chiquadora Ridge, Gobernadora east of the creek/northern Central San Juan Creek sub-basin, Cristianitos Canyon/southern Trampas Canyon sub-basin, and La Paz Canyon. A few scattered locations also occur in the Foothill-Trabuco Specific Plan area on the Saddleback Meadows site. Except for the La Paz Canyon and Saddleback Meadows locations, this species tends to occur in association with many-stemmed dudleya in the planning area. A total of about 130 locations are known from the planning area with about 12,800 counted individuals. Of the 130 locations, approximately 111 (85 percent) are on RMV land.

Within the subregion this species is most often found growing under or through shrubs in open coastal sage scrub associated with Cieneba sandstone outcrops or Cieneba sandy loams within the Santiago geologic formations. In other limited areas, this species is associated with cobbly loams or clay loams that support coastal sage scrub or chamise chaparral.

The following describes the *major* and *important populations* and *key locations* of the intermediate mariposa lily in the planning area:

- La Paz Canyon supports two locations of about 322 and 485 individuals, respectively (No. 1 on *Figure 4-22*). These locations may be considered *important populations* because they contribute to the geographic diversity of the species in the subregion.

- Lower Gabino/Blind canyons support two locations of about 12 and 305 individuals, respectively (No. 2 on *Figure 4-22*). These locations are on the southern boundary with Cristianitos Canyon. These locations may be considered *important populations* because they contribute to the geographic diversity of the species in the subregion.

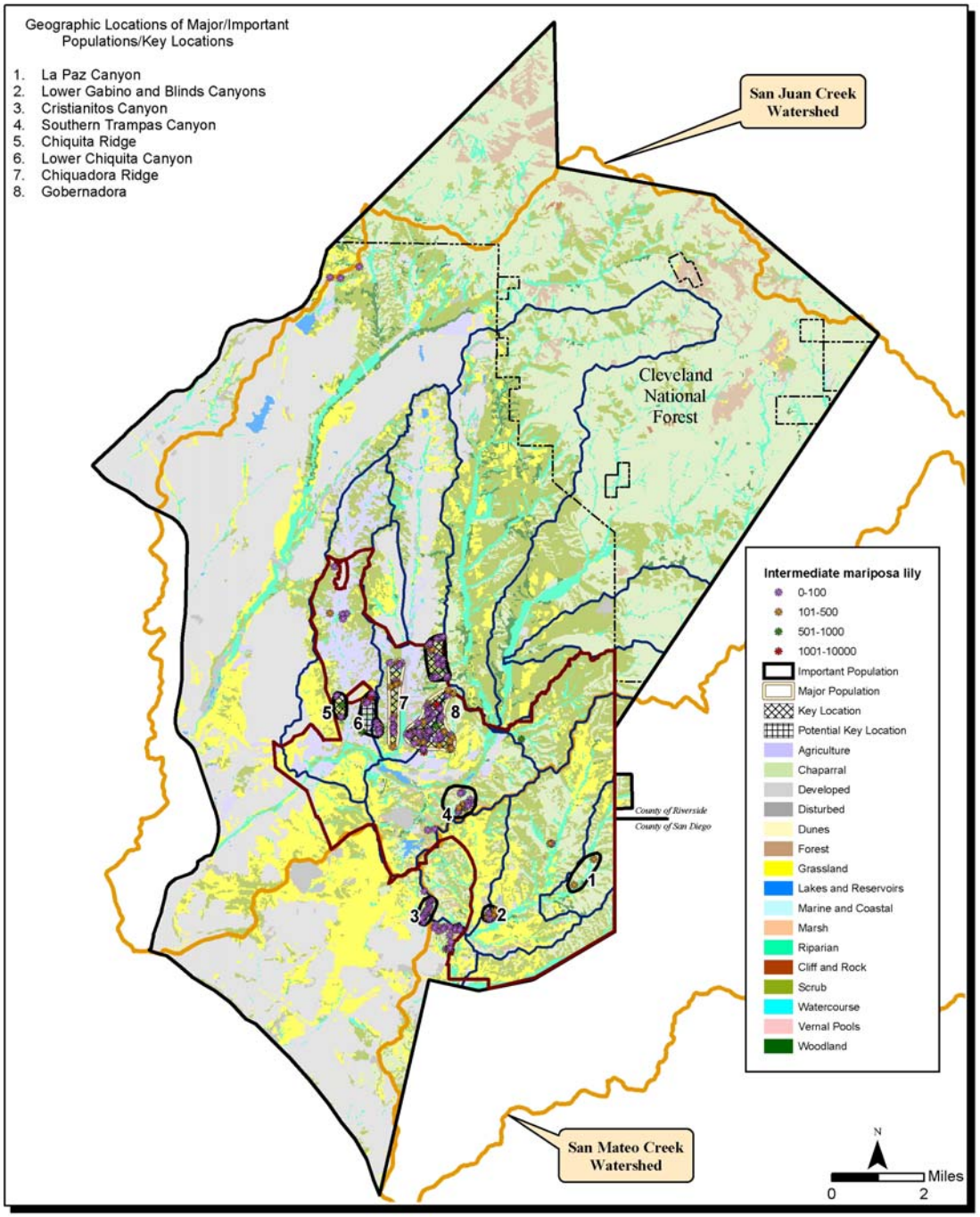
- Cristianitos Canyon within the Donna O'Neill Land Conservancy supports five locations of unknown size (data base has population size of 1) (No. 3 on *Figure 4-22*). In addition, about 15 locations occur west and south of the Cristianitos sub-basin contiguous with these five locations in Talega Development Open Space, with the largest population at 17 individuals. These combined locations may be considered an *important population* because they contribute to the geographic diversity of the species in the subregion.

- The southern edge of the Trampas Canyon sub-basin supports eight locations, with one population numbering 640 individuals, but the others numbering less than 50 individuals (No. 4 on *Figure 4-22*). These locations may be considered an *important population* because they contribute to the geographic diversity of the species in the subregion.

- Lower Chiquita Ridge west of the creek supports three locations numbering about 21, 47, and 625 individuals (No. 5 on *Figure 4-22*). Although these locations do not support large populations, together they may be considered to an *important population* in a *key location* because Chiquita Ridge is a key landscape feature and habitat linkage in the subregion.

- Lower Chiquita Canyon east of the creek and south of the treatment plant supports about 18 locations, with most uncounted, but one relatively large population of 660 individuals (No. 6 on *Figure 4-22*). These scattered locations, along with the location numbering 660 individuals, may be considered an *important population.* Whether this population is also in a *key location* depends of the protection status of the Chiquita Ridge and Chiquadora Ridge populations, as described in the next section.

- Middle Chiquita Canyon supports five scattered locations north of the Narrows and both east and west of the creek. The largest of the five locations is about 260 individuals. Two locations north of Oso Parkway occur in the Upper Chiquita Conservation Easement, with one location supporting only one individual and the other supporting ten individuals. Because of the few number of locations and the small number of individuals at each, these locations probably are not *important populations* or in *key locations*.



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Intermediate Mariposa Lily Distribution Map

FIGURE 4-22

Chiquadora Ridge supports about 14 locations totaling about 2,000 individuals (No. 7 on *Figure 4-22*). These locations constitute a *major population* in a *key location* because Chiquadora Ridge is a key landscape feature in the subregion and serves an important habitat connection function.

- Gobernadora sub-basin east of the creek and the northern portion of the Central San Juan Creek sub-basin supports more than 50 locations, with eight locations numbering more than 200 individuals and the two largest locations 775 and 1,300 individuals each (No. 8 on *Figure 4-22*). This area supports a total of about 6,600 individuals, or about 51 percent of the individuals in the subregion and about 6 percent of the population in Orange County. The location supporting 1,300 individuals is the single largest population in the subregion. These locations comprise a *major population* in a *key location*.

c. Protection Recommendations

- Protect approximately six locations along Chiquita Ridge, along with the location south of the treatment plant that supports 660 individuals, totally protection for about 1,600 individuals. Although these locations are scattered, together they comprise an *important population* in a *key location.*

- Protect the 14 locations comprising the *major population* on Chiquadora Ridge, for total protection of about 2,000 individuals.

- Protect two locations in the eastern portion of the Gobernadora sub-basin of 315 and 135 individuals each.

- Protect all known locations of intermediate mariposa lily in the San Mateo Watershed, totaling about 18 locations and more than 2,300 individuals.

- Salvage and translocate intermediate mariposa lily to the extent feasible and appropriate, as described below under Restoration Recommendations.

d. Management Recommendations

As part of the Adaptive Management Program, the following management activities for intermediate mariposa lily will be conducted:

- Control non-native invasive species such as cardoon, ryegrass, and mustards.

- Manage grazing in a manner that optimizes the control of non-native grasses (*Lolium, Bromus, Avena*) while allowing for proliferation of the native grasses and forbs. The optimum grazing pattern has not been established and will be part of the Adaptive Management Program.

- Conduct prescribed burning where appropriate and as described in the Fire Management Program.

- Protect intermediate mariposa lily populations from human disturbance such as hiking, mountain bikes and equestrian activities.

e. Restoration Recommendations

- Translocate salvaged intermediate mariposa lily to areas where suitable soil conditions occur. Specific translocation areas have not been identified, but based on the existing distribution, potential general translocation areas include Chiquita Ridge, Chiquadora Ridge, upper Cristianitos Canyon, La Paz Canyon.

- Initiate a seed collection program in 2003 if sufficient rain falls to warrant the collection program. Receiver sites should be identified in the winter of 2003 and a pilot program should be implemented to determine the effectiveness of propagation from seed.

4.2.16 Many-stemmed Dudleya

Dudleya multicaulis – Many-Stemmed Dudleya
Federal: None
State: None
CNPS: 1B

a. Regional Status

Many-stemmed dudleya is a small geophyte that grows in open-habitat soils associated with coastal sage scrub and grassland plant communities in southern California. It usually grows in shallow weathered cobbly loam or clay soils, and open barrens associated with rock outcrops and ridgelines.

The many-stemmed dudleya is endemic to southwestern California, and is known only from southeast Los Angeles County, Orange County, western Riverside County, extreme southwestern San Bernardino County, and the northernmost portion of San Diego County. Modern records

have not substantiated old collections from near Tehachapi in Kern County, and in Dehesa Valley in southern San Diego County.

Orange County supports the majority of the known populations of this species and was estimated by Roberts to support much as 80 percent of the total dudleya in the species' range (Roberts 1999). Roberts identified five areas of dudleya concentration in Orange County: 1) the San Joaquin Hills; 2) the northern Lomas de Santiago including the Santiago Hills north to Gypsum and Blind Canyons (1 and 2 combined generally comprise the Orange County Central/Coastal Subregion); 3) the Rancho Mission Viejo (Southern Subregion); and 4) the northern portion of San Diego County that comprises Camp Pendleton (Roberts 1999). A fifth concentration has been identified in the Gavilan Hills (Estelle Mountain) of western Riverside County (Roberts 1999). *Table 4-23* provides a region-wide summary of large and (potentially) important populations. Based on *Table 4-23*, it appears that Orange County (excluding the relatively small occurrences in the Cleveland National Forest) supports closer to 70 percent of the total dudleya.

TABLE 4-23
REGIONWIDE SUMMARY:
2002 STATUS OF MANY-STEMMED DUDLEYA
WITHIN KNOWN RANGE IN SOUTHERN CALIFORNIA

Regional Large Population Areas	Dudleya Population: Number of Counted/Estimated Plants
Rancho Mission Viejo and San Clemente	65,250
Central/Coastal NCCP Reserve Lands	52,000
Camp Pendleton, San Diego County	32,000
Estelle Mountain, Riverside County	10,000
Subtotal:	*159,250*
Other Significant Smaller Population Areas	
Corona, Alberhill, Cleveland National Forest Riverside County	4,486
Cleveland National Forest Orange and San Diego counties	1,938
San Dimas/San Jose Hills (mostly Bonelli Regional Park) Los Angeles County	2,459
Chino Hills, Orange County	150
Subtotal:	*9,033*
APPROXIMATE TOTAL PLANTS	168,300

The smaller populations listed in *Table 4-23* do not necessarily include all potential *important populations* or *key locations* of the many-stemmed dudleya, because yet undiscovered plants may persist in small habitat fragments located outside of these areas. The preservation of these potential smaller *important populations* may also facilitate the survival and recovery of this rare species. Delineation and identification of other smaller populations is beyond the scope of this analysis.

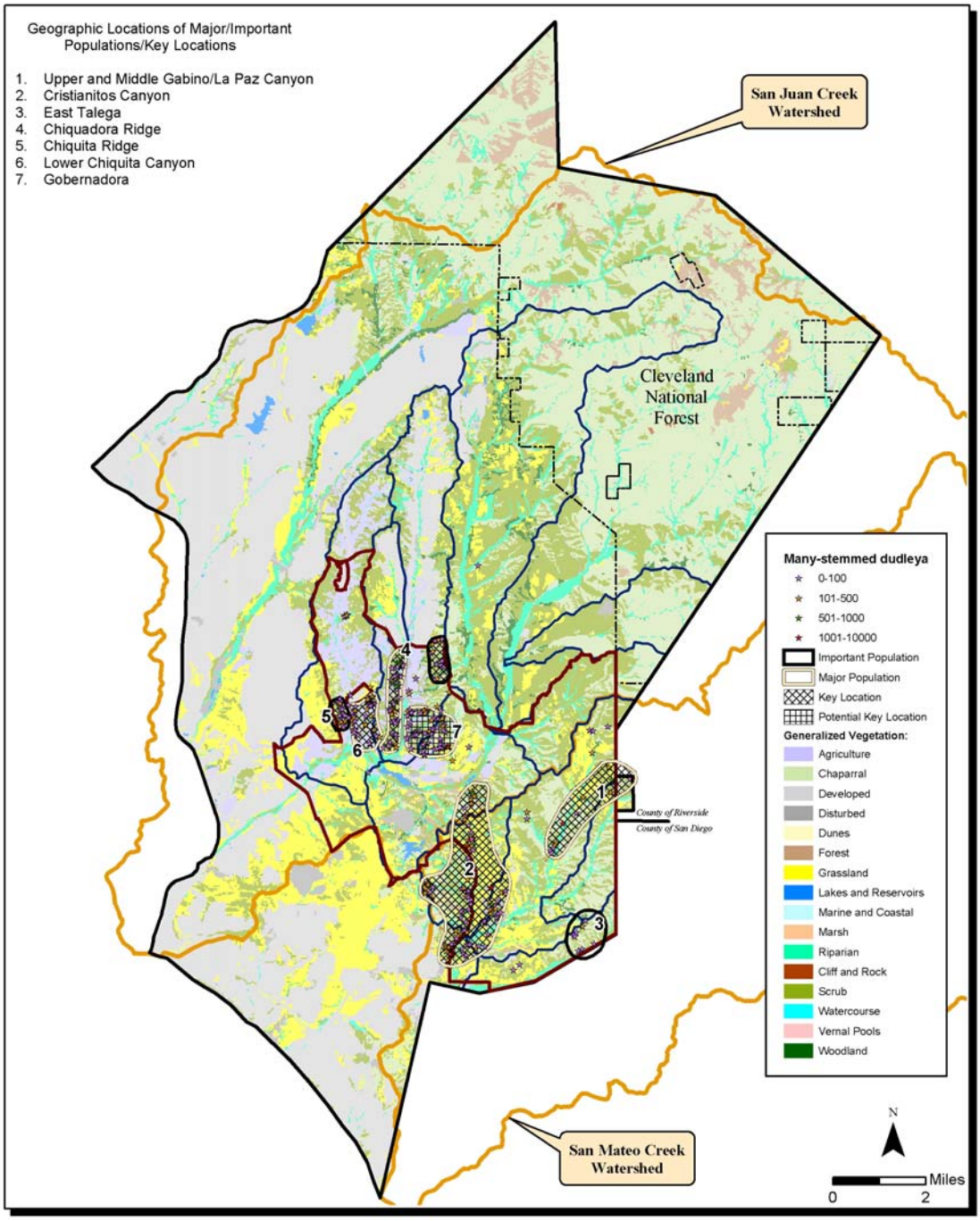
b. Subregional Status

Note to reader: This species account has been substantially revised since the April 2003 version of the Guidelines based on Spring/Summer 2003 surveys. One new *important population* in a *key location* has been identified in the Gobernadora sub-basin and the former lower Chiquita *important population* and potential *key location* has been upgraded to a designation as a *major population* in a *key location* based on a four-fold increase in the estimated population size. Based on this new information, two new protection recommendations have been added.

Many-stemmed dudleya is known from five main areas in the planning area (*Figure 4-23*): Chiquita Ridge; Chiquadora Ridge; Gobernadora/Central San Juan east of Gobernadora Creek and north of ColorSpot Nursery; Trampas Canyon/Cristianitos Canyon extending south to the Talega development in the San Clemente Watershed; and upper 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 data base, but these populations are considered to be small. The total counted individuals of many-stemmed dudleya in the planning area numbers about 65,250.

Within the planning area, this species occurs in open coastal sage scrub or sage scrub/grassland ecotones dominated by *Salvia apiana*, *Galium angustifolium*, *Bothriochloa barbinodis*, *Castilleja foliolosa*, *Aristida hamulosa*, and *Artemisia californica*. In some areas, such as ridges east of Gobernadora and north of ColorSpot Nursery, this species is associated with Cieneba sandstone outcrops that support low densities of *Galium angustifolium*, *Bothriochloa barbinodis*, and *Castilleja foliolosa*. At other locations, such as portions of Chiquadora Ridge and Cristianitos, many-stemmed dudleya is often associated with purple needlegrass grassland and clay outcrops within the grassland complexes. In most of these areas, the dudleya typically grows in the shade of larger grasses or shrubs that appear to provide at least limited "nursery" effects.

The following describes the *major* and *important populations* and *key locations* of many-stemmed dudleya in the planning area:



Draft NCCP/HCP Planning Guidelines

Many-stemmed Dudleya Distribution Map

FIGURE 4-23

Upper Gabino/Middle Gabino and upper La Paz Canyon support 12 locations ranging from about five individuals to about 1,500 individuals, cumulatively totaling more than 4,100 individuals (No. 1 on *Figure 4-23*). Eight of the 12 locations range from about 100-700 individuals, with one location at the boundary between middle and upper Gabino supporting 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. These locations comprise a *major population* in a *key location.*

- A *major population* totaling approximately 34,137 individuals in 164 locations is located in the Cristianitos sub-basin and the southern portion of the Trampas Canyon sub-basin extending, south to the Talega development in the San Clemente Watershed and eastward into the western portion of the Lower Gabino and Blind canyon sub-basins (No. 2 on *Figure 4-23*). This population, which accounts for 52 percent of the documented many-stemmed dudleya in the planning area, occurs on both RMV land and the Donna O'Neill Conservancy at Rancho Mission Viejo and extends into Talega Open Space, as described below.

    - The portion of the Cristianitos Canyon *major population* on RMV outside the Donna O'Neill Conservancy supports about 72 locations ranging up to 1,800 individuals. Five of these locations number 1,100, 1,160, 1,500, 1,700 and 1,800 individuals each, respectively. These locations comprise five of the 11 largest counts known from the planning area. An additional 11 locations range from about 400 to 976 individuals and 17 other locations support 100 to 355 individuals. The cumulative total of these locations is 18,796, individuals, or about 29 percent of the documented dudleya in the subregion. These locations comprise 55 percent of the individuals and 44 percent of the locations in the Cristianitos Canyon *major population* and *key location.*

    - The Donna O'Neill Land Conservancy supports about 85 locations, with two of the locations supporting about 2,000 individuals each, and a third location of 1,175 individuals. The cumulative total of dudleya on the Conservancy is 14,250 individuals, accounting for 42 percent of the individuals in the Cristianitos *major population*.

    - The Talega Open Space supports about seven locations totaling about 1,091 individuals, or 3 percent of the total in the Cristianitos *major population*.

Fourteen locations totaling 292 individuals occur east of Northrop Grumman, but population estimates were not made (No. 3 on *Figure 4-23*). The 14 locations are considered an *important population* because they contribute to geographic diversity in the subregion and potentially provide a connection with nearby populations on Camp Pendleton.

- Chiquadora Ridge, including the area within the Gobernadora sub-basin, supports about 47 discrete locations totaling about 8,623 individuals (No. 4 on *Figure 4-23*). The locations range from 1 to 750 individuals, with eight locations numbering 540 to 750 individuals each. These locations comprise a *major population* and *key location* because the ridge is a major landscape feature in the planning area that provides important habitat connectivity functions.

- Chiquita Ridge west of the creek supports about 18 discrete locations ranging up to about 420 individuals, with four locations supporting more than 100 individuals (No. 5 on *Figure 4-23*). The cumulative total of these locations is about 1,349 individuals. These locations comprise an *important population* and *key location* because of their clustering on Chiquita Ridge, a major landscape feature in the planning area that provides important habitat connectivity function.

- Lower Chiquita Canyon east of the creek and south of the treatment plant supports about 41 locations totaling approximately 6,686 individuals (No. 6 on *Figure 4-23*). (Note to reader: this is a four-fold increase in the population estimate compared to the pre-2003 survey data.) The locations range from 1 to 1,330 individuals, with four locations supporting at least 500 individuals. These locations comprise a *major population* in a *key location*. (This population was identified as an *important population* in a *potential key location* in the April 2003 version of the Guidelines.)

- Central Gobernadora sub-basin east of the creek and the Central San Juan subunit north of the creek comprises a single population supporting about 61 scattered locations ranging from 1 to 2,000 individuals (No. 7 on *Figure 4-23*). Although there is one location with 2,000 individuals, the remaining 60 locations number 225 or fewer individuals each. Combined, however, these locations total about 5,678 individuals and comprise a *major population.* Whether this population is in a *key location* should be considered in the context of the conservation status of the other *major* and *important populations* in the San Juan Creek Watershed, as discussed in the next section.

- Middle Chiquita Canyon (between the treatment plant and Oso Parkway) supports a few scattered locations in association with intermediate mariposa lily in the area between the Narrows and Tesoro High School. Because these locations are small and apparently do

not serve a linkage function between other larger populations, they do not comprise an *important population.*

An additional *important population* in a *key location* was identified in the Gobernadora sub-basin based on Spring 2003 surveys.

- Upper Gobernadora sub-basin supports 13 locations ranging from 5 to 513 individuals, and totaling 1,622 individuals (No. 8 on *Figure 4-23*). This population is considered an *important population* in a *key location* because it contributes to the geographic diversity and potentially is connected to any populations in Caspers Wilderness Park

b. Protection Recommendations

- Protect the Chiquita Ridge *important population* and *key location* totaling about 1,349 individuals in approximately 18 discrete locations. This population includes four locations totaling 100 to 420 individuals each.

- Protect the Chiquadora Ridge *major population* and *key location* totaling about 8,620 individuals in approximately 47 discrete locations. This population includes 24 locations totaling 100 to 750 individuals each, with eight of these locations numbering more than 500 individuals.

- Protect the Cristianitos Canyon *major population* and *key location* extending from the southern portion of the Trampas Canyon sub-basin in the north, through the Cristianitos Canyon sub-basin south to the Talega development open space located in the San Clemente Watershed. This area supports the largest *major population* and *key location* in the subregion with approximately 34,137 individuals in about 164 discrete locations, or about 52 percent of the documented dudleya in the planning area. Ninety-two of the 164 locations totaling 14,341 individuals are already conserved within the Donna O'Neill Conservancy at Rancho Mission Viejo and Talega open space (including two locations of 2,000 individuals and a third of 1,175 individuals). Five of the 72 RMV locations number 1,100, 1,160, 1,500, 1,700 and 1,800 individuals each. An additional 11 locations range from about 400 to 976 individuals and 17 other locations support 100 to 355 individuals.

- Protect the Gabino and Blind Canyon/La Paz Canyon *major population* totaling about 4,100 individuals in approximately 12 locations. This population includes eight locations of 100 to 1,500 individuals.

- Maintain direct habitat connectivity between the remaining major populations to convey pollinators and allow for dispersal.

- Salvage and translocate all individuals from development areas, as feasible and appropriate, where impacts cannot be avoided.

Based on new information from the Spring 2003 surveys, two protection recommendations have been added since the April 2003 version of the Guidelines.

- **Protect the lower Chiquita *major population* and *key location,* totaling about 6,686 individuals in 41 locations. The locations in this population range from 1 individual to 1,330 individuals, with four locations supporting at least 500 individuals.**

- **Protect the upper Gobernadora *important population* and *key location,* totaling 1,622 individuals in 13 locations.**

d. Management Recommendations

As part of the Adaptive Management Program, the following management activities for many-stemmed dudleya will be conducted:

- Control non-native invasive species such as cardoon, ryegrass, bromes, smooth cat's-ear (*Hypocharis glabra*), Crete hedypnois (*Hedypnois cretica*), and mustards.

- Manage grazing as part of the Adaptive Management Program in a manner that optimizes the control of non-native grasses (*Lolium*, *Bromus*, *Avena*) while allowing for proliferation of the native grasses and forbs.

- Protect many-stemmed dudleya populations from human disturbance such as hiking, mountain bikes and equestrian activities.

e. Restoration Recommendations

Translocation of many-stemmed dudleya has been demonstrated to be successful (e.g., the San Joaquin Hills Tollroad [SR-73]) and thus is recommended for as measure for mitigating impacts to dudleya, as described below:

- Translocate salvaged many-stemmed dudleya to CSS and VGL restoration and enhancement areas where feasible and appropriate. Potential restoration and enhancement areas include Chiquita Ridge, Chiquadora Ridge, upper Cristianitos

Canyon, upper Gabino Canyon, Blind Canyon, and the Radio Tower Road area (although there are no documented locations along Radio Tower Road, the area supports clay soils that might be suitable for the dudleya). Receiver areas should support clay, cobbly loam, or sandy clay loam soils suitable for many-stemmed dudleya.

- Salvage suitable topsoils from development areas where feasible and appropriate and transport to restoration areas. Salvaged topsoils may be used to create suitable many-stemmed dudleya habitat and may contain seed bank.

4.2.17 Mud Nama

Nama stenocarpum – Mud Nama
Federal: None
State: None
CNPS: List 2

a. Regional Status

Mud nama is a prostrate to ascending annual with short soft silky hairs, short glandular hairs, and some stiff hairs that are swollen at the base. The leaves vary from 5-30 mm and are typically oblanceolate or spoon shaped with wavy margins and rolled edges. The flowers are white to cream and the corolla is funnel shaped and 4-6 mm long.

This species occurs in vernally wet areas including vernal pools, the drying margins of lakes and ponds, and other intermittently wet areas. Historically in California, this species was known from Los Angeles, Orange, San Diego, Riverside and Imperial counties, across the desert through the southwestern U.S. to Texas and into Mexico. This species is also known from San Clemente Island. This species is believed to be extirpated from Los Angeles and Imperial counties and there were no recent records from Riverside County and Orange County. However, this species was identified in a vernal pool at Fairview Park in Costa Mesa in 1996, and at the Chiquita Ridge vernal pool in 1997. Three other populations have been identified on RMV since that time, one along the edge of a stockpond near the O'Neill residence and the other two along the edge of stock ponds between Cristianitos and Trampas canyons. A large population consisting of thousands of plants was also recently discovered at Mystic Lake along the San Jacinto River and another Orange County population was identified at the Lambert Reservoir in Central Orange County.

b. Subregional Status

As noted above, there are four occurrences known from the planning area (*Figure 4-24*), including the 1.2-acre vernal pool on Chiquita Ridge (500 individuals), along the margins of a stock pond immediately west of a Ranch residence south of Ortega Highway (350 individuals), and from the margins of two stock ponds located between Cristianitos and Trampas canyons south of Ortega Highway (7,500 and 2,000 individuals, respectively). The Rancho Mission Viejo populations vary considerably in size from year to year based upon rainfall. In dry years they may not appear at all and in wet years they number in the tens or hundreds.[4] Because the mud nama is so rare, all populations on RMV are *important populations* in *key locations*.

c. Protection Recommendations

- Protect the three known populations of mud nama on RMV property and their hydrologic sources. The fourth population is located in Ladera Open Space on Chiquita Ridge.

d. Management Recommendations

Implement a management program for mud nama, including control of non-native invasive species, management of grazing as part of the Adaptive Management Program, and prevention of human disturbance.

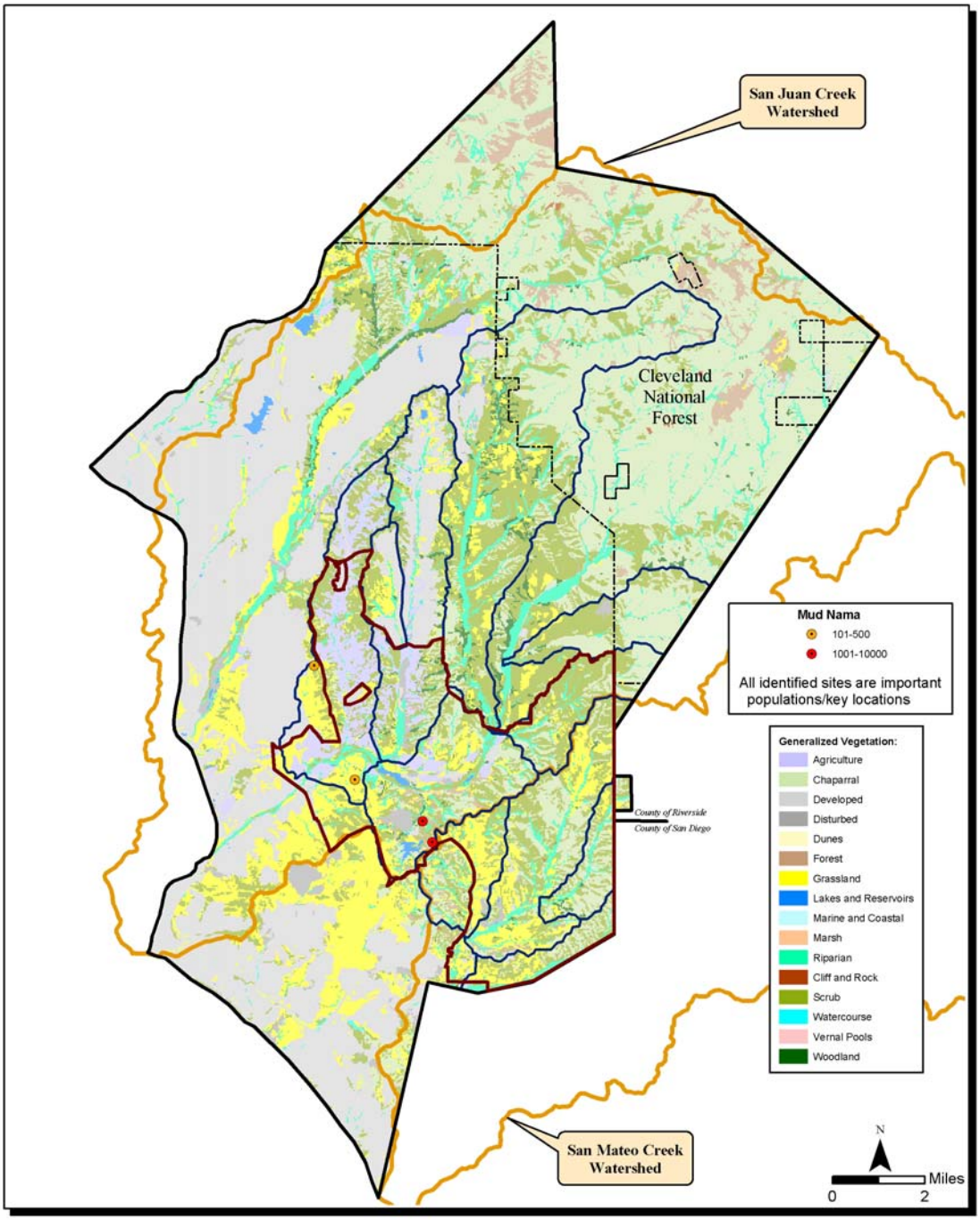
e. Restoration Recommendations

Mud nama responds very favorably to restoration efforts, as exemplified in the Fairview Park vernal restoration project. Five years of monitoring indicate that it has become well established in restored portions of the vernal pool (Bomkamp, pers. comm. 2002).

Through implementation of the Adaptive Management Program significant management opportunities that could substantially increase both the number of occupied sites of mud nama along with the total number of individuals within the subregion are available. As noted above, mud nama occupies drying ponds, including vernal pools and like many such annuals is likely dispersed by water fowl which carry seeds over long distances. Such species typically respond well to translocation or introduction efforts.

Potential introduction sites include: **(1)** the vernal pools located along Radio Tower Road; **(2)** the two unoccupied vernal pools on Chiquita Ridge; **(3)** the margins of seasonal ponds in the GERA; and **(4)** the margins of seasonal ponds in the Tesoro High School Mitigation site in Chiquita Canyon. All of these sites exhibit high potential for success and, as noted above, would

[4] Bomkamp, Tony. 2002. Personal Observations of the three populations between 1997 and 2001.



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Mud Nama Distribution Map

FIGURE 4-24

result in an increase in the number of occupied site and an increase in total number of individuals.

4.2.18 Salt Spring Checkerbloom

Sidalcea neomexicana – Salt Spring Checkerbloom
Federal: None
State: None
CNPS: List 2

a. Regional Status

Salt Spring checkerbloom is known to occur within California, Arizona, Baja California, Nevada, New Mexico, Utah, Idaho, Wyoming, Sonora (Mexico), and "elsewhere" (the CNPS Inventory [2001] is not specific in this regard). Within California this species is known from Los Angeles, Orange, Riverside, San Bernardino, San Diego and Ventura counties (CNDDB 2003). Within these areas, Salt Spring checkerbloom is found at elevations below 1,500 m (4,921 ft) (Hickman 1993).

The CNDDB has 15 occurrences for the Salt Spring checkerbloom, as summarized in *Table 4-24*.

TABLE 4-24
DISTRIBUTION OF SALT SPRING CHECKERBLOOM IN CALIFORNIA

County	General Locations
Los Angeles	Bryant Ranch, Claremont, Santa Monica
Orange	Lower Chiquita and Gobernadora canyons in slope wetlands
Riverside	San Jacinto Valley
San Bernardino	Twentynine Palms; Rabbit Springs in Lucerne Valley, San Bernardino; Chino Creek south of Ontario
San Diego	North end of Lake Cuyamaca
Ventura	Southern Pacific Railroad between Santa Ana Blvd. and San Antonio Creek Bridge; upper Cuyama Valley; east end of Lockwood Valley; northeast slope of Mt. Pinos

According to CNPS (2001), Salt Spring checkerbloom is known to occur within chaparral, coastal scrub, lower montane coniferous forest, Mojavean desert scrub, playas, alkaline habitat and mesic habitats. The ecological data provided with the CNDDB records confirms these habitat associations. Some of the species Salt Spring checkerbloom has been associated with

include yerba mansa (*Anemopsis californica*), large-flowered sand-spurrey (*Spergularia macrotheca*), (*Juncus* sp.), heliotrope (*Heliotropium* sp.), Great Basin sagebrush (*Artemisia tridentata*), and rubber rabbitbrush (*Chrysothamnus nauseosus*), the latter two species being common in Mojavean desert scrub. Salt spring checkerbloom is a perennial herb that blooms from March through June (CNPS 2001).

No literature was found on the life-history traits of Salt Spring checkerbloom.

b. Subregional Status

Salt spring checkerbloom is found in two slope wetlands in lower Chiquita Canyon and one slope wetland in Gobernadora Canyon (*Figure 4-25*). The Chiquita locations numbered 1,200 individuals for the northern location and 300 individuals for the southern location, respectively, during SOCTIIP surveys in 1995. The Gobernadora occurrence numbered only three individuals when it was first discovered in 2003. As described in the "Baseline Geomorphic and Hydrologic Conditions Report," these slope wetlands are perennially moist wetlands located along the toe of the slopes in lower Chiquita Canyon and are maintained by subsurface water movement in the sub-basin.

c. Protection Recommendations

- Protect the two locations of Salt Spring checkerbloom in the two slope wetlands in lower Chiquita Canyon.

d. Management Recommendations

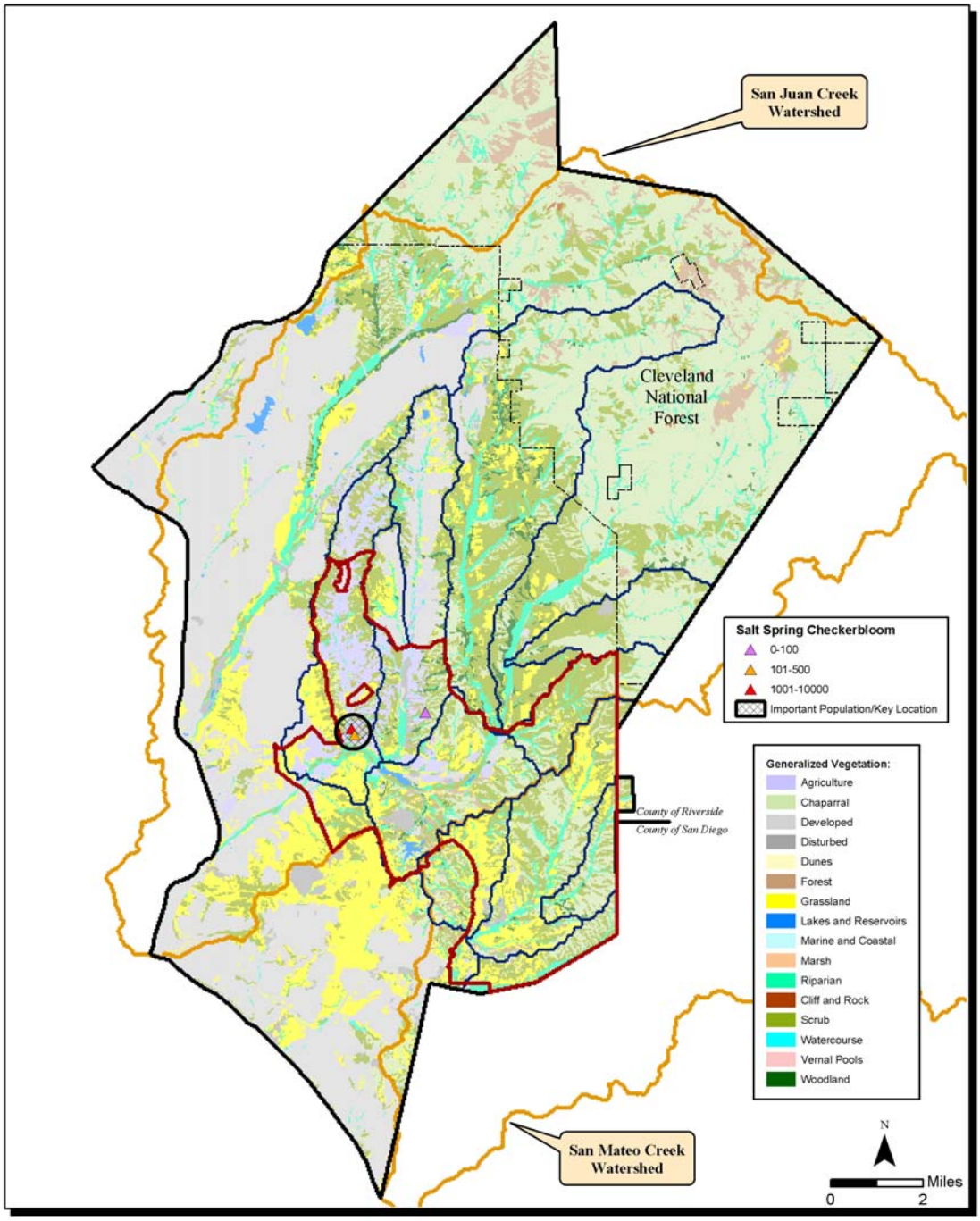
- Maintain existing slope wetland hydrology supporting the two locations of Salt Spring checkerbloom.

4.2.19 Southern Tarplant

Centromadia parryi var. *australis* – Southern Tarplant
Federal: None
State: None
CNPS: 1B

a. Regional Status

Southern tarplant is an annual member of the sunflower family (Asteraceae) that occurs in vernal pools, alkali playas, alkali grasslands, and disturbed areas. The stiff bristly stems are simple or



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Salt Spring Checkerbloom Distribution Map

FIGURE 4-25

branched and can reach heights of up to 0.7 m. The lower leaves vary from 5 to 20 cm, and are linear-lanceolate and deeply divided. The upper leaves are linear and are spine-tipped. The infloresence can vary from open to dense. The ray flowers number from 9 to more than 30 and the ligule is 2 to 6 mm, 2 lobed, and yellow (sometimes becoming red). The species is characterized by many disk flowers with yellow corollas and brown or black anthers.

Historically this species was known from 47 locations in San Diego, Orange, Los Angeles, Ventura and Santa Barbara counties, with four populations reported from Mexico.[5] Of the approximately 47 populations in the U.S., between 35 and 40 percent have been extirpated. Currently, Orange County contains the majority of the remaining populations (*Table 4-25*). In his status report, Roberts divided the populations into: "major" – over 8,000; "moderate" – between 1,000 and 5,000; and "small" – fewer than 1,000. Nine populations are reported by Roberts as moderate (over 1,000) and two populations, Talbert Marsh and Canada Chiquita are reported as major.

TABLE 4-25. REGIONWIDE SUMMARY:
2002 STATUS OF SOUTHERN TARPLANT WITHIN
THE KNOWN RANGE IN SOUTHERN CALIFORNIA

Regional Major Population Area(s) in Orange County	Southern Tarplant Population: Number of Counted/Estimated Plants
Rancho Mission Viejo	145,600
Newport Backbay	Estimated 160,000*
Talbert Park	8,000
Banning Ranch	2,000+
Hellman Ranch	3,300
Bolsa Chica	2,000+
Subtotal:	*~320,900*
Other Important Populations	
Madrona Marsh, Los Angeles County	Estimated 1,000 to 5,000
APPROXIMATE TOTAL PLANTS	325,900

Note:* The Newport Backbay population is a preliminary rough estimate and is subject to field verification by T. Bomkamp.

[5] Much of the information regarding status of the southern tarplant has been obtained from a report prepared by Fred Roberts for the Bolsa Chica Land Trust in 2000, entitled *Southern Tarplant (Hemizonia parryi ssp. australis) on the Bolsa Chica Mesa, Orange County, California.* This report was submitted to the Coastal Commission and is part of the public record for the Bolsa Chica project.

Of the extant populations, many are on protected lands, including the populations at Newport Ecological Reserve (estimated at 160,000 individuals by DuBois in 2002, pers. comm. 2002; this estimate is subject to field conformation to be completed by T. Bomkamp), Hellman Ranch (now in permanent conservation) (3,307 individuals recorded in 1996), Bolsa Chica Mesa (estimated 2,000 individuals in conservation/preservation areas based on surveys by LSA in 2001), Talbert Park (8,000+), Madrona Marsh, Banning Ranch (2,000+ individuals in 1999 recorded by GLA). Also, not included by Roberts are 11,000+ individuals in the Chiquita Tesoro Mitigation Site and an estimated 10,000+ individuals in the Ladera portion of the GERA mitigation area, both of which would be considered as "major" populations based upon the Roberts' convention.

b. Subregional Status

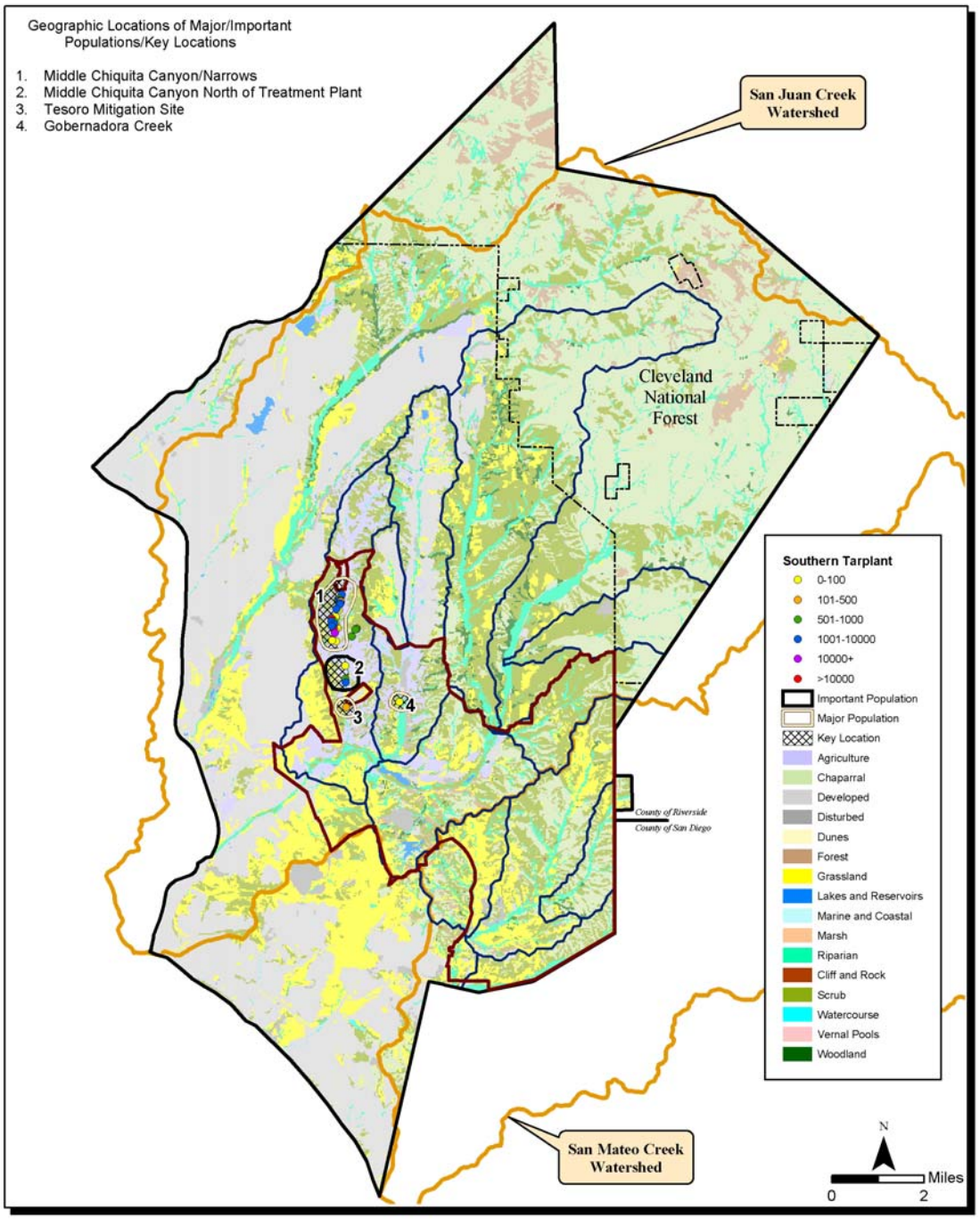
Southern tarplant is limited to two sub-basins in the planning area (*Figure 4-26*). The largest population is in Chiquita Canyon and, including the Tesoro mitigation site, numbers more than 135,600 individuals. A large population numbering 10,000+ individuals occurs on the GERA site in Gobernadora. It should be noted that southern tarplant populations are quite variable in size and location from year to year.

Within the subregion, this species is typically associated with wet meadow areas that exhibit mildly alkaline/saline soils dominated by saltgrass (*Distichlis spicata*), Mexican rush (*Juncus mexicanus*), yerba mansa (*Anemopsis californica*), shining peppergrass (*Lepidium nitidum*), dwarf peppergrass (*Lepidium latipes*), and alkali plantain (*Plantago elongata*). In Chiquita Canyon this species is sometimes associated with or in close proximity to Coulter's saltbush. More than any of the other special-status plant species under consideration, this species is well adapted to disturbance associated with flood events and appears to benefit from occasional disking or other soil-disturbing activities.

The following provides a more detailed description of the southern tarplant in the planning area and identifies *major* and *important populations*:

- Middle Chiquita north and south of the "Narrows" supports about 35 mapped locations ranging up to about 30,000 individuals in the largest (No. 1 on *Figure 4-26*). Estimated discrete locations numbering 7,000, 7,500, 10,000, 20,000, and 30,000 individuals, respectively, are located west of the creek. Locations east of the creek are more disparate and smaller, with the largest numbering about 750 individuals. This is a *major population* and the portion of the population west of the creek is a *key location*.

- Middle Chiquita northwest of the wastewater treatment facility supports three locations west of the creek numbering 3,000, 700 and 40 individuals, respectively (No. 2 on *Figure 4-26*). These locations comprise an *important population* in a *key location*.



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Southern Tarplant Distribution Map

FIGURE 4-26

The Tesoro High School mitigation site in Lower Chiquita supported approximately 1,100 individual in 2000, 6,000 individuals in 2001 and 11,000 individuals in 2002 as determined during monitoring of the population (No. 3 on *Figure 4-26*). This population was introduced to the site in Fall of 1999 as mitigation for impacts to the tarplant at the High School site. This population appears to be self-sustaining and has increased for three consecutive years and should now be considered a *major population* in a *key location*.

- Further south in lower Chiquita Canyon there is one population numbering about 400 individuals. This population is relatively small for this species, but should be considered part of the Tesoro mitigation site *major population*.

- Portions of the Ladera Ranch Mitigation site in GERA, on the west side of the Gobernadora Creek "spur" that enters the mitigation area, supports an estimated 10,000+ individuals that have colonized the mitigation areas (No. 4 on *Figure 4-26*). This population should now be considered a *major population* in a *key location*.

- Finally, a wetland seep between Gobernadora and Chiquita supports a few hundred individuals during optimal years. While not large enough to be considered a major population, this population may potentially be an *important population* in a *key location.*

c. Protection Recommendations

- Minimize impacts to the *key location* of southern tarplant west of Chiquita Creek in Middle Chiquita Canyon to the maximum extent feasible. Minimize impacts to the remainder of the *major population* in Middle Chiquita Canyon. Mitigate impacts to southern tarplant in a manner similar to the Tesoro mitigation project (ongoing mitigation projects in Chiquita Canyon have demonstrated over three successive years that this plant can be readily propagated from seed).

- Protect the *major population* of southern tarplant in a *key location* in Lower Chiquita Canyon.

- Protect the *major population* of southern tarplant totaling 10,000+ individuals located in GERA.

d. Management Recommendations

- Implement a management program for southern tarplant, including control of non-native invasive species, management of grazing and minimization of human access and disturbance as part of the Adaptive Management Program**.**

e. Restoration Recommendations

- Translocate salvaged southern tarplant to suitable restoration and enhancement areas in the Chiquita sub-basin. Receiver areas should support alkali soils suitable for the species and should be placed in locations that maximize connectivity and genetic exchange.