

# Southwestern Riverside County

## Multi-Species Reserve

### Management Plan

September 3, 2008

Prepared for:

**The Reserve Management Committee:**

California Department of Fish and Game  
Metropolitan Water District of Southern California  
Riverside County Habitat Conservation Agency  
Riverside County Regional Park and Open Space District  
U. S. Fish and Wildlife Service

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## **DEFINITIONS AND ACRONYMS**

Adaptive Management	To use the results of new information gathered through the Monitoring Program and Plan and from other sources to adjust management strategies and practices to assist in providing for the conservation of covered species
BLM	Bureau of Land Management
California Department of Fish and Game	CDFG: A department of the California resources agency
California Endangered Species Act	CESA: (California Fish and Game code, Section 2050 et seq.) and all rules, regulations and guidelines promulgated thereunder, as amended.
CDF/CalFire	California Department of Forestry and Fire Protection
CDFG	California Department of Fish and Game
CESA	California Endangered Species Act
CMA	Cooperative Management Agreement
County	County of Riverside
County Parks	Riverside County Regional Parks and Open Space District
DVL	Diamond Valley Lake
Ecoregion	Ecoregions denote areas of general similarity in ecosystems and in the type, quality, and quantity of environmental resources and are designed to serve as a spatial framework for the research, assessment, management, and monitoring of ecosystems and ecosystem components.
Federal Endangered Species Act	FESA: (16 U.S.C., Section 1531 et seq.) and all rules and regulations promulgated thereunder, as amended
FESA	Federal Endangered Species Act
FMA	Fuel Modification Area
FMP	Multi-Species Reserve Fire Management Plan

FMU	Fire Management Unit
Habitat	The combination of environmental conditions of a specific place providing for the needs of a species or a population of such species
HCP	Habitat Conservation Plan
MSHCP	Multiple Species Habitat Conservation Plan
MSR	Southwestern Riverside County Multi-Species Reserve
MWD	Metropolitan Water District of Southern California
RCA	Western Riverside County Regional Conservation Authority
RCHCA	Riverside County Habitat Conservation Agency
RCRPOSD	Riverside County Regional Park and Open Space District
Reserve	Southwestern Riverside County Multi-Species Reserve
RMC	Reserve Management Committee
SKR	Stephens' kangaroo rat
SKR HCP	Stephens' Kangaroo Rat Habitat Conservation Plan
United States Fish and Wildlife Service	USFWS: An agency of the United States Department of the Interior
USFWS	United States Fish and Wildlife Service
Wildlife Agencies	The USFWS and CDFG, collectively
WRCMSHCP	Western Riverside County Multiple Species Habitat Conservation Plan
WRP	Multi-Species Reserve Wildfire Response Plan
WUI	Wildland/Urban Interface

## **1. INTRODUCTION**

### **1.1. Background of the Habitat Conservation Plans**

#### **1.1.1. Southwestern Riverside County Multi-Species Habitat Conservation Plan**

The Southwestern Riverside County Multi-Species Reserve (MSR or Reserve) was established in October 1992 as mitigation for impacts to sensitive species resulting from the creation and operation of the reservoir “Diamond Valley Lake” (DVL) near Hemet, California. To this end, the Metropolitan Water District of Southern California (MWD) developed a Multi-Species Habitat Conservation Plan (MSHCP) which included the establishment of the Reserve, provisions for research and management funding, and a Cooperative Management Agreement (CMA) between the five agencies with interest in the Reserve: MWD; the Riverside County Habitat Conservation Agency (RCHCA); the Riverside County Regional Park and Open Space District (RCRPOSD); the California Department of Fish and Game (CDFG); and the U.S. Fish and Wildlife Service (USFWS).

The Reserve MSHCP is the basis for a State of California Fish and Game Code Section 2081/2835 Agreement regarding take of sensitive species found within the impact area of Diamond Valley Lake, its associated support facilities, and on-going operations. In addition, the Reserve MSHCP is the basis for a Federal Section 7(a) conference opinion for Diamond Valley Lake’s impacts to the California gnatcatcher (*Polioptila californica californica*).

The Reserve MSHCP covered a 20,000 acre planning area including approximately 2,400 acres of previously conserved habitat (the Shipley Reserve), 6,600 acres of new conservation land, 8,600 acres dedicated to two reservoirs and water-related facilities, and 2,400 acres dedicated to recreation facilities at Diamond Valley Lake (previously “Domenigoni Valley Reservoir Project” or “Eastside Reservoir Project”) and existing Lake Skinner. The Reserve was established by combining the Shipley Reserve, lands around Lake Skinner, and lands around DVL to create a contiguous Reserve of approximately 9,000 acres. Subsequent acquisitions have added to the Reserve and increased the size of the Reserve to approximately 14,000 acres (21 square miles).

The CMA established a Reserve Management Committee (RMC) consisting of one representative from each of the five agencies. Management of the Reserve is by a consensus (unanimous) vote of at least three RMC members present and voting, except that one member from either CDFG or USFWS must be present for business to be transacted.

#### **1.1.2. Stephen’s Kangaroo Rat Habitat Conservation Plan**

The Riverside County Habitat Conservation Agency (RCHCA) is a Joint Powers Authority comprised of the cities of Corona, Hemet, Lake Elsinore, Moreno Valley, Murrieta, Perris, Riverside, Temecula, and the County of Riverside. The RCHCA completed a Habitat Conservation Plan (HCP) in 1996 which authorizes incidental “take” (as defined by the Federal and State Endangered Species Acts) of the federally-listed endangered and State-listed threatened Stephens’ kangaroo rat (*Dipodomys stephensi*). The Stephens’ kangaroo rat HCP describes the conservation, mitigation, and monitoring measures that are to be implemented

under the Section 10(a) permit issued by the USFWS and authorization by CDFG. The HCP area covers approximately 533,954 acres within RCHCA member jurisdictions, including an estimated 30,000 acres of occupied Stephens' kangaroo rat habitat at the time the HCP was approved.

A part of the permit/authorization terms and conditions for the HCP is that "The RCHCA will ensure ongoing and appropriate management of conserved Stephens' kangaroo rat habitat in the core reserves..." Further, "The plan provides a framework and funding for:

1. Coordinating management of conserved Stephens' kangaroo rat habitat;
2. Increasing the amount and quality of Stephens' kangaroo rat habitat in the reserve system through additional land acquisitions and adaptive management activities including habitat enhancements and restoration; and
3. Monitoring the status of Stephens' kangaroo rat populations in the plan area."

At the time, the Reserve had approximately 1,988 (Stephens' kangaroo rat HCP, page 115) acres of RCHCA parcels and conservation easements and was considered the largest of the Stephens' kangaroo rat core reserves. The overall goal of the Stephens' kangaroo rat Habitat Management section of this Management Plan is to provide the RCHCA a plan by which effective management of the Stephens' kangaroo rat populations and habitat in the RCHCA-owned parcels and conservation easements within the Reserve can be implemented and monitored to comply with the requirements of the Stephens' kangaroo rat HCP.

The 1992 Reserve MSHCP states that "Lands within the Lake Skinner-Domenigoni Valley core reserve will be managed and administered pursuant to the terms of the Southwestern Riverside County Multi-Species HCP prepared by the Metropolitan Water District (MWD) and the RCHCA, and approved by the USFWS and CDFG." Stephens' kangaroo rat habitat in the Reserve is specifically managed for conservation through interest generated by endowments provided by the RCHCA and MWD. All lands, including those owned by RCHCA, will be managed consistent with this plan, and this plan has been designed to be consistent with the Stephens' kangaroo rat HCP.

The 1996 Stephens' kangaroo rat HCP states that "Upon approval of the Stephens' kangaroo rat HCP, the RCHCA will add all land under its ownership in the Lake Skinner area to the Multi-Species Reserve established by the Southwestern Riverside County MSHCP. Through this action, conserved habitat on RCHCA lands will be managed by the existing Reserve Management Committee (RMC). Management of Stephens' kangaroo rat habitat on the Multi-Species Reserve will be guided by the RMC pursuant to the provisions of the Reserve MSHCP. On lands dedicated to Stephens' kangaroo rat on the Multi-Species Reserve, and on suitable habitat contained within RCHCA properties added to the Reserve, management will be directed toward maintenance and expansion of Stephens' kangaroo rat populations. In all other areas, land will be managed for biodiversity pursuant to criteria established in the [Reserve] MSHCP and through adaptive techniques approved by the Management Committee."

### **1.1.3. Western Riverside County Multiple Species Habitat Conservation Plan**

The Western Riverside County Multiple Species Habitat Conservation Plan (WRCMSHCP) is a comprehensive, multi-jurisdictional Habitat Conservation Plan (HCP) focusing on conservation of species and their associated habitats in Western Riverside County. The WRCMSHCP Plan Area encompasses approximately 1.26 million acres (1,966 square miles) and includes all unincorporated Riverside County land west of the crest of the San Jacinto Mountains to the Orange County line, as well as the jurisdictional areas of the Cities of Temecula, Murrieta, Lake Elsinore, Canyon Lake, Norco, Corona, Riverside, Moreno Valley, Banning, Beaumont, Calimesa, Perris, Hemet, and San Jacinto, including the Southwestern Riverside County Multi-Species Reserve.

The WRCMSHCP was adopted on June 17, 2003, by the Riverside County Board of Supervisors, and approved and permitted by the USFWS on June 22, 2004. This plan is administered by the Western Riverside County Regional Conservation Authority (RCA). The plan calls for the establishment of a 500,000 acre Conservation Area to be managed for the benefit of the 146 covered species of plants and animals. Existing conservation lands, including the MSR, are included in the 500,000 acre Conservation Area. The WRCMSHCP categorizes the MSR as “Public/Quasi Public” lands that are anticipated to be managed for open space value and/or in a manner that contributes to the conservation of the WRCMSHCP covered species.

It is contemplated in the WRCMSHCP that existing individual reserves will manage their resources under independent management plans. However, the MSR is not obligated to spend management funds providing for species covered under the WRCMSHCP but not covered under the Reserve MSHCP (e.g., Quino checkerspot butterfly; *Euphydryas editha quino*). It is also important to note that any management plan developed under the WRCMSHCP will not supersede this management plan, or automatically grant the RCA rights to manage or monitor species on the MSR. Any monitoring or management actions proposed by the RCA on the MSR should be funded by the RCA and will require prior approval by the Reserve Manager and/or the RMC.

## **1.2 Research**

From October 1992 to the present, the Reserve has operated under an interim management plan contained in the Reserve MSHCP. During this period, the RMC sponsored extensive research on the Reserve to provide data upon which to base subsequent management decisions.

In 1992, baseline vegetation data for the Reserve was established using air-photo interpretation. In addition, in 1994, MWD disseminated a Request for Proposals on behalf of the RMC to the scientific community to “Conduct research studies of sensitive species on reserve lands”. At least 47 proposals from 22 organizations were received and reviewed. Ultimately, approximately 13 studies were funded. In addition, other studies have been authorized on the Reserve, some with funding from the Reserve (Appendix 1). Approximately \$4 million of Reserve funds have been spent to date on scientific research on the Reserve (Monroe 1999).

From 1992 through 2002, all research on the Reserve was administered by MWD and research reports and results were delivered to the MWD office in Los Angeles. Subsequent to 2002, all research reports and results that have been received are stored at the Multi-Species Reserve Field Office (Appendix 1).

### **1.3 Purpose and Need of the Management Plan**

This Management Plan is designed to guide the management of the Reserve for the next 15 years (2008 - 2023). This management plan will articulate the short-term and long-term goals for the Reserve and describe detailed plans and schedules to achieve those goals.

The primary objective of this plan is to outline management of the Reserve to maintain viable populations of sensitive species and other wildlife by managing large, contiguous areas of habitat for these species. Through management, preservation, restoration, and enhancement, this large, contiguous area will serve as ecologically valuable open space for southwestern Riverside County in perpetuity. In addition, the Reserve MSHCP and the CMA require the development of a management plan. This plan fulfills that requirement.

### **1.4 Overall Goals and Scope of the Management Plan**

The overall goal of this Management Plan is to provide the RMC a plan by which effective management of Reserve wildlife and habitats can be implemented and monitored in a fashion consistent with the requirements of the Reserve MSHCP, the Stephens' kangaroo rat HCP, and related agreements.

To achieve this overall goal, this Management Plan includes several elements:

- Statement of the goals and objectives of the Management Plan;
- Compilation of the relevant information for developing the Plan, including baseline data for the Reserve areas that describes the biological context and setting of the Plan;
- Identification of Reserve habitats, wildlife, and management challenges;
- Identification of appropriate strategies for implementing management and associated monitoring; and
- Integrating wildfire management into the Management Plan.

### **1.5 General Overview of Biological Context and Setting of the Multi-Species Reserve**

The ecoregion of the Reserve is roughly defined as the region south of the Santa Ana River, east of the Coast Range (Santa Ana Mountains), generally west of the San Jacinto Mountain range, and north of the Palomar Mountains. This region includes large portions of the Santa Margarita River and Santa Ana River watersheds. The Multi-Species Reserve occurs primarily in the Santa Margarita Watershed; only the very northern portion of the Reserve (hills north of Diamond Valley Lake) occurs outside of the Santa Margarita Watershed and within the Santa Ana River Watershed (Figure 1).

The ecoregion is a floodplain valley, with numerous hilly outcrops, surrounded by steep hills or mountains (except at the northern end where there are two low passes leading to the Santa Ana River basin.) The flat valleys and often abruptly rising hills create a mosaic of diverse habitats. Hills are dominated by a subassociation of coastal sage scrub called Riversidean sage scrub (hereafter referred to as simply “sage scrub”), chaparral, and sparsely vegetated rocky outcrops. Flatlands are primarily dominated by non-native grasses. There are seasonal wetlands and permanent riparian vegetation in the major floodplains. The ecoregion is characterized by generally low rainfall which is annually and locally variable. Nearly all precipitation falls between November and April.

As a result of variable precipitation and topography, the plant and animal communities of the ecoregion are highly variable and often patchy. This ecoregion is a transitional area between desert and coastal areas and therefore species from both areas occur within the Reserve, as well as species that are unique to the transitional zone.

Western Riverside County, which in the 1980’s grew by more than a half million people, is described by Sullivan and Scott (2000) as a “global hotspot of biodiversity.” At least 400 plant and animal species are endemic to Southern California, meaning that they occur in no other known location. “Western Riverside [County] is an epicenter of endemism with a high density of rare species coinciding with one of the rapidly urbanizing regions of the country; this complex environment requires that preserves encompass habitats that will serve a number of sensitive species” (Sullivan and Scott 2000).

In addition to the Multi-Species Reserve, other conservation lands are located in the ecoregion. They include, but are not limited to: Johnson Ranch/French Valley Wildlife Area and Skunk Hollow to the southwest of the Reserve; the MWD Salt Creek conservation site to the north of the North Hills of the MSR; six other core Stephens’ kangaroo rat reserves; U. S. Forest Service lands (San Bernardino National Forest to the east, and Cleveland national Forest to the south and west); and lands proposed for conservation in fulfillment of the WRCMSHCP.



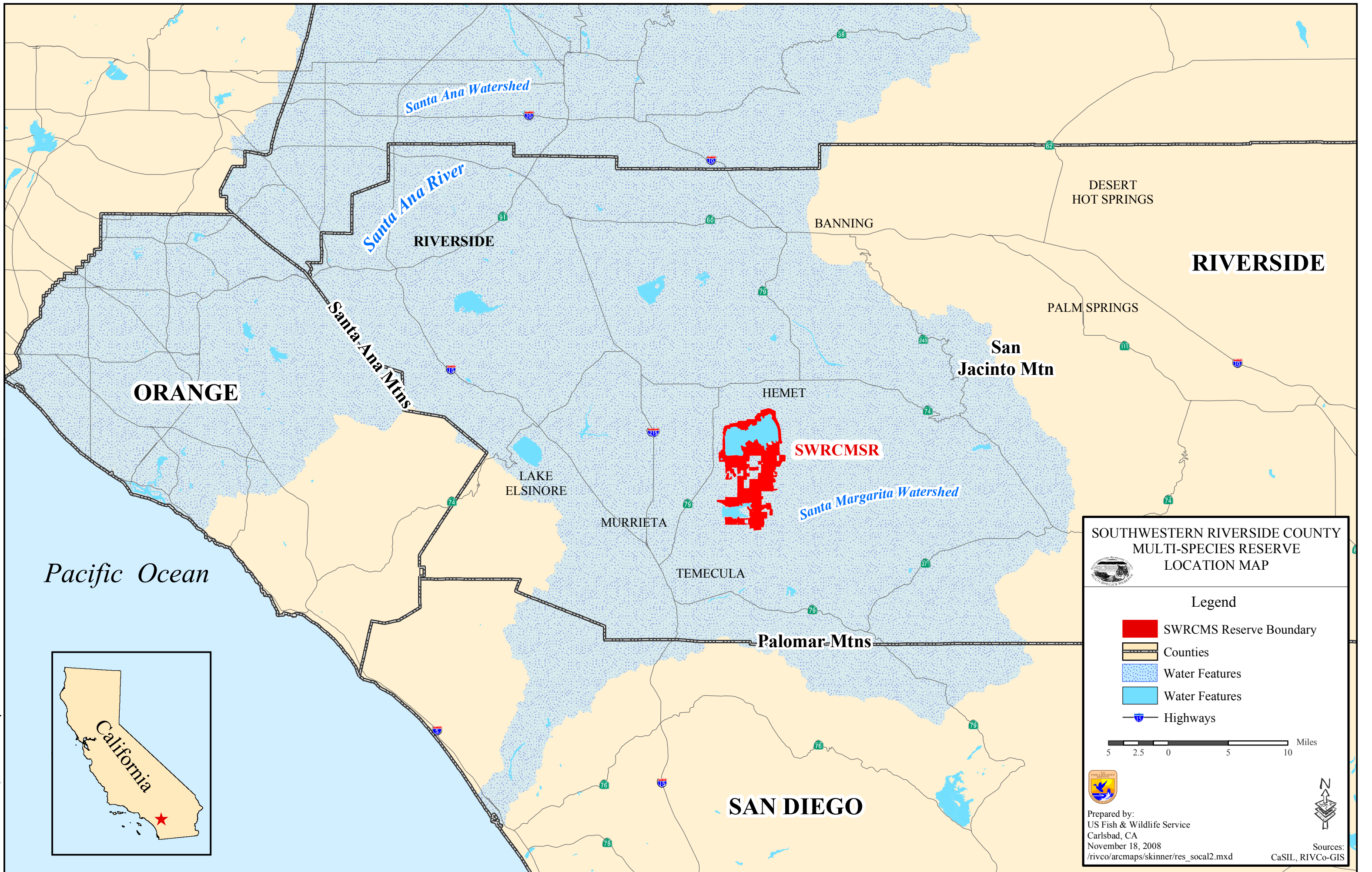


Figure 1

Figure 1. Regional map. Southwestern Riverside County Multi-Species Reserve Management Plan, September 3, 2008.

## **2.0 EXISTING SETTING WITHIN THE MANAGEMENT AREA**

### **2.1 Land Ownership and Land Use**

#### **2.1.1 Land Ownership**

In 1992, the Reserve was created as an expansion of the Roy E. Shipley Reserve. The Shipley Reserve lands totaled approximately 2,400 acres and were managed pursuant to a Cooperative Management Agreement that included the same five agencies which are represented on the RMC for the Reserve (MWD, RCHCA, RCRPOSD, USFWS, and CDFG). The Cooperative Management Agreement stipulated that the management of the Shipley Reserve would be “as a single ecological unit for the protection, restoration, and maintenance of the quality and diversity of the plants, wildlife, and their habitats occurring on those lands.”

As mitigation to offset impacts to sensitive resources from the construction and operation of Diamond Valley Lake, MWD expanded the Shipley Reserve to approximately 9,000 acres in 1992 and renamed it the Southwestern Riverside County Multi-Species Reserve, or MSR. A new Cooperative Management Agreement was signed in 1992 to provide for management of all 9,000 acres, including the original Shipley Reserve, as a single reserve.

Through acquisitions from willing sellers since 1992, the Multi-Species Reserve has increased in size to approximately 14,000 acres comprising lands in the following ownerships (Figure 2)<sup>1</sup>:

1. MWD (approximately 10,600 acres);
2. Bureau of Land Management (BLM) (approximately 200 acres);
3. Riverside County Habitat Conservation Agency (approximately 2,335 acres within the Reserve, and 205 acres of conservation easement within Las Mañanitas; legal documents and agreements executed by Finisterra Farms, a California corporation);  
and
4. County of Riverside (approximately 660 acres).

For purposes of legal description of the lands within the Reserve, it should be understood that these distinctions are necessary for the definition of fee title, easement ownership, and potential uses. When referring to these lands within the Reserve, these distinctions should not be interpreted as implying separate management of Reserve lands; the Reserve, consisting of various portions of lands owned by several of the entities listed above, are managed as a single ecological unit by the RMC.

Land occupied by Stephens' kangaroo rat throughout the Reserve was placed into conservation easements in favor of the RCHCA. These easements are comprised of approximately 1,277 acres (MWD), 42 acres (RCRPOSD), and 205 acres (Finisterra Farms) (Figures 3, 4, and 5, respectively). These lands are dedicated to Stephens' kangaroo rat management in perpetuity.

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<sup>1</sup> Note: Acreages are estimated based on information compiled from two separate GIS sources (USFWS and RCHCA) and rounded.

### **2.1.1.1 Baseline and Subsequent Acquisitions**

Since the establishment of the original 9,000 acres, approximately 5,000 acres have been added to the Reserve. Of those added acres approximately 1,600 have been considered for mitigation banking purposes, and some credits have been sold (Appendix 2). It should be noted that the approximately 1,600 acres were purchased for the sole purpose of expanding the Reserve, but since they were not part of the original land to mitigate for impacts to DVL it was determined that they may be used for mitigation banking purposes. Resolution number 19 (dated August 2, 1994) provides background and details regarding mitigation banking on the Reserve.



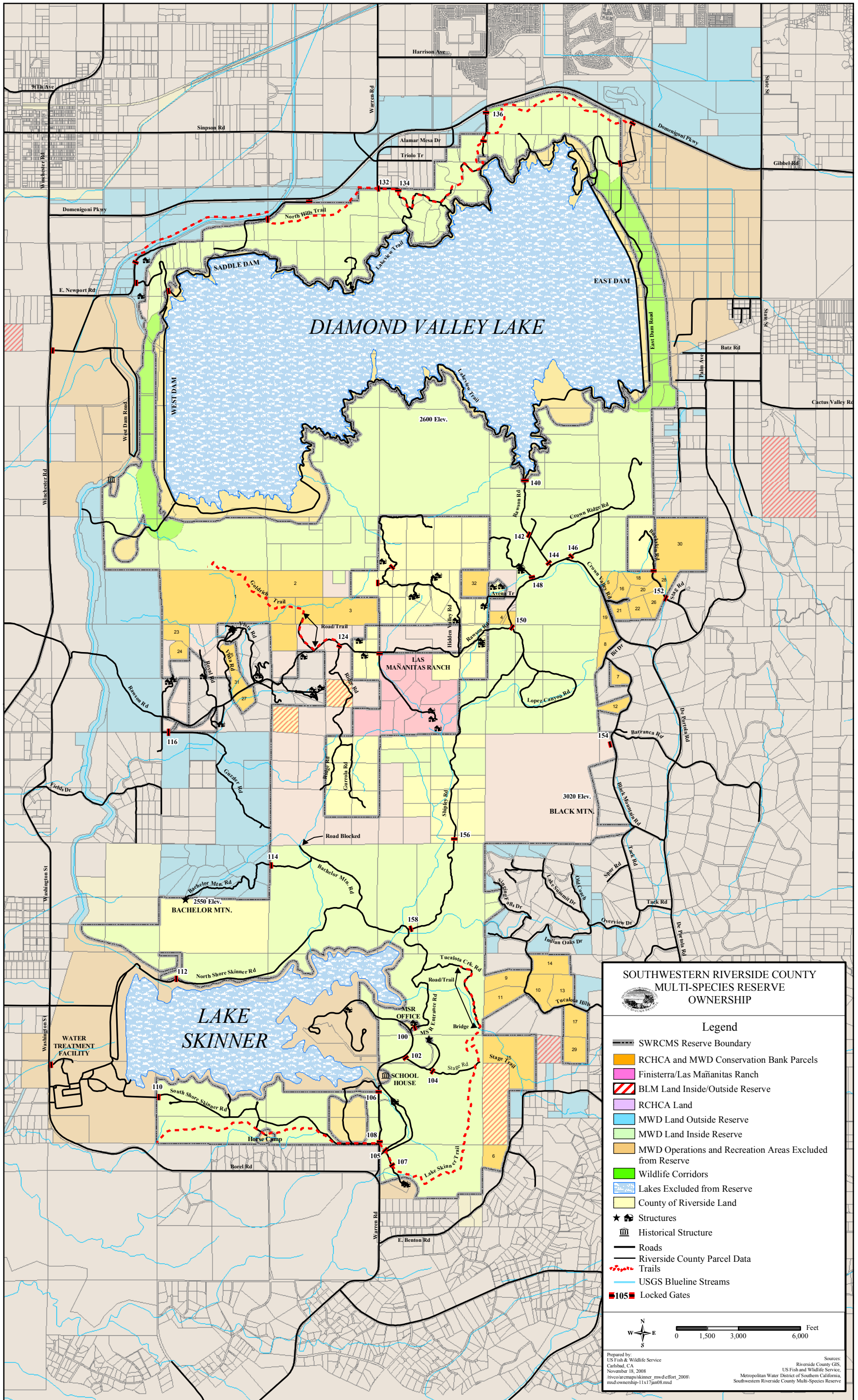


Figure 2

Figure 2. Land ownership. Southwestern Riverside County Multi-Species Reserve Management Plan, September 3, 2008.



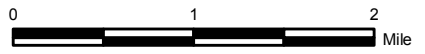

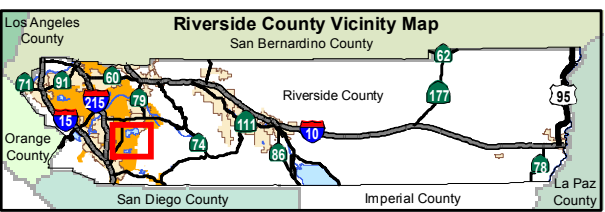
# Riverside County Habitat Conservation Agency



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## RCHCA CONSERVATION EASEMENT ON MWD LAND WITHIN THE SOUTHWESTERN RIVERSIDE COUNTY MULTI-SPECIES RESERVE

	MAJOR ROADS
	1996 BASELINE CORE RESERVE BOUNDARY
	WATERBODIES EXCLUDED FROM CORE RESERVE
	PARCEL LINES
	RCHCA CONSERVATION EASEMENT

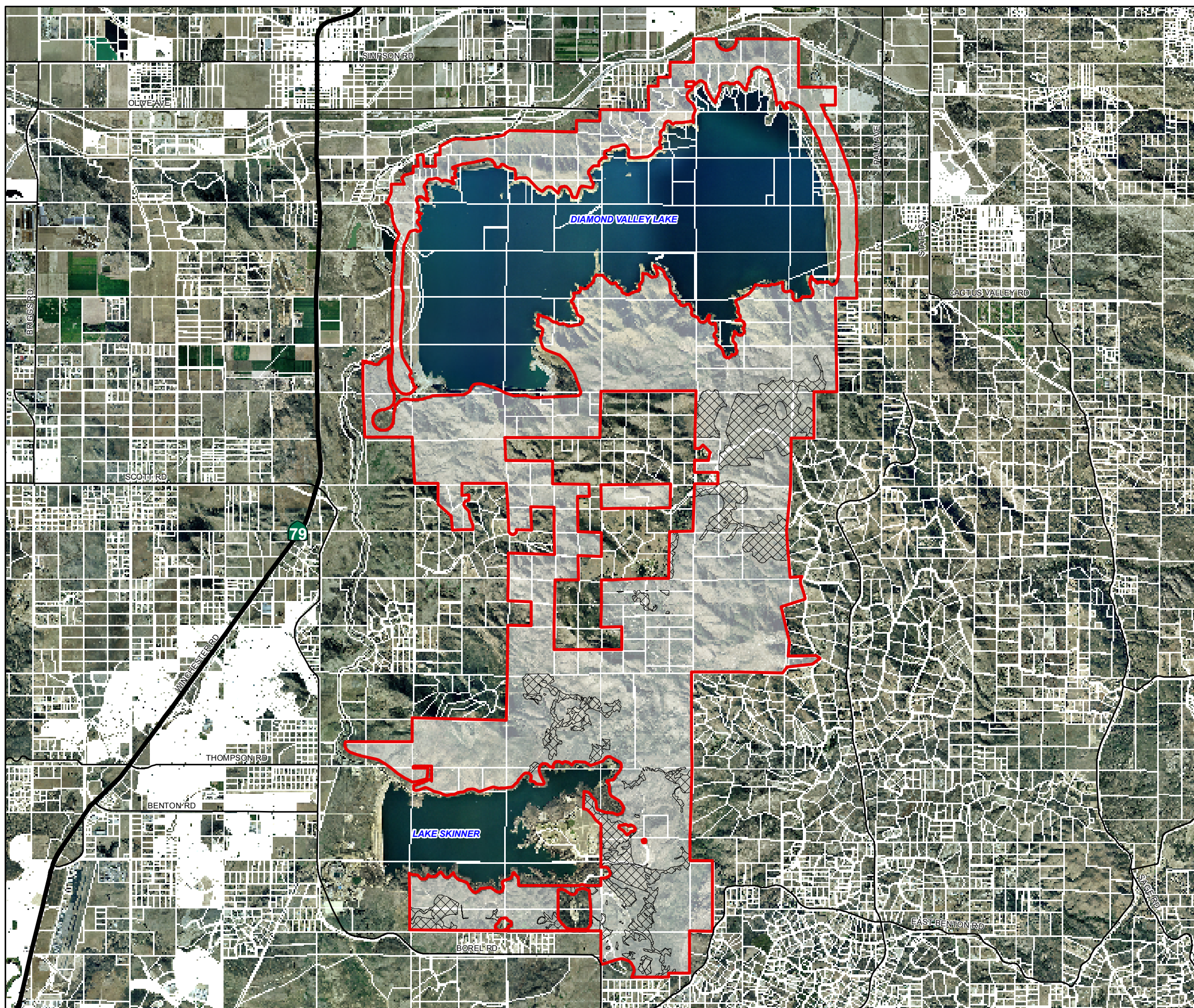
Riverside County Vicinity Map  
San Bernardino County

Date: September 18, 2007

Map Source: County of Riverside, TLMA/GIS. Map Created By: Christina Lindsay  
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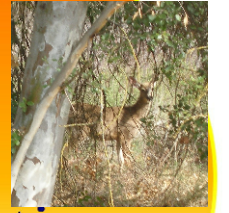
Coordinate System: NAD83 State Plane VI FIPS0406 (Feet)

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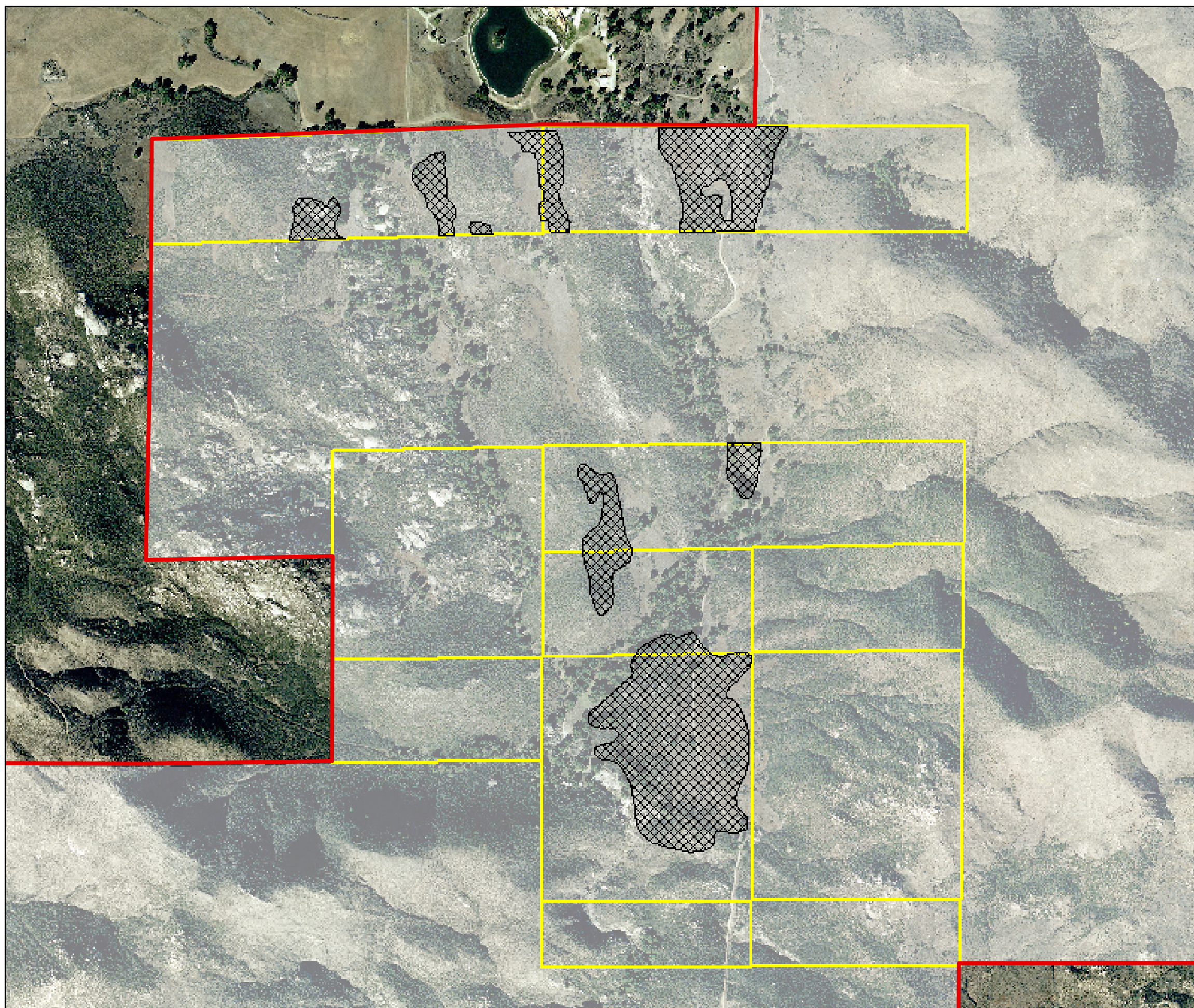


# Riverside County Habitat Conservation Agency



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## RCHCA CONSERVATION EASEMENT ON RIVERSIDE COUNTY REGIONAL PARK AND OPEN SPACE DISTRICT LAND WITHIN THE SOUTHWESTERN RIVERSIDE COUNTY MULTI-SPECIES RESERVE



	1996 BASELINE CORE RESERVE BOUNDARY
	RCHCA CONSERVATION EASEMENT
	DEFINED PARCELS
	WATERBODIES EXCLUDED FROM CORE RESERVE
	MAJOR ROADS

**BPD**

0 0.15 0.3 Mile

**Riverside County Vicinity Map**

**Southwestern Riverside County Core Reserve**

Date: November 20, 2007

Map Source: County of Riverside, TLMA/GIS. Map Created By: Christina Lindsay  
 U:\Projects\Christina\RCHCA\SouthWest\_RC\_MS\Lake\_Skinner\_Domenigoni\_Vly\Baseline\Conservation\_Esmnt\_Riv\_Co.mxd

Coordinate System: NAD83 State Plane VI FIPS0406 (Feet)




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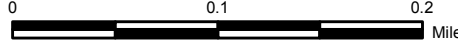

# Riverside County Habitat Conservation Agency

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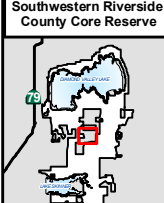
## RCHCA CONSERVATION EASEMENT ON FINISTERRA FARMS

	FINISTERRA FARMS BOUNDARY
	RCHCA SKR CONSERVATION EASEMENT
	PARCEL LINES

EPD  
Riverside County

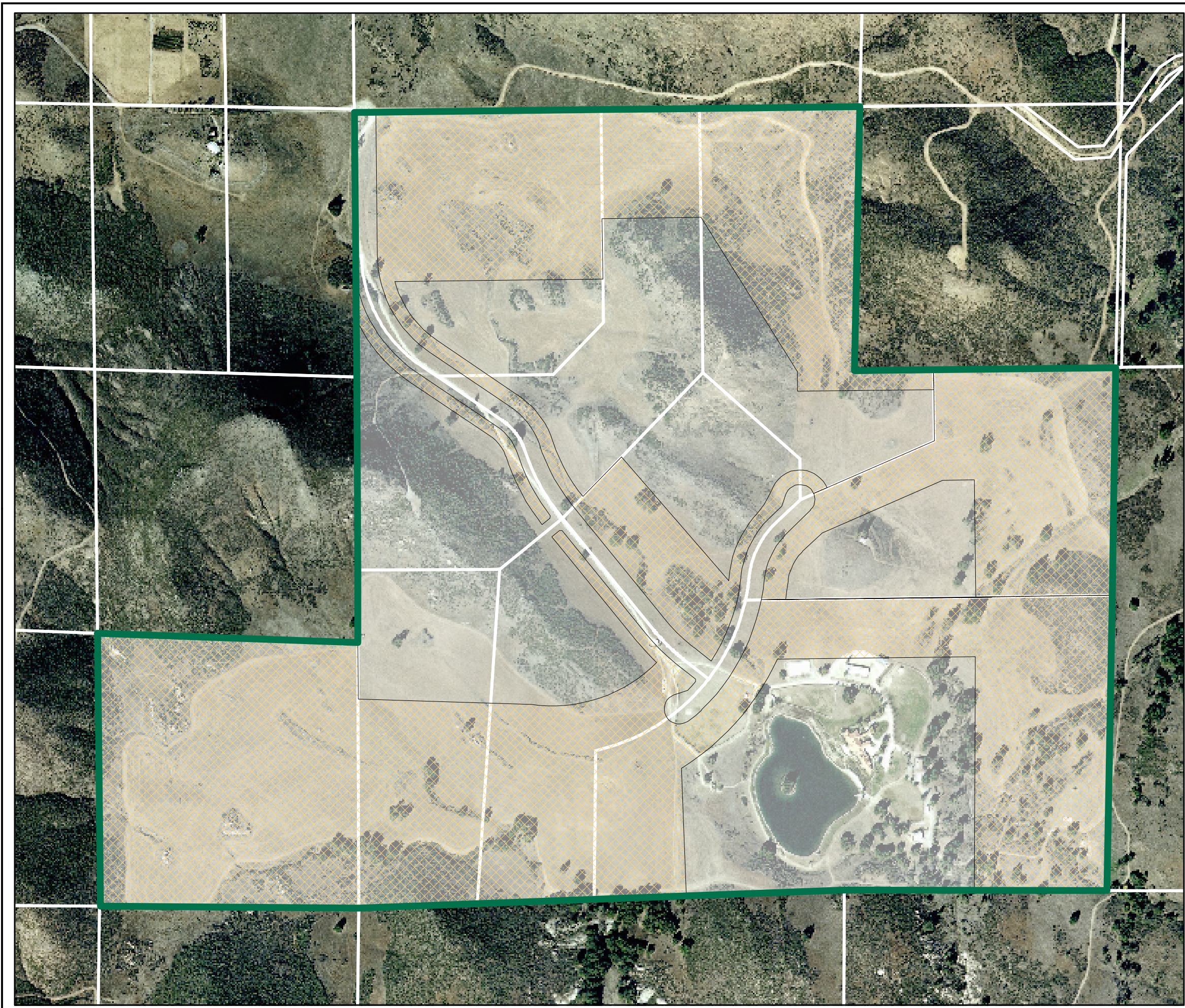
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It is also important to note that the Reserve currently has 21 parcels located within the Oakridge Ranches Homeowner's Association along the eastern border of the Reserve near De Portola Road and Crown Valley Road. These parcels are subject to the Covenants, Conditions, and Restrictions (C, C, & R's) dated June 19, 1980. In addition, annual dues are paid to the homeowner's association for each parcel.

On March 15, 2000, "Reden-Johnson" donated seven acres to the Reserve as mitigation for a development project (Wagner 2007). It is believed that the seven acres are located outside of the current Reserve boundary, possibly within the Lake Skinner View Estates Homeowner's Association lands to the east of the Reserve. The exact location of this land and supporting documentation is forthcoming.

### **2.1.1.2 BLM Memorandum of Understanding**

The BLM was a signatory to the Stephens' kangaroo rat HCP and thereby agreed to include selected BLM parcels within the Reserve. Originally, there were 356 acres (distributed among 6 parcels) of BLM land within the established Reserve boundary. Three of those parcels have been transferred to MWD ownership and are part of the MWD ownership tallied in §2.1.1 above. BLM land is currently included within the boundaries of the Reserve, but will not be managed pursuant to the Reserve Management Plan until a formal management MOU can be established between the BLM and one of the member agencies of the RMC. It is anticipated that the approval of this management plan for this Reserve will facilitate the preparation of an MOU with BLM regarding the management of the remaining three parcels in the Reserve.

### **2.1.2 Connectivity and Land Use**

The Reserve is part of a contiguous block of relatively natural habitat that extends east to the San Bernardino National Forest, and southeast to the Cleveland National Forest. Included in this region is Vail Lake, an area supporting many sensitive and listed animal and plant species. Vegetation in this area is dominated by chaparral but also includes sage scrub, grassland, coast live oak woodland, and riparian forest. The WRCMSHCP proposes linkages between the Reserve and other areas to the east, south, and west. To the east, a linkage would connect the Reserve with San Bernardino National Forest and to the south, a linkage to the Cleveland National Forest, both of which could potentially support a number of species that are covered under the Reserve HCP and the WRCMSHCP. However, adjacent land uses which generally consist of Rural and Rural Mountainous Development may affect resources within the linkage. Fire, fire suppression, livestock grazing, and off-road vehicle activities associated with these land use designations may result in adverse edge effects to the species and their associated habitats through the linkage.

Additional linkages are planned for west of the Reserve. Links to Paloma Valley (a core area in the WRCMSHCP) may be made through lower Warm Springs Creek. This area is constrained by existing agricultural land uses and urban development. An additional linkage to Antelope Valley would also link the Reserve with another WRCMSHCP core area. Development is rapidly increasing in the areas to the west and north of the Reserve. This increase in development will introduce added pressures of trespass, dumping, off-road vehicle use, and



isolation for sensitive Reserve species. Conversely, increased development may also provide opportunities for natural resource education and interpretation.

A significant portion of the Reserve lands and surrounding lands are owned by MWD. MWD currently holds a contract with RCRPOSD to operate and manage Lake Skinner Regional Park on the east side of the lake. Land uses there include camping, boating, and fishing. In addition, MWD has the right (as designated in the CMA) to utilize the Reserve to meet its water service obligations or water service operations responsibilities, to perform rescue operations, and similar activities (Reserve MSHCP §3.14.2).

### **2.1.3 Las Mañanitas Ranch**

Las Mañanitas Ranch (legal documents and agreements executed by Finisterra Farms, a California corporation) is located near the center of the Reserve (see Figure 2). In 1995, Las Mañanitas placed a conservation easement of 205 acres dedicated to the Stephens' kangaroo rat (*Dipodomys stephensi*) in favor of RCHCA. The agreement provided Las Mañanitas the species protections received by MWD as part of establishing the Reserve, and at the same time provided USFWS the authority to make annual visits to the conservation easements to assure compliance with the terms of the agreement. The agreement identifies that the conservation easement areas of Las Mañanitas are to become part of the Reserve to the extent that 1) management of the conservation easement areas will be conducted in a manner consistent with the Reserve goals and objectives, and 2) the conservation easement areas will be subject to the USFWS MOU implementing agreements and the CMA.

## **2.2 Physical Setting**

### **2.2.1 Climate and Geology**

The western Riverside County climate is Mediterranean with hot, dry summers and cool winters. The majority of annual precipitation falls in the months of November through April, with average rainfall of about 13 inches, although average rainfalls are quite variable within western Riverside County due to weather patterns, topography, rain shadow effects, etc. More importantly for management of the Reserve is the variability of annual rainfall in large part due to the El Niño Southern Oscillation (ENSO), with some years having just a few inches of rain or less ("La Niña" events) and others with 20 inches or more ("El Niño" events.)

The Reserve is underlain by several geologic formations (Figure 6). The predominant geologic formation is upper Jurassic marine, followed by (in descending order of occurrence) Pre-Cenozoic granitic and metamorphic rock; basalt intrusive; Mesozoic granitic rock; Pre-Cretaceous metamorphic rock; Jura-trias metavolcanic rock; Mesozoic ultrabasic intrusive rock; Pleistocene nonmarine; and alluvium. Soil types of the Reserve include many variations of loams (including many variations of sandy and rocky loams); alluvium; Auld cobbly clay; and Porterville clay. Topographically, the Reserve is between 1,400 feet (426 meters) and 3,040 feet (926 meters) elevation. In addition, there is highly variable topographic relief comprised of two major mountains (Bachelor Mountain and Black Mountain) and three major stream channels (Tucalota Creek, Middle Creek, and Rawson Creek).

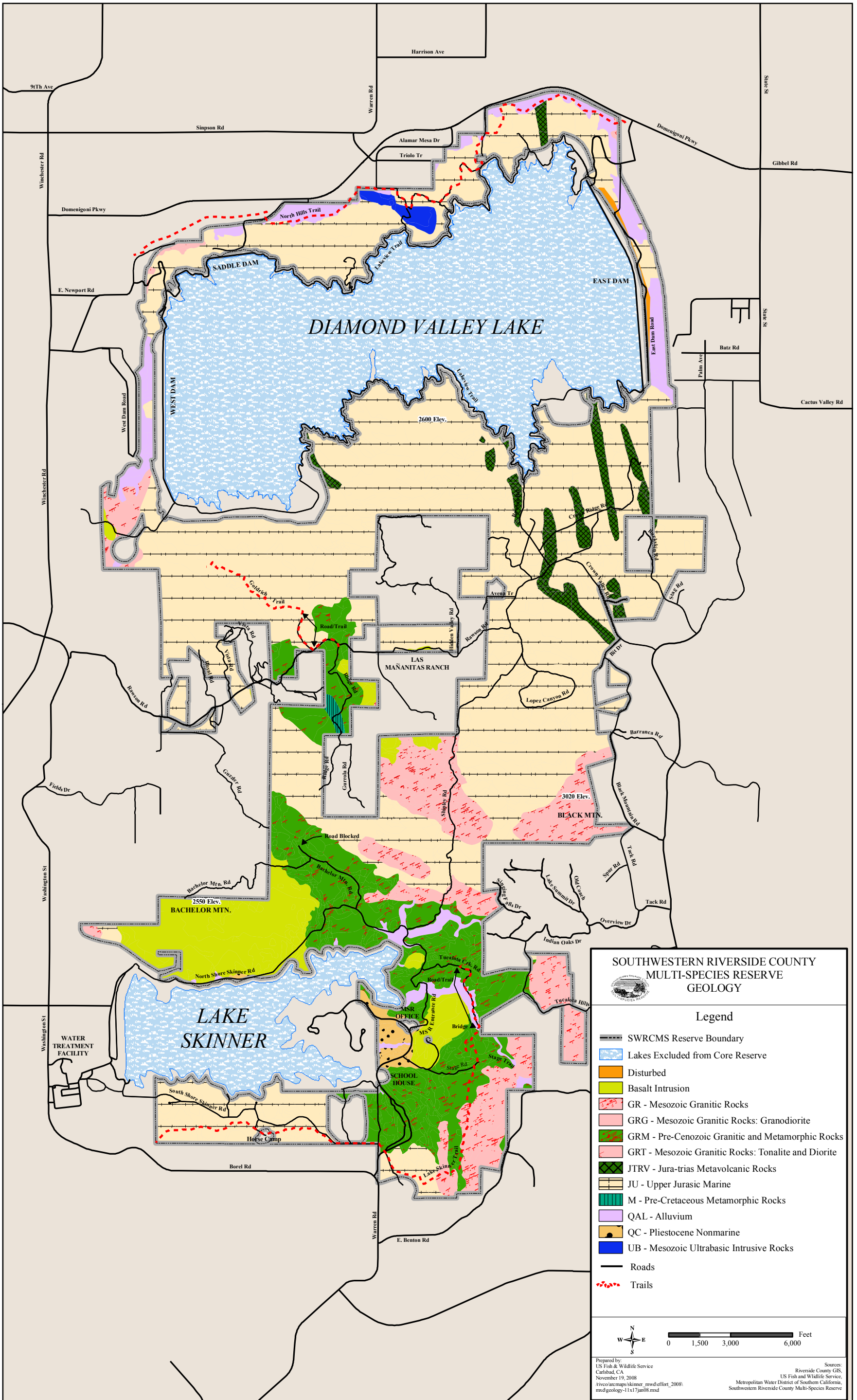


Figure 6

Figure 6. Major geologic formations.

Southwestern Riverside County Multi-Species Reserve Management Plan, September 3, 2008.

### 2.2.2 Vegetation Communities

Climate, soils, and topography primarily determine vegetation communities. Vegetation communities are habitats for wildlife and many wildlife species show strong preferences for certain habitat types. They have evolved along with their habitats and, as a result, are highly dependent on them. Much of the biological information in this section is from unpublished data collected on the Reserve since 1992.

The habitats on the Reserve can be separated into seven broad types: oak woodland, riparian; sage scrub; grassland; chaparral; wetlands; and disturbed, and are discussed below. Rocks and cliffs can be considered habitat sub-types, as they occur within the seven broad habitats, and many species utilize these substrates. Habitat categories of the Reserve from 1992 – 2000 are identified in Table 1 and Figure 7.

Vegetation data was estimated in 1992 using aerial photography and field verification. The vegetation categories were again mapped using the same methodology in 2002 using year 2000 aerial photography. The 1992 vegetation data was mapped within the current Reserve boundary for comparison. Notable changes are the increase in grassland and decrease in sage scrub. This change could be attributed to type-conversion of sage scrub to grassland due to nitrogen deposition or too-frequent disturbance such as wildfire. The increase in cleared/graded land can be primarily attributed to authorized activities related to the construction of DVL that had not taken place in 1992, but were subsequently done prior to the 2000 aerial imagery (wildlife corridors and dams).

Table 1. Vegetation within the Reserve from 1992 – 2000.

Vegetation Category	Vegetation sub-category	Number of habitat acres inside the 1992 Reserve (approx. 9,391 acres)	Number of habitat acres as of 1992 within the year 2000 Reserve boundary (approx. 13,721 acres) for comparison	Number of habitat acres as of 2000 within year 2000 Reserve boundary (approx. 13,721 acre)	Number of acres change from 1992 to 2000 within the Reserve boundary in year 2000
Oak woodland	Live oak woodland	15.4	31.6	32.6	+1
Riparian	Sycamore riparian	3.9	8.7	8.7	0
	Live oak riparian	128.6	148.1	148.1	0
	Cottonwood willow	40.1	136.9	132.8	-4.1
Sage scrub	Sage scrub	5,950.8	8,620.3	8,537.4	-82.9
Grassland	Grassland	1,666.6	1,868.5	1,921.0	+52.5
	Agriculture	316.0	478.2	73.0	-405.2
Chaparral	Chaparral	1,215.9	2,115.0	2,217.0	+102
Wetlands	Seasonal wetlands	5.6	20.8	24.9	+4.1
	Marsh	1.1	2.6	0.0	-2.6
	Streams	4.7	4.7	4.7	0

<b>Vegetation Category</b>	<b>Vegetation sub-category</b>	<b>Number of habitat acres inside the 1992 Reserve (approx. 9,391 acres)</b>	<b>Number of habitat acres as of 1992 within the year 2000 Reserve boundary (approx. 13,721 acres) for comparison</b>	<b>Number of habitat acres as of 2000 within year 2000 Reserve boundary (approx. 13,721 acre)</b>	<b>Number of acres change from 1992 to 2000 within the Reserve boundary in year 2000</b>
Disturbed	Developed	38.5	38.2	41.7	+3.5
	Cleared or graded	3.5	139.5	471.7	+332.2
	Exotic trees	0.1	5.4	5.8	+0.04

(Source: Aerial Information Systems air-photo analysis and vegetation cover summary dated May 14, 2004)

Since the Year 2000 vegetation assessment was conducted, an additional 160 acres has been added to the Reserve (APN 467-210-010: RCHCA). The majority of this 160 acre parcel is primarily sage scrub, with small amounts of grassland and a small portion of oak woodland.



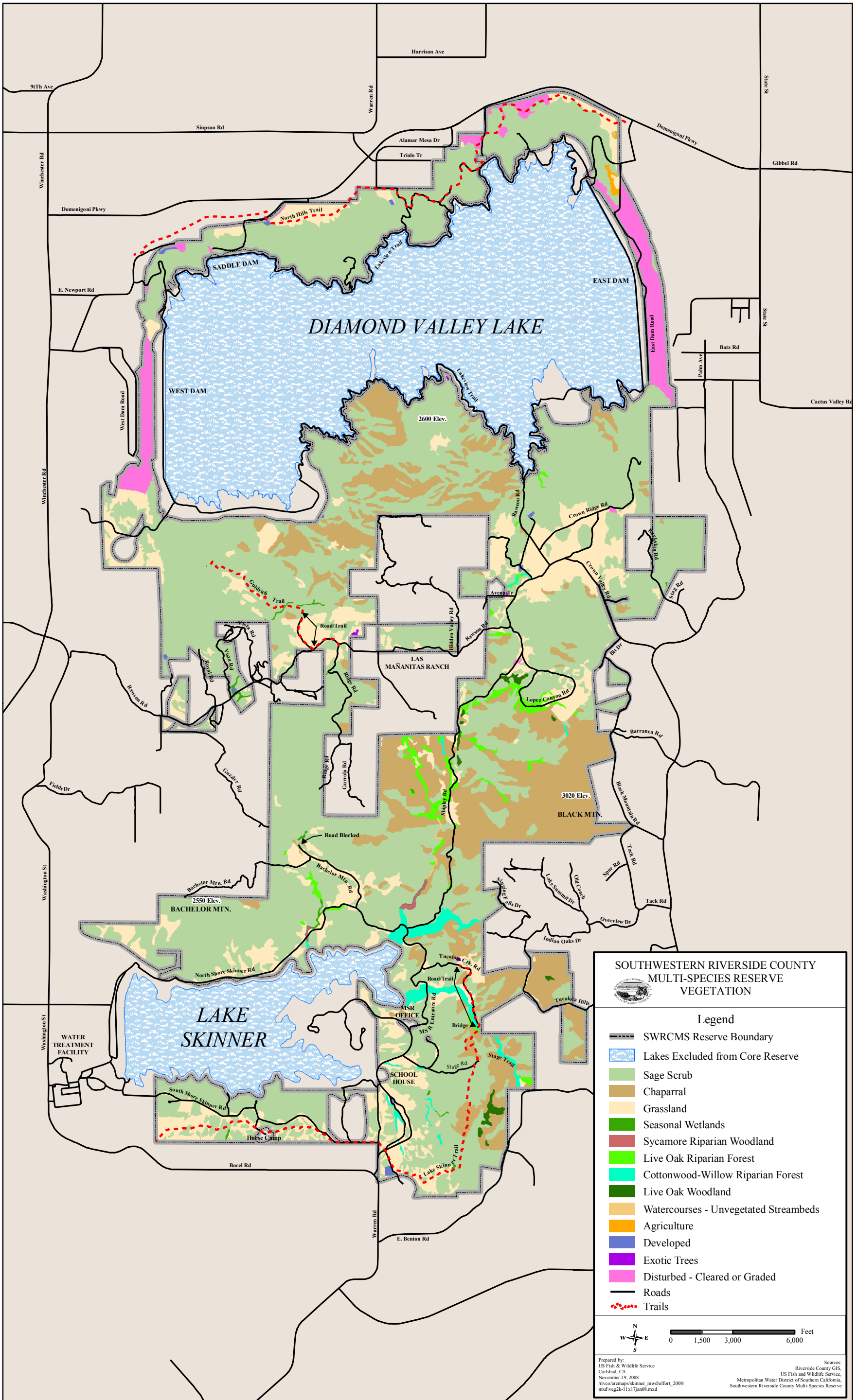


Figure 7

Figure 7. Year 2000 vegetation of the Southwestern Riverside County Multi-Species Reserve.

**Oak Woodland: 34 acres (<1%)<sup>2</sup>**

Oak woodlands represent high wildlife species abundance with over 300 species of birds depending on them at some stage in their life cycle (Zach 2002). This habitat is represented on the Reserve primarily by coast live oaks (*Quercus agrifolia*) interspersed with few Engelmann oaks (*Quercus engelmannii*) in select locations (primarily Lopez Canyon), and otherwise occurs sporadically throughout the Reserve. A few of the species which utilize this habitat on the Reserve include screech owl (*Otus asio*), acorn woodpecker (*Melanerpes formicivorus*), barn owl (*Tyto alba*), and mule deer (*Odocoileus hemionus*). Empirical observations suggest that this important habitat is not regenerating well on the Reserve (Zach Principe, pers. comm.) This will require active management to plant and protect young saplings until they are large enough to withstand browsing by deer and other factors.

**Riparian: 298 acres (2%)**

This habitat includes the narrow ribbon of trees along the creeks of the Reserve. The dominant plant species are Fremont's cottonwood (*Populus fremontii*), western sycamore (*Platanus racemosa*), narrow-leaved willow (*Salix exigua*), and black willow (*Salix gooddingii*). On the Reserve, this habitat occurs along Tucalota Creek, Middle Creek, Rawson Creek, and several unnamed tributaries to Tucalota, Rawson, and other minor creeks and tributaries.

Riparian habitat supports more species of birds, as well as other wildlife, than any other habitat type in the southwest. This is particularly true in southern California, where riparian woodlands provide a literal oasis in an otherwise arid landscape for some 140 species of birds, one third of which are riparian obligates. Riparian habitat is also one of the State's most endangered habitats, with less than five percent of the woodlands present at the time of statehood remaining<sup>3</sup>.

Riparian habitats in southern California are declining rapidly due to development. Protection and restoration of this important habitat within the Reserve will benefit a number of species, including, but not limited to the least Bell's vireo (*Vireo bellii pusillus*) and southwestern willow flycatcher (*Empidonax traillii extimus*), both of which are protected under the Federal Endangered Species Act and California Endangered Species Act. Other species include great blue heron (*Ardea herodias*), western screech owl (*Otus asio*), and yellow warbler (*Dendroica petechia*). In addition, this habitat supports neo-tropical migrant birds that travel through southern California on their way between wintering and breeding grounds.

**Sage scrub: 8,776 acres (63%)**

The sub-association of coastal sage scrub in the Reserve is considered a drier form and is often referred to as "Riversidean Sage Scrub." This habitat is characterized by low shrubs of white sage (*Salvia apiana*), black sage (*Salvia mellifera*), bush sunflower (*Encelia farinosa*), California sagebrush (*Artemisia californica*), and buckwheat (*Eriogonum fasciculatum*). This habitat type has also declined significantly due to the high rate of development in southern California (Atwood and Bontrager 2001). On the Reserve this habitat is utilized by coastal California gnatcatcher (*Poliophtila californica californica*) and orange-throated whiptail (*Cnemidophorus hyperythrus*), among others.

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<sup>2</sup> Acreages are approximate and are based on the Year 2000 vegetation assessment within approx. 14,000 acre boundary.

<sup>3</sup> (Barbara Kus: <http://www.werc.usgs.gov/sandiego/flycat.html>)

**Grassland: 2,049 acres (14%)**

Non-native grasslands within the area of the Reserve are likely to have been type-converted from southern California bunchgrass prairie, native flower field, or Riversidean sage scrub. Native grass species which occur on the Reserve include giant stipa (*Achnatherum coronatum*), purple three-awn (*Aristida purpurea*), California brome (*Bromus carinatus*), salt grass (*Distichlis spicata*), blue wild rye (*Elymus glaucus*), deer grass (*Muhlenbergia rigens*), and purple needle grass (*Poa secunda*). Non-native species include wild oat (*Avena fatua*), ripgut brome (*Bromus diandrus*), and a number of other bromes and fescues, among others.

Reserve species that depend on this habitat for breeding include Stephens' kangaroo rat (*Dipodomys stephensi*), American badger (*Taxidea taxus*), burrowing owl (*Athene cunicularia*), as well as a number of raptors which utilize this habitat for foraging: barn owl (*Tyto alba*); red-tailed hawk (*Buteo jamaicensis*); ferruginous hawk (*Buteo regalis*); black-shouldered kite (*Elanus leucurus*); American kestrel (*Falco sparverius*); and golden eagle (*Aquila chryseatos*), among others.

**Chaparral: 2,279 acres (16%)**

This habitat type is dominated by chamise (*Adenostoma fasciculatum*), scrub oak (*Quercus berberidifolia*), or shrub forms of live oaks. On the Reserve, it occupies areas above the low elevation sage scrub community. Resprouted chamise produces medium quality browse having relatively low protein content for up to two post-fire years until the shoots become unpalatable to mule deer. This habitat provides cover for mule deer (*Odocoileus hemionus*) and many small birds and mammals. Chamise leaves and bark are gathered and stored by dusky-footed woodrats (*Neotoma lepida*). Other species that utilize this habitat on the Reserve include, but are not limited to; California quail (*Lophortyx californicus*); spotted towhee (*Pipilo erythrophthalmus*); California thrasher (*Toxostoma redivivum*); and black-chinned sparrow (*Spizella atrogularis*).

**Wetlands: 30 acres (<1%)**

Wetland habitats are primarily comprised of ephemeral and annual streams, marshes, and seasonal wetlands. While not a large percentage of the Reserve area, these water sources are very important to wildlife. Other water bodies include Diamond Valley Lake at the north end of the Reserve and Lake Skinner at the south end of the Reserve, however page ES-1 of the Reserve MSHCP states that water bodies are not a part of Reserve. Although these lakes are not considered part of the Reserve, they do provide important water resources to the wildlife of the Reserve.

**Disturbed: 534 acres (4%)**

Disturbed habitats are comprised of developed, cleared or graded areas and exotic trees. Developed, cleared and/or graded areas include buildings such as the Shipley office and barn, the old Shipley residence site, the east and west dams of Diamond Valley Lake, and a portion of the Lake Skinner Park maintenance yard. Exotic trees include Eucalyptus trees, pepper trees, olive trees, etc. which are primarily remnants of the past homesteads within the Reserve. While exotic trees are non-native, and will be removed over time from the Reserve, they do provide nesting habitat for many raptors and other birds. In addition, historically, there was a regionally important great blue heron rookery located in Eucalyptus trees in Middle Creek, which is no longer being used, probably due to the death and decadence of the roost tree.

### 2.2.3 Other Features

#### **Rocks and Cliffs:**

Although a significant portion of the Reserve is represented by this habitat, it is interspersed within primarily grassland and chaparral habitats, and therefore, is difficult to quantify. This by no means minimizes its importance in the ecological function of rocky habitat within the Reserve. A number of species utilize this habitat: northern red-diamond rattlesnake (*Crotalus ruber ruber*), turkey vulture (*Cathartes aura*), prairie falcon (*Falco mexicanus*), and canyon wren (*Catherpes mexicanus*), among others.

#### **Water Bodies:**

As previously described, two Metropolitan reservoirs are located within the boundaries of the Reserve (but are not a part of the Reserve): Lake Skinner is an approximately 1,200 acre drinking water reservoir located in the southern portion of the Reserve. Diamond Valley Lake is an approximately 4,450 acre reservoir in the northern portion of the Reserve. Both reservoirs are owned and operated by MWD to provide domestic water supplies to customers within its service area (San Diego, Riverside, San Bernardino, Orange, Los Angeles, and Ventura counties.) While these lakes provide secondary benefit to wildlife, they (including an operations buffer area) are excluded from conservation and conservation management under the Reserve MSHCP. Lake Skinner has significant riparian habitat along its borders, however this habitat is quickly degrading due to the increasing prevalence of tamarisk and pampas grass. Diamond Valley Lake has only been filled for a couple of years, and is already exhibiting pockets of Tamarisk infestation at low water levels. While the two lakes are not part of the Reserve, they do provide incidental benefit (and threats in the form of invasive species) to Reserve wildlife and migratory wildlife.

### 2.3 Fire History

In October 1995, the Multi-Species Reserve contracted Ogden Environmental and Energy Services to compile a history of fire and other vegetation disturbances in the Reserve. The resultant document “Disturbance history of vegetation on reserve land” (Ogden 1997) is located in the Reserve library at the Multi-Species Reserve Field Office.

An understanding of fire history is important to the management of Reserve lands; type and frequency of fires may be key factors in the presence of existing vegetative associations, and may influence future vegetative trends, as well. Although fire is an integral process in sustaining many of the native vegetation communities found within the Reserve, increased fire frequency (i.e., more frequent fires than the “natural” fire regime) can result in shifts in species dominance, at best, or vegetative type conversion, at worst.

To compile the data, MWD provided Ogden with the California Department of Forestry and Fire Protection’s (CDF/CalFire) digital database of fire history. The Ogden database for western Riverside County covered the period from 1913 to 1994, however the first recorded fire within MSR boundaries in the fire database is 1962 (Table 2). In addition, MWD provided information on fires between 1994 and 1997 from hand-drawn maps from Bill Wagner (Wagner Biological



Consulting, Mountain Center, California). Fire data were also supplemented by newspaper accounts of fires, where possible.

In May 2006, the Reserve Manager worked with the U. S. Fish and Wildlife Service to compile data between 1960 and 2006 from CDF's fire history database and develop maps of fires that fell within current Reserve boundaries. The May 2006 mapping effort identified three fires that occurred either completely or partly on the Reserve that are not included in the Ogden report (Table 2): 1977 ("Shipley"); 1985 ("Skinner"); and 1987 ("Winchester #1"); and updated fires in the Reserve since 1997 (Table 2 and Appendix 3). Typically, only fires exceeding 300 acres are mapped by CDF; therefore, some small fires such as the 35 acre "Construction Fire" near the borrow pit on the Diamond Valley Lake south high-water road on July 23, 2001, are not included.

Fire history information should be continually updated for management purposes.

Table 2. Multi-Species Reserve Fire History

Ogden (1997) id#	Name of Fire	Year	Total Size (acres) <sup>1</sup>	In Ogden Report?	May 2006 FWS data	# of acres burned within current Reserve boundary (~14,000 ac)
45	Ryan	1962	1,910	yes	yes	925
48	Rawson	1962	15,368	yes	yes	5,885
9		1977	251	yes	yes	20
	Shipley	1977	320	no	yes	148
23	Rawson	1979	1,000	yes	yes	620
42	Skinner	1979	345	yes	yes	597
145	Dell	1980	378	yes	yes	149
17	Cawston	1981	721	yes	yes	119
7		1982	186	yes	yes	105
27	Rawson	1982	1,757	yes	yes	970
	Skinner	1985	674	no	yes	468
	Winchester #1	1987	1,096	no	yes	595
41	Benton	1988	1,784	yes	yes	843
32	California	1990	728	yes	yes	461
55	California	1993	23,127	yes	yes	9,161
144	Newport	1996	140	yes	yes	96
	Mountain	2003	10,000	no	yes	2,433
	Skinner	2005	50	no	yes	48
	Bella	2005	300	no	yes	162
	Skinner	2006	350	no	yes	312

<sup>1</sup> It is important to note that the Ogden report attempted to quantify the number of acres that burned within the Reserve boundary, but an artificially large boundary was being used at the time (the 20,000 acre planning boundary).

## 2.4 Grazing and Agricultural History

Also included in the "Disturbance History of Vegetation on Reserve Land" (Ogden 1997) is a discussion of the agricultural history of the Multi-Species Reserve. The agricultural history

covers 22 individual years between 1939 and 1995. Maps provided in the report detail and describe the agricultural history of the MSR area for that time period; however, it is important to note that percentages of the agricultural practices in the “Reserve” used in the report are inaccurate due to the fact that they used an artificially large reserve boundary area (the 20,000 acre planning boundary). Further, the text states that “...a poster-size set of agricultural disturbance history maps has been prepared and is contained in a separate volume” (Ogden 1997, Page 23), but the MSR office does not have this material. However, small maps are available in the document itself.

According to the Ogden (1997) report, agricultural disturbance was at its lowest level in 1939 and reached its maximum extent in 1959 when as much as 37 percent of the Reserve was in some type of agriculture. Agricultural disturbance declined slightly from 1959 through the 1960’s and early 1970’s to a low of approximately 30 percent (Table 3). This analysis was derived primarily from aerial photograph interpretation and differentiated row crops, undifferentiated agriculture (grazed or fallow field), and grazed.

A portion of the Multi-Species Reserve was farmed and cattle-grazed by the Rawson family from approximately 1864 – 1957 (Wanzuk-Barton 2005). At first, the Rawsons lived in the Glen Oaks area, but later (around 1879) moved north into the Crown Valley area. Once a new adobe home was completed, the Rawsons began clearing Crown Valley for dry-farming. In addition to dry-farming, the area was grazed by cattle. Later, in the 1920’s, sheep grazing was common and hogs were also raised in the area. In addition, parts of the Rawson Ranch were dedicated to fruit orchards and the Rawsons also maintained large apiaries of up to 1,000 colonies from the time they settled in Crown Valley.

During the time that Dr. Roy Shipley owned and operated the Shipley Reserve area, he drilled approximately four to five wells in the general Crown Valley area to irrigate the fields for oat hay (Peter Ames, pers. commun.) According to Mr. Ames, this method was practiced until around 1982.

Table 3. Agricultural history of the Multi-Species Reserve

Year	Agricultural activity	General MSR area
1939	Row Crops	Around Lake Skinner, Crown Valley, and around Diamond Valley
1948	Row Crops	Around Lake Skinner, Crown Valley, and around Diamond Valley
1953	Row Crops, Undiff. Ag.	Crown Valley, Rawson Canyon, and area south of Lake Skinner now listed as undifferentiated agriculture. Row crops north, east, and west of Lake Skinner and around Diamond Valley.
1957	Row Crops, Undiff. Ag.	Crown Valley, Rawson Canyon, and area south of Lake Skinner now listed as undifferentiated agriculture. Row crops north, east, and west of Lake Skinner and around Diamond Valley.
1959	Row Crops, Undiff. Ag.	Crown Valley, Rawson Canyon, and area south of Lake Skinner now listed as undifferentiated agriculture. Row crops north, east, and west of Lake Skinner and around Diamond Valley.
1961	Row Crops, Undiff. Ag.	Crown Valley, Rawson Canyon, and area south of Lake Skinner listed primarily as row crops. Row crops north, east, and west of Lake Skinner and around Diamond Valley.
1962	Row Crops	Around Lake Skinner, Crown Valley, and around Diamond Valley
1967	Row Crops	Around Lake Skinner, Crown Valley, and around Diamond Valley

Year	Agricultural activity	General MSR area
1974	Row Crops	Around Lake Skinner, Crown Valley, and around Diamond Valley. Additional undifferentiated vegetation northeast of Lake Skinner.
1978	Row Crops	Around Lake Skinner, Crown Valley, and around Diamond Valley. Additional undifferentiated vegetation northeast of Lake Skinner.
1980	Row Crops	Around Lake Skinner, Crown Valley, and around Diamond Valley. Additional undifferentiated vegetation northeast of Lake Skinner.
1984	Row Crops	Around Lake Skinner, Crown Valley, and around Diamond Valley. Additional undifferentiated vegetation northeast of Lake Skinner.
1986	Row Crops, Undiff. Ag., and Grazing	Row crops and undifferentiated agriculture round Lake Skinner with some grazing south of Lake Skinner, Row Crops and Undifferentiated Agriculture in Crown Valley, and around Diamond Valley.
1987	Row Crops, Undiff. Ag., and Grazing	Row crops and undifferentiated agriculture round Lake Skinner with some grazing south of Lake Skinner, Row Crops and Undifferentiated Agriculture in Crown Valley, and around Diamond Valley.
1988	Row Crops, Undiff. Ag., and Grazing	Row crops and undifferentiated agriculture round Lake Skinner with some grazing south of Lake Skinner, Row Crops and Undifferentiated Agriculture in Crown Valley, and around Diamond Valley.
1989	Row Crops, Undiff. Ag., and Grazing	Row crops and undifferentiated agriculture round Lake Skinner with some grazing south of Lake Skinner, Row Crops and Undifferentiated Agriculture in Crown Valley, and around Diamond Valley.
1990	Row Crops, Undiff. Ag., and Grazing	Row crops and undifferentiated agriculture round Lake Skinner with some grazing south of Lake Skinner, Row Crops and Undifferentiated Agriculture in Crown Valley, and around Diamond Valley.
1991	Row Crops, Undiff. Ag., and Grazing	Row crops and undifferentiated agriculture round Lake Skinner with some grazing south of Lake Skinner, Row Crops and Undifferentiated Agriculture in Crown Valley, and around Diamond Valley. Reduced disturbance around Lake Skinner.
1992	Row Crops, Undiff. Ag., and Grazing	Row crops and undifferentiated agriculture round Lake Skinner with some grazing south of Lake Skinner, Row Crops and Undifferentiated Agriculture in Crown Valley, and around Diamond Valley. Reduced disturbance around Lake Skinner.
1993*	Row Crops, Undiff. Ag., and Grazing	Row crops and undifferentiated agriculture round Lake Skinner with some grazing south of Lake Skinner, Row Crops and Undifferentiated Agriculture in Crown Valley, and around Diamond Valley. Reduced disturbance around Lake Skinner. Grazing activity southwest of Diamond Valley.
1994*	Row Crops, Undiff. Ag., and Grazing	Row crops and undifferentiated agriculture round Lake Skinner with some grazing south of Lake Skinner, Row Crops and Undifferentiated Agriculture in Crown Valley, and around Diamond Valley. Reduced disturbance around Lake Skinner. Grazing activity southwest of Diamond Valley.
1995*	Row Crops, Undiff. Ag., and Grazing	Undifferentiated agriculture round Lake Skinner, Row Crops in Rawson Canyon and Undifferentiated Agriculture in Crown Valley, and Row Crops around Diamond Valley. Reduced disturbance around Lake Skinner. Grazing activity southwest of Diamond Valley.

\*Agricultural activities did not take place during these years following the formation of the Reserve. Identification of these crops in the Ogden (1997) report are probably the result of aerial imagery detecting old crop vegetation patterns.

## 2.5 Mining

It's important to note that several mines occur within Reserve boundaries. Some mines and mine shafts were related to silica mining, and others may have simply been exploratory. Some of these mines currently support sensitive species of bats (Townsend's western big eared bat [*Corynorhinus townsendii townsendii*] observed in Crown Valley mine shaft by Pat Brown

[Brown 1991]). All mine shafts and adits will be mapped and evaluated for potential danger to the general public or to wildlife (i.e., the danger of entrapment.) Due to public safety concerns and in the interest of bat conservation, all mine shafts within the Reserve boundaries that may be encountered by the public should have “bat gates” installed at their openings. Any mines or adits that may cause entrapment of wildlife will have mitigating measures employed.

## **2.6 Stephens’ Kangaroo Rat**

Stephens’ kangaroo rats are a medium-sized member of the rodent family Heteromyidae. North American heteromyids are an ecologically uniform group of nocturnal, burrowing granivores found in arid regions. Stephens’ kangaroo rat is similar to other kangaroo rats in having external cheek pouches, large hind legs and relatively small front legs. The average adult weight is 67 g and total adult body plus tail lengths range between 227 and 300 mm (Bleich 1977). The tail is crested and bicolored, and is 1.45 times the length of the head and the body. Stephens’ kangaroo rat is morphologically similar to the Dulzura kangaroo rat (*Dipodomys simulans*), a sympatric species within the Reserve, but differs in external and cranial characteristics (Bleich 1977). In addition, these two species display somewhat different habitat associations.

Initial research reports identified the two kangaroo rat species that inhabit areas of the Reserve as *Dipodomys stephensi* (Stephens’ kangaroo rat) and *Dipodomys agilis* (Pacific kangaroo rat). Subsequent DNA sampling split *D. agilis* into two separate species, resulting in *D. agilis* and *D. simulans* (Sullivan and Best 1997). The Dulzura kangaroo (*D. simulans*) rat tends to inhabit a mosaic of environments ranging from coastal grassland and chaparral in southern California, to arid desert and coniferous forest in Baja California. The two species of kangaroo rat currently recognized on the Reserve are the Stephens’ and the Dulzura kangaroo rats.

### **2.6.1 Stephens’ Kangaroo Rat Habitat Associations**

The Stephens’ kangaroo rat is found almost exclusively in open grasslands or sparse shrublands with cover of less than 50 percent during the summer (Bleich 1973; Bleich and Schwartz 1974; Grinnell 1933; O’Farrell 1990; Thomas 1973). O’Farrell’s work (1990) demonstrated that the proportion of annual forbs and grasses is important because Stephens’ kangaroo rat avoid dense grasses (e.g., non-native bromes [*Bromus* spp.]) and are more likely to inhabit areas where the annual forbs disarticulate in the summer and leave more open areas. He also noted a positive relationship between the presence of the annual forb red-stemmed filaree (*Erodium cicutarium*), grazing, and the Stephens’ kangaroo rat. O’Farrell and Uptain (1987) noted a decline in the abundance of Stephens’ kangaroo rat in the Warner Ranch area when the livestock were changed from mixed Hereford stock to Holstein dairy cattle, a change which reduced grazing pressure and resulted in an increase in three-awn grasses (*Aristida* sp.) Conversely, the Stephens’ kangaroo rat has been trapped in brittlebrush (*Encelia farinosa*) dominated coastal sage scrub with an estimated shrub cover of over 50 percent (USFWS 1997).

Soil type is also an important factor for Stephens’ kangaroo rat populations (O’Farrell and Uptain 1989; Price and Endo 1989). As a fossorial animal, the Stephens’ kangaroo rat typically is found in sandy and sandy-loam soils with proportionately low clay to gravel. Also, Price and Endo (1989) suggest that sandy soils may be necessary for sand bathing, which reduces oil

buildup on their fur and may also reduce parasites. In addition, slope is an important factor in predicting Stephens' kangaroo rat occupation; they tend to use more level slopes (less than 30%), but may be found on steeper slopes in very low densities (less than 1 individual per hectare).

Open ground is an important habitat factor determining the distribution and quality of Stephens' kangaroo rat habitat. Periodic fires, grazing (O'Farrell and Uptain 1987), annual weather variations (Price and Endo 1989), and probably longer cycles of dry and wet periods also play a role in appropriate Stephens' kangaroo rat habitat. Although precipitation is positively related to primary production of food resources and breeding activities (McClenaghan and Taylor 1993, Price and Kelly 1994), several years of high rainfall can be detrimental to Stephens' kangaroo rat. For example, dense matting of annual grasses, such as ripgut grass (*Bromus diandrus*), may exclude this species from certain areas after periods of high rainfall (USFWS 1997). Over the short term, however, Goldingay and Price (1997) did not detect seasonal differences in habitat use by the Stephens' kangaroo rat despite seasonal variation in the microhabitat. O'Farrell (1997) noted distinct population changes in response to above-average precipitation and increased vegetative cover; population densities were inversely correlated with rainfall and cover.

### **2.6.2 Stephens' Kangaroo Rat Distribution on the Reserve**

A number of studies on Stephens' kangaroo rat distribution and density have been conducted on the Reserve since 1989. Following is a short summary of each study:

#### **O'Farrell and Uptain (1989)**

O'Farrell and Uptain (1989) surveyed areas of the entire known range of Stephens' kangaroo rat in California, including areas within the Reserve in 1988 using burrow count methodology.

They identified three areas partially within the year 2007 Multi-Species Reserve: 1) one-half acre of low Stephens' kangaroo rat abundance along the North Hills of DVL under the current lake inundation level; 2) an area of approximately 40 acres of low Stephens' kangaroo rat abundance along Rawson road in the area of the current Goldrich trail head, and 3) an area of unknown size of high Stephens' kangaroo rat abundance comprised mainly of the area currently called Las Mañanitas Ranch (a.k.a. "Finisterra Farms").

#### **ERC (1990)**

In 1989 and 1990, ERC conducted a survey to determine the presence of Stephens' kangaroo rat at potential reservoir sites for MWD in southern California using trapping and burrow count methodologies (ERC 1990). Within the current Multi-Species Reserve boundary, areas surveyed during this effort included three trapping grids around Lake Skinner Reservoir and three trapping grids in the Crown Valley area.

The results of the surveys resulted in estimates of: 1) approximately 500 acres of habitat occupied by Stephens' kangaroo rat in the areas to the northeast, east and south of Lake Skinner Reservoir of mostly trace, but some medium-level occupancy; 2) approximately 400 acres of

low, medium, and high occupancy in the Crown Valley area, and 3) approximately 350 acres of medium to high occupancy in the Rawson Canyon (Las Mañanitas Ranch) area which they cite as “described in O’Farrell and Uptain (1989)” (it should be noted that the 1989 citation did not estimate the number of acres of occupied habitat in the Rawson Canyon [Las Mañanitas Ranch] area, but did so in this document).

In a subsequent document, ERC lumped the densities of Stephens’ kangaroo rat in the Crown Valley area (ERC 1991), but it is unclear how the numbers from the 1990 document were converted to those reported in 1991; therefore, for purposes of this planning document, we will use the numbers reported in the 1990 document.

### RECON Report (1993)

In 1993, previous estimates of the amount of acres occupied by Stephens’ kangaroo rat in the Reserve were compiled by RECON (Regional Environmental Consultants) using O’Farrell and Uptain (1989) and a number of other reports. This summary of all known Stephens’ kangaroo rat estimates was done for RCHCA for inclusion in the March 1996 Stephens’ kangaroo rat HCP. It’s important to note that the RECON report used the initial Reserve boundary size of the Reserve of 9,815 acres. In this report, RECON identified 2,032 acres of Stephens’ kangaroo rat habitat within the Reserve; however, they used eight density categories and provided no definition of what those categories meant in terms of number of burrows or animals per area of land. The eight categories used were only defined as: trace, trace-low, low, low-medium, medium, medium-high, high, and occupied.

### Wagner (2001)

William Wagner submitted a status update of Stephens’ kangaroo rat on the Reserve to the RCHCA in 2001. In his report, Mr. Wagner cited a survey done by a private consultant to estimate Stephens’ kangaroo rat abundance within the 1996 Stephens’ kangaroo rat HCP boundary for the Reserve. Subsequent to this report, RCHCA measured the area of occupied habitat as reported. The estimate of occupied habitat within the 1996 boundary was reported by RCHCA as 2,157 acres, an increase of 125 acres of Stephens’ kangaroo rat occupied habitat. Wagner used the following Stephens’ kangaroo rat density (Stephens’ kangaroo rat burrows per hectare) categories in his report to the RCHCA: High = >30; Medium = 10 – 30; Low = 2 – 10; and Trace = <2. In the final RCHCA mapping effort, RCHCA used the eight habitat classifications used in the RECON report. It is unknown how the habitat categories were separated from the Wagner (2001) report to the final August 27, 2002 RCHCA mapping effort.

Changes in Stephens’ kangaroo rat density from 1994 to 2001 are not remarkable, and may reflect additional lands supporting this species having been added to the Reserve (Figures 8 and 9, respectively), or variability in observers. Some of the changes in density may also be attributable to the significant variability in the definitions of burrow count densities and how those burrow densities relate to the number of animals occupying any given area of land (Table 4):

Table 4: Comparison of reported burrow and animal density definitions

<i>Citation</i>	<i>Area</i>	<i>Trace</i>	<i>Trace-low</i>	<i>Low</i>	<i>Low-medium</i>	<i>Medium</i>	<i>Med-high</i>	<i>High</i>
O'Farrell and Uptain (1989)	# burrows/1000 m <sup>2</sup>	<5		5 - 20		20 - 70		>70
O'Farrell and Uptain (1989)	# animals/ha (10,000 m <sup>2</sup> )	<1		1 - 5		5 - 10		>10
ERC (1990)	# burrows/176.7 m <sup>2</sup>	<12		13 - 60		61 - 121		>122
ERC (1990)	# animals/ha	<5		11 - 13		14 - 29		32 - 37
RECON (1993)	Not defined	Not defined	Not defined	Not defined	Not defined	Not defined	Not defined	Not defined
Wagner (2001)	# burrows/ha	<2		2 - 10		10 - 30		>30

The March 1996 Stephens' kangaroo rat HCP reported that there were approximately 1,988 acres of Stephens' kangaroo rat occupied habitat in the Reserve. At that time, the total Reserve acreage was approximately 13,158 acres but has subsequently expanded to approximately 14,000 acres. Much of the Stephens' kangaroo rat occupied habitat on this core reserve occurs on lands which were converted from sage scrub and chaparral to cleared land through agriculture, grazing, and/or fire. Currently, there are approximately 1,524 acres of land dedicated to Stephens' kangaroo rat management in the Reserve as conservation easements throughout the Reserve (Figures 3, 4, and 5).

Current estimates of Stephens' kangaroo rat occupancy on the Reserve are not available, but will be made once the Reserve Management Plan has been adopted and annual work plans can be submitted to the RCHCA. Once the annual work plans are accepted by the RCHCA, the RCHCA will consider funding requests for Stephens' kangaroo rat habitat management activities on RCHCA lands and RCHCA conservation easement lands. Funding requests will be subject to RCHCA Board approval and will be funded from the interest from the Reserve Stephens' kangaroo rat endowment.

In addition to the studies of Stephens' kangaroo rat distribution discussed above, a number of research studies on this species have been conducted on the Reserve (Appendix 1). The majority of these studies were examinations of Stephens' kangaroo rat habitat use and behavior rather than distribution.



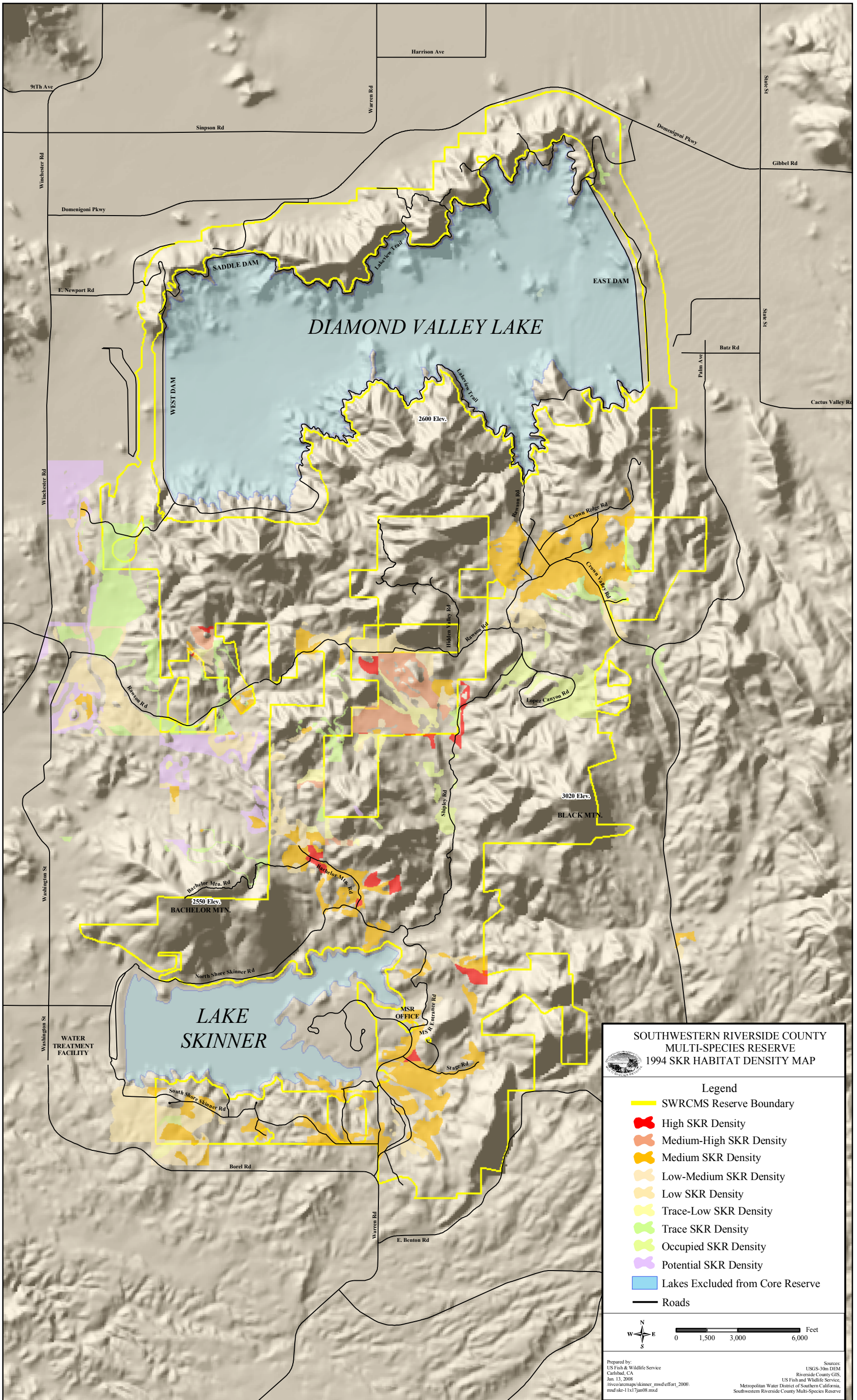


Figure 8

Figure 8. Stephens' kangaroo rat population density estimates at the Southwestern Riverside County Multi-Species Reserve using year 1994 data



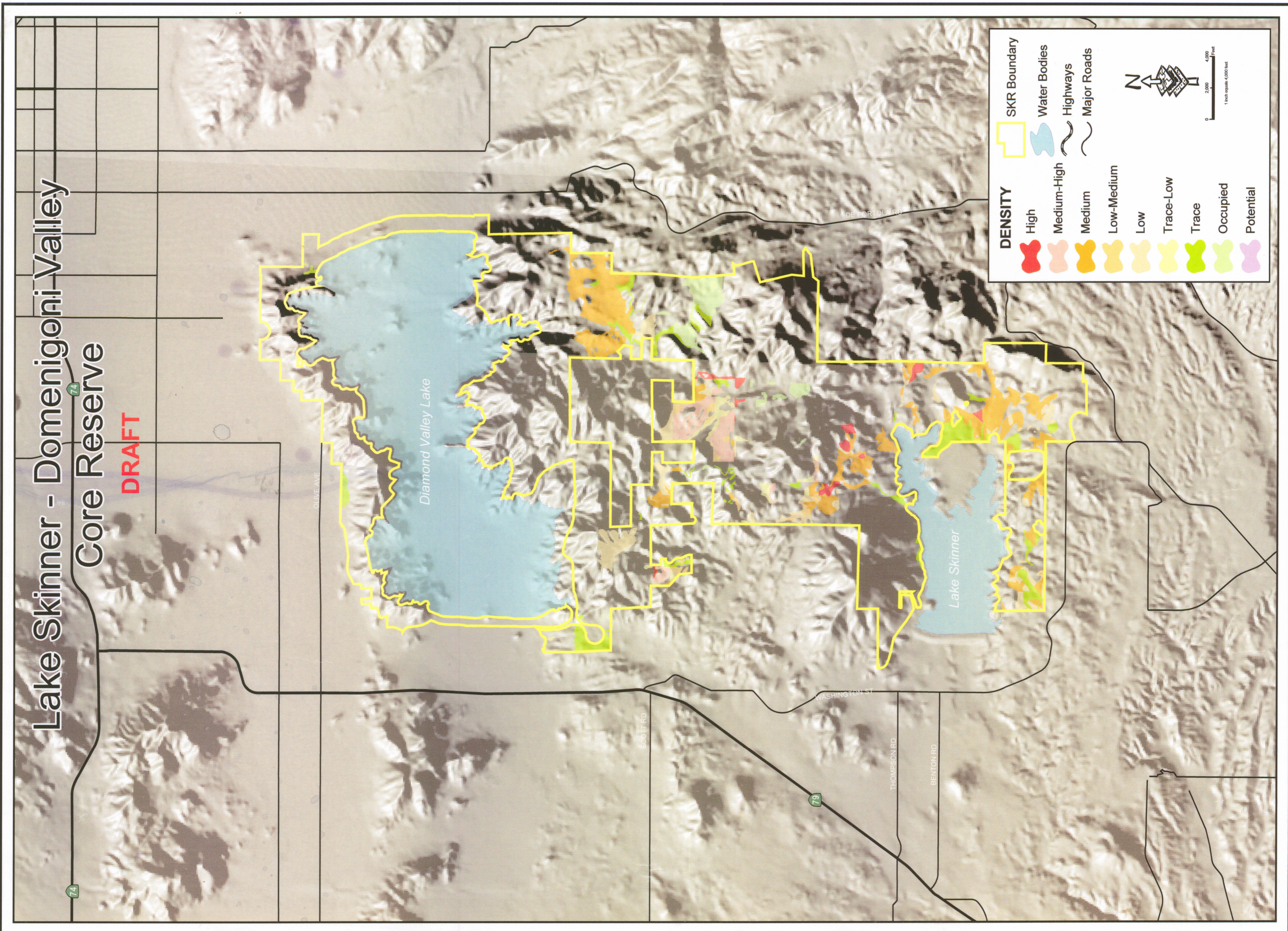


Figure 9

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Figure 9. Stephens' kangaroo rat population density estimates at the Southwestern Riverside County Multi-Species Reserve using year 2000 data.



## 2.7 Special-Status Species Management Issues

The 1992 Reserve MSCHP covered 31 sensitive species, 16 of which occurred within the DVL impact area. In 1992, with the exception of Stephens' kangaroo rat, none of the species covered by the Reserve MSHCP were listed by the Federal or State governments as threatened or endangered. Since that time, four of the species have been listed (Table 5). A comprehensive list of species known or expected to occur on the Reserve can be found in Appendix 4.

It is important to note that it is the goal of this management plan that management for one species will not negatively impact other species covered under the Reserve MSHCP, with the exception of lands dedicated for management exclusively of Stephens' kangaroo rat.

Table 5. Species covered by the 1992 Reserve MSHCP.

<i>Common Name</i>	<i>Scientific Name</i>	<i>Regulatory status</i> <sup>1</sup>	<i>Notes</i> <sup>2</sup>
<b>Plants</b>			
Smooth tarplant	<i>Centromadia</i> [ <i>Hemizonia</i> ] <i>pungens</i> , ssp. <i>laevis</i>	CNPS 1B	The taxonomy of this species has changed since 1992. It was listed as " <i>Hemizonia laevis</i> " in the MSHCP. Also listed in MSHCP as "C2" Federal status (see explanation below).
Payson's jewelflower	<i>Caulanthus simulans</i>	CNPS 4	Listed as C2 in 1992 MSHCP
Parry's spineflower	<i>Chorizanthe parryi</i> var. <i>parryi</i>	CNPS 3	Listed as C2 in 1992 MSHCP
San Jacinto Valley crownscale	<i>Atriplex coronata</i> var. <i>notatior</i>	FE, CNPS 1B	C2 in 1992, listed as Federally Endangered in 1998.
Munz's onion	<i>Allium munzii</i>	FE, ST, CNPS 1B	Both Federal and State status have been upgraded since 1992.
Engelmann oak	<i>Quercus engelmannii</i>	CNPS 4	
Palmer's grapplinghook	<i>Harpagonella palmeri</i>	CNPS 4	
<b>Reptiles</b>			
Orange-throated whiptail	<i>Cnemidophorus</i> <i>hyperythrus beldingi</i>	SSC	Listed as C2 in 1992 MSHCP
San Diego horned lizard	<i>Phrynosoma coronatum</i> <i>blainvillei</i>	SSC	Listed as C2 in 1992 MSHCP
Northern red-diamond rattlesnake	<i>Crotalus ruber ruber</i>	SSC	Listed as C2 in 1992 MSHCP
Western whiptail	<i>Cnemidophorus tigris</i> <i>multiscutatus</i>		Listed as C2 in 1992 MSHCP
Southwestern pond turtle	<i>Clemmys mamorata</i> <i>pallida</i>	SSC	Listed as C2 in 1992 MSHCP
<b>Birds</b>			
California gnatcatcher	<i>Polioptila californica</i> <i>californica</i>	FT, SSC	FP in 1992

<b>Common Name</b>	<b>Scientific Name</b>	<b>Regulatory status <sup>1</sup></b>	<b>Notes <sup>2</sup></b>
Bell's sage sparrow	<i>Amphispiza belli belli</i>	SSC	Listed as C2 in 1992 MSHCP
Southern California rufous-crowned sparrow	<i>Aimophila ruficeps canascens</i>	SSC	Listed as C2 in 1992 MSHCP
Great blue heron	<i>Ardea herodias</i>		
White tailed kite	<i>Elanus leucurus</i>	CFP	
Bald eagle	<i>Haliaeetus leucocephalus</i>	SE, CFP, Bald Eagle Act	Listed as T in 1992 MSHCP, Federally delisted Aug. 9, 2007
Cooper's hawk	<i>Accipiter cooperi</i>	SSC	
Ferruginous hawk	<i>Buteo regalis</i>	SSC	Listed as C2 in 1992 MSHCP
Golden eagle	<i>Aquila chrysaetos</i>	CFP, SSC, Bald Eagle Act	
Loggerhead shrike	<i>Lanius ludovicianus</i>	SSC	Listed as C2 in 1992 MSHCP
Burrowing owl	<i>Athene cunicularia hypugea</i>	SSC	
California horned lark	<i>Eremophila alpestris actia</i>	SSC	Listed as C2 in 1992 MSHCP
<b>Mammals</b>			
Mountain lion	<i>Felis concolor</i>	CDFG "Specially protected mammal" under Fish and Game code 4800	Listed as CFP in 1992 MSHCP
American badger	<i>Taxidea taxus</i>		Listed as CSC in 1992 MSHCP
Stephens' kangaroo rat	<i>Dipodomys stephensi</i>	FE, ST	
Los Angeles pocket mouse	<i>Perognathus longimembris brevinasus</i>	SSC	Listed as C2 in 1992 MSHCP
San Diego desert woodrat	<i>Neotoma lepida intermedia</i>	SSC	Listed as C2 in 1992 MSHCP
San Diego black-tailed jackrabbit	<i>Lepus californica bennettii</i>	SSC	Listed as C2 in 1992 MSHCP
Northwestern San Diego pocket mouse	<i>Chaetodipus fallax fallax</i>	SSC	Listed as C2 in 1992 MSHCP

<sup>1</sup> Regulatory status:

## Federal Status

FE = Federal Endangered  
 FT = Federal Threatened  
 FP = Federal Proposed

## State Status

CFP = California fully protected  
 SSC = California Species of Special Concern  
 SE = State Endangered  
 ST = State Threatened

California Native Plant Society (CNPS)

1B	=	Plants considered rare, threatened or endangered in California but more common elsewhere
3	=	Plants about which we need more information – a review list
4	=	Plants of limited distribution – a watch list

"Species of Special Concern" (SSC) status applies to animals not listed under the Federal Endangered Species Act or the California Endangered Species Act, but which nonetheless: 1) are declining at a rate that could result in listing; or 2) historically occurred in low numbers and known threats to their persistence currently exist. SSC share one or more of the following criteria:

1. Occur in small, isolated populations or in fragmented habitat, and are threatened by further isolation and population reduction;
2. Show marked population declines. Population estimates are unavailable for the vast majority of taxa. Species that show a marked population decline, yet are still abundant, do not meet the Special Concern definition, whereas marked population decline in uncommon or rare species is an inclusion criterion;
3. Depend on a habitat that has shown substantial historical or recent declines in size. This criterion infers the population viability of a species based on trends in the habitats upon which it specializes. Coastal wetlands, particularly in the urbanized San Francisco Bay and south-coastal areas, alluvial fan sage scrub and coastal sage scrub in the southern coastal basins, and arid scrub in the San Joaquin Valley, are examples of California habitats that have seen dramatic reductions in size in recent history. Species that specialize in these habitats generally meet the criteria for Threatened or Endangered status or Special Concern status;
4. Occur only in or adjacent to an area where habitat is being converted to land uses incompatible with the animal's survival;
5. Have few California records, or which historically occurred here but for which there are no recent records; and
6. Occur largely on public lands, but where current management practices are inconsistent with the animal's persistence.

California Fully Protected Species: The classification of Fully Protected was the State's initial effort in the 1960's to identify and provide additional protection to those animals that were rare or faced possible extinction. Lists were created for fish, mammals, amphibians, reptiles, birds, and mammals. Please note that most fully protected species have also been listed as threatened or endangered species under the more recent endangered species laws and regulations.

A special status species is one that is designated as a species which falls under one or more of the following categories:

- Federal Endangered Species Act of 1973 (as amended)
- California Endangered Species Act
- California State fully protected
- California State Species of Special Concern
- California Native Plant Society (CNPS)

<sup>2</sup> Notes:

The 1992 MSHCP identified a number of species' status as "Federal C2" which was a designation for species for which the U.S. Fish and Wildlife Service had information indicating that protection under the

Federal Endangered Species Act may be warranted but for which it lacked sufficient information on status and threats to determine if elevation to Category-1 status was warranted. The out-dated "Category 1" status are now referred to as "Candidate species" and are species for which there is enough information to indicate that listing as threatened or endangered is warranted, but preparing a listing proposal is precluded by other, higher priority listing activities. It is important to note that the "Category 2" designation no longer exists in the USFWS species classification system.

Additional rare, sensitive, and listed species known to occur on the Reserve are listed in the Reserve Comprehensive Species List (Appendix 4). Activities that may disturb any of these species may require coordination with the appropriate regulatory agencies. For example, there is a regionally-important population of Quino checkerspot butterfly (*Euphydryas editha quino*) on the Reserve. This species is not one of the covered species in the Reserve MSHCP, therefore any activities which may negatively impact this species (e.g., prescribed burns or mowing in occupied areas, etc.) must be coordinated with the appropriate regulatory agency.

## **2.8 Other Significant Management Issues**

A number of management issues (both ecological and anthropogenic) are important to be aware of in managing the Reserve. These issues include (but are not limited to): invasive species and air pollution; non-native and urban-related predators; trespass, vandalism, and dumping; off-road vehicle use; illegal shooting; and night lighting.

### **2.8.1 Invasive Species and Air Pollution**

Invasive annual grasslands and weeds such as mustard (*Brassica nigra*) and Russian thistle (*Salsola tragus*) are persistent issues and will likely never be completely controlled, but should be addressed nonetheless. There are numerous research studies which indicate that the problem of invasive exotics in western Riverside County is exacerbated by air pollution that results in increased levels of nitrogen (N) deposition and increased productivity of weeds and non-native grasses (Weiss 1999, Allen et al. 2000, Allen 2004; Stylinski and Allen 1999).

While the conversion of native vegetation communities such as coastal sage scrub to non-native annual grasslands and forbs (e.g., filaree) is a serious management issue for many species dependent on coastal sage scrub, such as the California gnatcatcher (*Polioptila californica californica*) (Minnich and Dezzani 1998), annual grassland and non-native forbs, *per se*, may not be detrimental to Stephens' kangaroo rat or other grassland species such as the grasshopper sparrow (*Ammodramus savannarum*), burrowing owl (*Athene cunicularia*) and Munz's onion (*Allium munzii*), however, the cover density of annual grassland and forbs is a crucial factor for these species. For example, areas where grassland/forb cover exceeds 50 percent becomes marginal habitat for the Stephens' kangaroo rat, and it often is precluded altogether in areas where grassland cover approaches 100 percent. In addition, areas with high density cover of grasslands also may develop thick thatch that precludes the Stephens' kangaroo rat, burrowing owl, and Munz's onion even in non-growing seasons or years with poor grass productivity.

Air pollution levels are clearly beyond the control of a Reserve Management Plan, therefore management will need to focus on managing the effects of air pollution; in other words, controlling the cover and density of non-native grasslands and forbs to the extent feasible and practicable.

### **2.8.2 Non-native and Urban-related Predators**

As development pressures increase surrounding the Reserve, as well as activities on properties surrounded by Reserve lands, the effects of “edge” will become more and more important to reserve management. One such edge effect is the influx of urban predators into the Reserve. Although quantified studies on the impacts of non-native predators on reserve wildlife are scarce, there is general agreement among reserve managers that cats and dogs can be a significant issue and the problem may become worse as areas adjacent to the reserves become more urbanized (either high density or low density). While cats tend to be limited to the edge of reserves, their impacts on nesting native bird populations cannot be disregarded<sup>4</sup>. In addition, dogs tend to move further into a reserve and may form formidable packs which can have highly deleterious effects on many wildlife species.

### **2.8.3 Trespass, Vandalism, and Trash Dumping**

Trespass, vandalism, and trash dumping have been documented by Reserve personnel at the Reserve for years, and can be expected to increase with increased development around and near the Reserve. Interactions with some individuals who have been caught involved in one or all of these activities have indicated that they have a sense of entitlement to access areas of the Reserve. This entitlement may be due to the fact that they were able to access the area prior to the formation of the Reserve, or they may see “public land” as open to all public access. The effects of trespass, vandalism, and trash dumping range from being generally unsightly to having potentially significant adverse effects on the habitats and wildlife of the Reserve. Adverse effects include, but are not limited to, the following:

- Reduction of occupied habitat areas, including the footprint of trash dumps and access roads;
- Introduction of non-native pests and seeds such as old world rats, mice, and vegetation into the Reserve;
- Toxic materials from dumped items, including oil, paints, and other chemicals and hazardous (e.g., electronic lead solder and other heavy metal waste) and industrial (e.g., asphalt) wastes;
- Compounding (where the presence of one dumping event encourages others to add to it);
- Increased fire risk; and
- Direct mortality of wildlife from increased travel on roads and through habitats.

Vandalism has minimal physical effect on habitats and wildlife, but may have severe financial impact due to the need to repair damage. In addition, the cutting of fences, damage to gates, and creation of new roads and trails makes the Reserve more accessible to other trespassers compounding the problems listed above.

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<sup>4</sup> American Bird Conservancy, Washington, D.C. [www.abcbird.org](http://www.abcbird.org)

#### **2.8.4 Off-road vehicles**

Another form of trespass on the Reserve is the use of unauthorized off-road vehicles. Problems with unauthorized off-road vehicle use include damage to sensitive habitats, direct and indirect “take” of sensitive and listed wildlife species, trash dumping, erosion, and an increased risk of fire. As previously discussed, off-road vehicle use may be the result of the entitlement perceived by individuals who were able to access the Reserve lands prior to the establishment of the Reserve. In addition, the relative lack of legal off-road parks and the increased development surrounding the Reserve make the open space lands increasingly irresistible to off-road riders. Any reserve management program will need to attempt to control off-road vehicle use to the extent possible.

#### **2.8.5 Illegal shooting**

Another form of trespass and vandalism is illegal shooting. Illegal shooting includes localized target practice, especially around trash dumps, and illegal hunting of wildlife throughout the Reserve. Illegal shooting results in an accumulation of expended pistol, rifle, and shotgun shells, lead pollution from bullets and shot, broken glass, clay pigeon debris, threats to wildlife, additional trash and garbage dumping, increased off-road vehicles, and increased fire risk, as well as direct risks to public and Reserve staff safety.

#### **2.8.6 Night Lighting**

Another inherent side-effect of increased development around the Reserve and within in-holdings is the impact of artificial night lighting on Reserve wildlife. Many species on the Reserve are either nocturnal or crepuscular (e.g., Stephens’ kangaroo rat, woodrat, jackrabbit, pocket mouse, badger, etc. to name a few of the species covered under the Reserve MSHCP), and potential influences of artificial lights at night include disruption of foraging behavior, increased risk of predation, disruption of biological clocks, increased deaths in collisions on roads, and disruption of dispersal movements and corridor use (Rich and Longcore 2005). One of the first class of animals to drop out of a reserve of insufficient size are the large carnivores (Shafer 1990). A study of dispersing mountain lion (*Felis concolor*) in urban southern California noted several exploratory movements that did not follow favored topography or vegetation patterns (Beier 1995). Beier (1995) hypothesized that the lions were moving away from the urban glow and navigating toward the darkest horizon. If the Reserve is to maintain its mountain lion population, movement and dispersal corridors are going to need to be in place to allow genetic exchange and movement of individuals between the Reserve and other large areas to the east, south and west of the Reserve. The Reserve staff may work with Reserve neighbors to minimize night lighting within and around the Reserve and within these movement corridors. Such collaborative activities will be important to maintaining healthy populations of many of the Reserve’s wildlife species.

### **2.9 Reserve Cultural Resources**

Cultural resources may take the form of both prehistoric and historic. Prehistoric resources are in the form of artifacts and other evidence of habitation by Native Americans that predate the

settlement of California by Europeans. Historical resources include artifacts and the remnants of structures normally associated with the settlement of California by non-Native Americans. Surveys for cultural resources on the Reserve were conducted from February 1992 through November 1995 (Appendix 5) (Applied Earthworks 2001). The report identifies a number of cultural properties and includes management recommendations for all recorded sites. A small portion of the existing Reserve was not surveyed for archaeological resources due to the fact that some areas were simply too densely vegetated to conduct thorough surveys and some current Reserve properties were added after the survey was conducted. It is estimated that these unsurveyed lands constitute approximately 10% of the current Reserve. Impacts such as ground disturbance or providing access to sites in the unsurveyed areas may require that the area be surveyed prior to the initiation of any activities.

Cultural resources within the Reserve are being treated and managed in accordance with the federal standards and guidelines set forth in Section 106 of the National Historic Preservation Act of 1966. Additionally, all work related to potentially significant and important cultural resources followed the standards, guidelines, and principles of the Advisory Council's "Treatment of archaeological properties: A handbook (1980)", the Council's "Manual of mitigation measures" (1982), and "Historic preservation: Secretary of Interior's standards and guidelines" (1983). The cited laws, regulations, and guidelines specify how cultural resources are to be managed. Briefly, archival and field surveys must be conducted, and cultural resources must be inventoried and evaluated. Additionally, sites and remains important to Native Americans must be identified and treated in a sensitive manner, consistent with state and federal laws. Prehistoric and historical resources deemed "significant" (i.e., eligible for listing on the "National Register of Historic Places", per 36 CFR 60.4) or "important" (per the "California Environmental Quality Act guidelines") must be considered in the planning and development of the Reserve. Any proposed undertaking that may affect important or significant resources also must be submitted to the State Historic Preservation Officer for review and comment prior to implementation.

### **2.9.1 Management of Cultural Resource Information**

Artifacts documented and collected from the Reserve during the Applied Earthworks (2001) archaeology survey are currently housed at the Western Center for Archaeology and Paleontology in Hemet, California. The information contained within the archaeology report is considered confidential and for management purposes only. Individuals interested in the Reserve's archaeology data should be referred to the U. C. Riverside's Eastern Information Center.

As previously discussed, not all areas of the Reserve have been surveyed for archaeological or cultural resources. The RMC has stated that any artifact that is discovered should not be moved if it is in no immediate danger of being pilfered. The artifact and its location should be documented in the Archaeology Report and then reported to the underlying landowner with a copy added to the Archaeology Report in the Reserve Library.<sup>5</sup>

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<sup>5</sup> Multi-Species Reserve Management Committee Meeting Minutes, August 4, 2004



### **3.0 OVERVIEW OF MANAGEMENT GOALS, OBJECTIVES AND STRATEGIES**

#### **3.1 Reserve Goals and Objectives**

The Reserve MSHCP specifies overall management goals and provides for an adaptive management approach for meeting these goals and objectives. Pursuant to the Reserve MSHCP, the goals of this Reserve are as follows (MSHCP §3.12.2):

1. To cooperatively manage the Reserve lands as a single ecological unit;
2. To manage the Reserve to promote quality and diversity of plants and animal communities within the Reserve, with an emphasis on restoring these communities to their natural condition;
3. To accommodate research on the Reserve, with a focus on ecological studies and studies of life history, habitat requirements, and factors affecting population viability of sensitive species that have practical application for Reserve management and operations and/or regional reserve planning;
4. To the extent feasible without compromising the above primary management goals, to provide opportunities for (in descending order of priority) teaching and interpretive activities, historical and cultural research and interpretation, and nature study and appreciation; and
5. To the extent feasible without compromising the above primary management goals, to provide for low-impact recreational opportunities in areas of the Reserve which are deemed appropriate for such activities by the Reserve Management Committee.

#### **3.2 Habitat Management Strategies**

Habitat management (with the objectives of conservation, protection, recovery, and enhancement) for native species biodiversity is the overall strategy to be pursued by this Management Plan. The focus of management will be on maintaining the Reserve as a functioning ecosystem and on assisting the habitat within the Reserve to recover from previous disturbance (i.e., the effects of grazing, and the proliferation of non-native species.) In general, management will seek to maintain existing high quality habitat. Habitat manipulation for single species benefit will not be emphasized in favor of management for native species biodiversity, with the exception of management for Stephens' kangaroo rat on RCHCA lands and conservation easements.

Habitat within the Reserve will be protected by fencing borders adjacent to development to prevent habitat degradation from off-road vehicle use, shooting, fire, and use by domestic animals and livestock. Restrictions on human use of the habitat are imposed, limiting uses to those compatible with resource management objectives. Management of fire unit boundaries with fuel breaks, shaded fuel breaks, and other methods will be implemented, as appropriate. In addition, control of non-native species will be a primary objective.

Habitat management within the Reserve will be an on-going management objective. There are five primary strategies for managing habitats: sheep grazing; mowing; herbicides; fire (including both management and control of unplanned wildfires and prescribed burns); and restoration. Each strategy has advantages and disadvantages depending on local conditions. It is anticipated that the ultimate management approach will require integration of the different strategies in response to local conditions implemented at the discretion of the RMC and Reserve Manager. It is important to note that the use of management activities such as sheep grazing and herbicides will require coordination with the MWD Committee representative when implemented within either the Diamond Valley Lake or Lake Skinner watersheds. In the case of herbicides, the individual(s) applying, or supervising the application of herbicides must hold either a Qualified Applicator's License or Certificate.

### **3.2.1 Sheep Grazing**

Sheep grazing as a management tool is discussed as a management strategy primarily because of the relatively easy logistics of implementing sheep grazing in southern California. Typically, sheep prefer broad-leaf herbs but also forage on grasses if the grazing coincides with the peak growing season for grasses and before grass awns (bristle-like or barbed appendage around the seed) develop; sheep avoid the sharp awns such as those on ripgut grass (*Bromus diandrus*). Carefully timed light to moderate cattle grazing also could be used as a management tool, but is less likely to be feasible due to the labor and cost of transporting cattle. In addition, the significant weight of cattle versus sheep may make them less desirable because of the potential negative impacts on burrowing animals such as Stephens' kangaroo rat.

Sheep grazing can have both beneficial and adverse effects on natural habitats. While grazing can be used for controlling invasive, non-native grasses and weeds and for habitat management and fuel controls, uncontrolled or over-grazing can result in destruction of native species and vegetation communities and damage soils through compaction or encouraging erosion.

The utility of sheep grazing as a management tool for maintaining and enhancing habitats was demonstrated by Kelt et al. (2005), who compared grazing and mowing as alternative habitat management methods on the Reserve. The results of this study indicate that Stephens' kangaroo rat populations increased over the four years on the grazed plots. Kelt et al. (2005) concluded that sheep grazing was an effective management tool for enhancing Stephens' kangaroo rat habitat.

The utility of sheep grazing for maintaining and enhancing certain habitats (e.g., non-native grasslands) needs to be balanced against any other adverse effects, such as consumption and/or trampling of native vegetation, including special-status plant species. Ideally, sheep would be utilized and be closely managed in areas where other sensitive resources are not present or the timing of the grazing would avoid and minimize impacts to other resources.

Sheep may spread non-native grass and weed species either by their hooves, fur, or feces. Sheep should be fed "sterile" feed in order to eliminate the problem of transport through their feces for five to nine days in order for seeds to pass completely through their digestive system. The

problems of non-native seed transport via hooves or fur is more problematic and should be addressed, if possible.

It is likely that sheep will step into and crush some Stephens' kangaroo rat burrows. However, the impact to burrow systems and a limited number of individual Stephens' kangaroo rats will be offset by the population-level benefits of habitat enhancement. The long-term viability of a local population can be improved as long as the grazing event is timed carefully and the number of grazing animals is not excessive.

Sheep will browse on woody vegetation in the absence of grasses and forbs, so concern regarding sheep entering sensitive areas (e.g., sage scrub) is an important consideration. However, with proper sheep grazing management (e.g., control with fences); it should be possible to protect native shrubs.

Recommendations for sheep grazing are compiled in the The Nature Conservancy's Weed Control Methods Handbook<sup>1</sup> and the Forest Service of British Columbia Extension Note EN16<sup>2</sup>:

- Because sheep do not graze uniformly, herding, fencing, and/or salt licks should be used to concentrate the sheep in the desired location;
- Herds as opposed to single sheep are preferred because sheep need a period of adaptation to consume a new forage type and this adaptation period can be shortened if they can follow the behavior of other sheep;
- Sheep should be brought to a site when they most likely will be able to graze the target species (e.g., after grass has germinated and is growing, but before seed has set in the spring); and
- Grazing should be continuously monitored by experienced shepherds and well-trained dogs and/or fencing and promptly removed once the proper amount of control has been achieved.

Sheep grazing may be used in combination with other management strategies depending on local conditions. For example, grazing may be appropriate in areas that are not accessible to tractors for mowing such as steep or rocky terrain, whereas mowing or herbicides may be appropriate elsewhere. In addition, sheep may be more cost-efficient than herbicides for larger-scale management. In the future, once grass-specific herbicides such as Fusilade® are approved for aerial application, this method may prove to be more efficient and effective, second only to prescribed burns.

### **3.2.2 Mowing**

Mowing can be used to control invasive non-native grasses and weeds, but should only be used in areas that are relatively free of rocks (that may spark fires) and are level. Invasive vegetation can be controlled with relatively little soil disturbance. If mowing is repeated over time before the non-native grasses set seed in the spring, relatively long-term control of non-native grass

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<sup>1</sup> <[tnc.weeds.ucdavis.edu/products/handbook/04.grazing.pdf](http://tnc.weeds.ucdavis.edu/products/handbook/04.grazing.pdf)>

<sup>2</sup> <[for.gov.bc.ca/rsi/research/cextnotes/extnot16.htm](http://for.gov.bc.ca/rsi/research/cextnotes/extnot16.htm)>

seed production can be affected. Logistical considerations when utilizing mowing include, but are not limited to avoiding soil compaction when the ground is wet.

As previously discussed, Kelt et al. (2005) also evaluated mowing alone and in combination with grazing to enhance Stephens' kangaroo rat habitat at the Reserve. As with grazing, after two consecutive years of mowing Stephens' kangaroo rat densities increased and after four years Stephens' kangaroo rat densities on the treatment plots were statistically the same as the control plots that initially had higher Stephens' kangaroo rat densities. Kelt et al. (2005) concluded that grazing and mowing were equally successful for improving habitat for the Stephens' kangaroo rat.

### 3.2.3 Herbicides

Herbicides are widely used throughout California for exotic weed control. Although there are a number of herbicides that can kill exotic weeds, there are only a few which can be legally used in wildland areas. The most common is triclopyr (e.g., Garlon®) and glyphosate (e.g., Roundup®, Rodeo®, or Aquamaster®). For particular weeds, other herbicides are more effective; these include clopyralid (e.g., Transline®) for star thistle (*Centaurea* spp.), imazapyr (e.g., Stalker® or Habitat®) for tamarisk (*Tamarisk* spp.), and chlorsulfuron (e.g., Telar®) for perennial pepperweed (*Lepidium latifolium*).

Special application methods, such as cut stump (spraying the end of the stem of a plant immediately after cutting) or frill (making angled cuts into the stems and spraying herbicide into the cut), or using high concentrations of herbicides are common methods to avoid damage to non-target plants.

Herbicides kill plants by working on either the plant's anatomy (contact herbicides, which typically affect the cell walls or membranes) or physiology (interferes with the plants ability to process nutrients or moisture). Selective herbicides only kill certain species of plants and not others, but the amount of the herbicide applied greatly influences the selectivity whereas non-selective herbicides kill many plant species.

Herbicide has been used successfully on the Reserve in small areas. One area included a two-acre burn in the southeast section of the Reserve near the entrance to Lake Skinner Park. After the initial burn, and once the annual grasses began to grow, Fusilade was applied to the entire area. The non-native grasses died and native vegetation emerged. Fusilade® has also been used on a small (one-half acre) plot adjacent to an occupied Quino checkerspot butterfly (*Euphydryas editha quino*) population to reduce the non-native grasses. Fusilade® targets annual grasses only and does not appear to harm perennial grasses (e.g., *Nassella pulchra*) or other native species (C. Moen, pers. obs.).

Additionally, Allen (2005) reported on the results of a weed control program at the Reserve that has used Fusilade®. Dr. Allen conducted a lengthy weed-control experiment where she examined the effectiveness of Fusilade® applications alone and in combination with dethatching. The Fusilade® treated areas successfully decreased the amount of non-native grasses and increased the production of native and non-native forbs.

In addition to grass-specific herbicides, glyphosate-based herbicides have been used to control other weedy species on the Reserve. Specifically, Aquamaster® has been used to control invasive Tamarisk (*Tamarisk ramosissima*) in riparian areas.

### 3.2.4 Fire

Fire as a general habitat management tool has been broadly applied to natural landscapes to control non-native invasive species and to enhance the germination of native forbs and grasses. The Nature Conservancy has applied fire for habitat management and has summarized its potential benefits, including stimulating the germination of some native plants and reducing the abundance of non-native invasive species. However, Keeley et al. (2005), for example, recommends caution regarding the use of prescribed fire for natural community restoration because inappropriately applied prescribed fire can actually increase the abundance of non-native species, especially if fire intervals are shorter than the community would naturally experience.

The application of prescribed burns to habitat management for grassland species (e.g., Stephens' kangaroo rat, Munz's onion, burrowing owl, etc.) would focus on reducing the density of non-native grasses and the buildup of thatch and increase the relative proportion of native and non-native forbs (e.g., filaree spp.) that both provide seeds for many species and also disarticulate after the growing season, thus resulting in greater areas of bare ground preferred by many grassland species. The utility of using prescribed burns for managing Stephens' kangaroo rat habitat have been investigated on several of the Stephens' kangaroo rat reserves, including this reserve (O'Farrell 1997), Lake Mathews Multiple Species Reserve, Lake Perris State Recreation Area (Price et al. 1995), and on March Air Force Base (TNC 1996).

While all three studies clearly demonstrated an immediate positive response by the Stephens' kangaroo rat to prescribed burning, the O'Farrell and TNC studies emphasize that fire-based management needs to be monitored annually and applied as needed in response to environmental conditions, particularly in years with above normal precipitation.

There is some disagreement about the best timing of prescribed burns as it relates to grassland species habitat management. The Nature Conservancy (1996) study suggests that spring burns are best for controlling non-native annual grasses such as *Bromus mollis*, *B. diandrus*, *Hordeum leporinum*, *Avena barbata*, and *A. fatua*. Both fall and spring burns favor native and non-native forbs. Price et al. (1995) also concluded that spring burns have no adverse effect on at least the short-term survival of the Stephens' kangaroo rat. However, O'Farrell (1997) recommends fall burns because they better reflect a natural fire regime and because of a concern about reducing the forb seed base that Stephens' kangaroo rat depend on, especially during the peak breeding season. O'Farrell was concerned that spring burns may have a long-term negative impact on Stephens' kangaroo rat populations.

In general, fire is beneficial to grassland species because it removes dense non-native grasses, thatch, and weeds that may preclude use of the habitat. Fire is also a very efficient way to treat large areas of habitat that cannot be mowed, such as rocky and steep areas. However, both prescribed and unplanned fire as a habitat management tool carries real, or at least perceived,

inherent risks that may be unacceptable for many areas. Foremost is the potential risk to public safety and property. For this reason, prescribed burns on the Reserve should be done under a Vegetation Management Plan (VMP) agreement with the California Department of Forestry and Fire Protection (CalFire). CalFire then works closely with the land manager to plan and execute a safe burn. In the event that the burn becomes out of control, CalFire then has immediate resources to correct the problem. In addition, by working under a VMP, the State indemnifies the landowner from damages that may arise from a prescribed burn.

### **3.2.5 Restoration and Planting**

Ecological restoration refers to various approaches to the task of ecological healing or rehabilitation. These include “restoration” itself, as well as rehabilitation, reclamation, re-creation, and ecological recovery. Ecological restoration is the active management of an area to return it to a native state, especially in habitats that have been degraded or completely type-converted due to non-native species invasions or some physical damage. Restoration is often regarded as a distinctive form of conservation management, differing from “preservation”, “conservation”, “stewardship”, or even “management” itself. However, there is no sharp distinction among these various forms of manipulation. All of them involve a series of attempts to compensate in a specific, ecologically effective way for alterations typically caused by human activities.

Rehabilitation is a broad term that may be used to refer to any attempt to restore elements of structure or function to an ecological system, without necessarily attempting complete restoration to any specified prior condition; for example, replanting of sites to prevent erosion.

Reclamation typically refers to rehabilitative work carried out on the most severely degraded sites, such as bulldozer lines used to fight wildfires. Though reclamation work often falls short of restoration in the fullest sense (a copy of a native ecosystem is not achieved immediately), it is clearly a necessary step in the process of restoration under such conditions.

Re-creation attempts to completely reconstruct an ecosystem on a site so severely disturbed that there is virtually nothing left to restore. The new system may be modeled on a system located outside the range of the historical system, or may be established under conditions different from those under which it occurred naturally.

Ecological recovery involves letting a system recover on its own, with the expectation that it will regain desirable attributes through natural succession. This hands-off approach to restoration may or may not be effective. It is best regarded as a key component of other restoration activities.

Restoration and planting activities on the Reserve will most likely be conducted following the removal of non-native, invasive plants (e.g., Tamarisk), or following either wildfire or prescribed burns. In addition, restoration of sensitive habitats (see Oak Restoration Plan; Appendix 6) may be conducted throughout the Reserve. In all cases, only local, native seed or cuttings will be used for restoration and planting.

### **3.2.6 Vector Control**

Among California's environmental health agencies, the term "vector" is defined to include not only the classic carrier of a disease pathogen from a reservoir animal to human, but also those biting, stinging, or venomous organisms that injure people. These have been labeled "vectors of trauma". Potential vectors which may occur on the Reserve include rodents (which may carry bubonic plague, Hantavirus, etc.), raccoons, skunks, foxes, and bats (which may carry rabies), and insects (which may carry many potential pathogens).

Delivery of community-wide vector control services are generally the action of a governmental agency. In California, special districts and local (primarily county) environmental health entities are involved, along with a few cities and other public agencies, with providing limited vector control services.

Typically in southern California, vector control activities are carried out in riparian and/or wetland systems. There are three major vector problems associated with riparian/wetland areas in southern California: mosquitoes, rodents, and ticks. Some problems could be highly important in localized areas. One example is murine typhus; a second is biting gnats such as species from the genera *Leptoconops* and *Culicoides*.

Mosquitoes are vectors of western equine encephalitis, St. Louis encephalitis, malaria, west Nile virus, dog heartworm, and trauma. There are approximately 50 species of mosquitoes in California, many of which require water in their immature life stages. Riparian habitats can be highly productive areas for many species of mosquito.

The principal vector of the encephalitides, *Culex tarsalis*, and the vectors of malaria (*Anopheles* spp.), are similar in that the female deposits eggs which must remain in the water for a week or more, depending on temperature, for completion of the life cycle. The water habitat most conducive to reproduction of these species is quiet but not stagnant; not very deep and with "feather edges"; heavily overgrown with emergent vegetation and weedy edges to protect the larvae and pupae from wind and wave action, predators; and relatively permanent to allow several generations to develop. The best way to prevent reproduction is to channelize the water to facilitate its movement and to prevent ponding. If ponding is necessary or desirable, the design and maintenance of the ponds should minimize breeding and encourage predation.

Several *Aedes* species occur in riparian systems. These mosquitoes differ in habitat from *Culex* and *Anopheles* in that the female lays eggs in areas where water will be present later. When the area is flooded, the eggs hatch and development begins. The simplest way to reduce production of these species is to design and maintain water channels so that floodwater recedes rapidly back into the main channel without being held in temporary puddles, pools, and ponds. If floodwater does become impounded, the same criteria for minimizing reproduction as listed for *Culex* and *Anopheles* apply.

It is important to remember that mosquitoes play an important role in a functioning ecosystem. Many species of wildlife consume mosquitoes as a primary food source, including but not limited to: bats; birds; and amphibians. For example, some bats may consume up to one-half their weight of insects in a night. The little brown bat (*Myotis lucifugus*) feeds on midges, mosquitoes, caddis flies, moths, and beetles (USFWS 1982). Further, Tuttle (1979) stated that 500 bats can easily capture 500,000 insects in a single night.

The Reserve Manager will coordinate with the local County vector control program to ensure that pre-treatment coordination is established. Annual coordination with County vector control will be important to ensure that the Manager will be notified prior to the initiation of any vector control treatments. The Reserve Manager will be closely involved with the decisions as to the methods proposed, the application, and potential impacts to Reserve resources, and will be prepared to monitor the results to the maximum extent practicable.

### **3.3 Reserve Security**

The primary problems of Reserve security were previously discussed. Trespass, vandalism, trash dumping, illegal shooting and off-road vehicles contribute to a general degradation of habitat and result in direct and indirect impacts to Reserve wildlife and habitats. These activities can also jeopardize the integrity of habitat restoration areas, habitat management areas, scientific research areas, and the safety of Reserve staff. Although it would be impossible to completely secure all areas of the Reserve, a feasible goal is to improve security and minimize impacts from these activities to the extent practicable. Objectives of Reserve security include: regular patrols; gating and fencing; and signage. In addition, a positive relationship with Reserve neighbors through direct contact and participation in public meetings can increase public involvement and significantly enhance Reserve security. Further, the Reserve Manager and Reserve Patrol will work cooperatively with local law enforcement and wildlife agency wardens.



## **4.0 HABITAT MANAGEMENT PROGRAM**

The overall goal of this Reserve is to 1) prevent further loss of native biodiversity, and 2) protect and encourage the re-establishment of native species with a particular emphasis on species covered in the Reserve MSHCP. Based on the research conducted on the Reserve to date, and on the general research related to the status of southern California's native communities, the primary concerns for management on this reserve are: 1) the introduction and spread of highly invasive non-native species; 2) disturbance regimes (e.g., frequent wildfire, human-induced soil disturbance resulting in non-native species invasions and erosion, etc.); and 3) edge effects created as development pressures increase around the Reserve.

The primary objective of habitat management will be to maintain viable populations of sensitive species and other wildlife on the Reserve by managing large contiguous areas of habitats for the species covered by the Reserve MSHCP and other native wildlife. To the extent feasible given funding availability, management will be focused on maintaining habitat quality and on enhancing natural biological communities. The lands will be managed primarily for diversity; natural processes which contribute to the growth, development, maturation, decline, and conversion of communities within the region will generally be monitored but not actively managed. Thus, for example, sage scrub communities which naturally convert to chaparral may be allowed to do so; similarly, chaparral communities which convert to sage scrub following fire may be allowed to do so. Thus, a dynamic natural ecosystem will be maintained. Intervention in natural processes will occur only when a significant threat to the maintenance of the overall biological communities is threatened. In addition, efforts will be taken to control wildfires which may threaten large areas of the Reserve and could cause a significant loss of biodiversity.

This emphasis on biodiversity and on maintaining a dynamic ecosystem on the Reserve directs management strategies. First, except for those areas which are already dedicated for management of Stephens' kangaroo rat, specific areas will not be dedicated entirely to management for a single species. Second, the success of the Reserve will not be measured in terms of the success of any one of the species covered by the Reserve MSHCP because it is anticipated that populations of these species will naturally fluctuate within the Reserve.

### **4.1 Description of the Management Approach**

The Reserve MSHCP (§3.11) describes general management strategies for the Reserve. It directs the RMC to pursue an adaptive management strategy, the purpose of which is to enhance the value or function of habitat resources to support diverse native plant and animal communities, based on the best available science. Adaptive management is defined here to mean that the Reserve Manager will utilize information on past research, current scientific studies, as well as information from previous successes or failures in habitat management activities on the Reserve to design and conduct future management.

This Management Plan, and all subsequent Management Plans, will be based on the adaptive management approach specified in the Reserve MSHCP (described briefly here). This approach to planning focuses on a process-based management strategy. Adaptive management begins with general objectives and strategies to be pursued by management, along with general policies

to govern the Reserve Manager's approach to managing various tasks. These general guidelines can remain fixed, while year-to-year management activities to accomplish the objectives and comply with policies can be quite flexible, reflecting current field conditions, changes in scientific understanding of problems, and changes in available management methodologies. For example, instead of specifying a precise target of "acres of tamarisk to be removed" in a given time period, the planning objective is to "control and/or remove non-native plants and animals" and the exact level of control required is determined by the Reserve Manager based on data about the status of the resource, the priority of the control effort, and the availability of control methods.

The adaptive management approach therefore gives the RMC and the Reserve Manager a set of objectives and priorities which are clear enough to guide action but flexible enough to allow for in-field judgment. The RMC and Reserve Manager can then annually make decisions in the pursuit of these objectives based on:

1. The best available information;
2. Monitoring data on field/ecological conditions;
3. The status of the plant and animal communities; and
4. The status of potential and actual threats to the Reserve.

This approach focuses management on key concerns such as control of non-native species and maintaining viable populations of threatened and endangered species without creating artificially precise (and potentially infeasible or counterproductive) standards of performance. The Reserve Manager can thereby maintain flexibility and allocate resources to reflect current conditions and their scientific judgment related to the seriousness of a given problem.

#### **4.1.1 Passive and Active Management**

Adaptive management may be considered when new data about the status of the ecosystem or the biological communities on the Reserve indicates a change in habitat quality or a reduction of a key wildlife population. There would be two possible responses when adaptive management is considered:

- 1) Passive management: Allow the habitats and populations to vary within their natural bounds of resiliency in relation to stochastic environmental and demographic variables, but monitor the situation to determine if action is necessary; or
- 2) Active management: Change the management of the Reserve's land and/or water resources to enhance the value of a given resource, for example, by changing the frequency of controlled burns or transplanting sage scrub species into a burned area;

This adaptive management strategy allows for considerable field management flexibility in meeting general management goals and objectives. Under this approach, the accomplishment of the Reserve's general management objectives may be handled on a case-by-case basis by monitoring the following:

- The general status of the ecosystem, such as:

- Landscape-level changes in plant and animal communities;
- Changes in key habitats, such as riparian areas and oak woodlands; and/or
- Changes which indicate potential for type-conversion of native to non-native habitats;
- The status of specific plants and animals, such as changes in the distribution and abundance of threatened and endangered species or of the 31 species covered under the Reserve MSHCP;
- The potential threats to the ecological integrity of the system and the species on which it depends, such as:
  - The appearance of non-native species, or changes in the status of non-native species; and/or
  - Changes in the level of human use of the Reserve.

Based on the general monitoring program described above, significant changes in the status of monitored resources are identified and then analyzed to determine if they constitute a favorable change or a “problem.” Note that the definition of “problem” is open to scientific evaluation; there are no automatic thresholds which trigger management action. For example, the presence of a single, highly invasive, non-native plant on the Reserve may be considered a problem requiring immediate action, while the continued presence of non-native grasses over wide areas of the Reserve may be considered an acceptable condition in the short-term requiring no immediate action, only on-going management.

Once a “problem” is identified, the available and relevant scientific literature is consulted and the nature of the problem is evaluated. Three levels of evaluation and decision-making may occur:

- (1) Where the field experience of the Reserve Manager indicates that a problem should be addressed immediately and can be addressed without significant associated adverse impact, the Reserve Manager may take immediate action. Examples of such situations include discovery of a new, exotic species on the Reserve, such as a new and invasive plant, or a change in the status of an already well-understood exotic species, such as an increase in the population of brown-headed cowbirds or tamarisk. In this type of situation, the Reserve Manager may take action immediately and without consultation with the RMC. A report of field management actions will be made at the subsequent RMC meeting.
- (2) Where the field experience of the Reserve Manager indicates that there are questions regarding the nature and significance of the problem, or questions about appropriate management action, the Reserve Manager will consult with colleagues and the scientific community. Using the best scientific and expert available information, the Reserve Manager will prepare a proposed action plan. Depending on the scope and severity of the problem, the Reserve Manager may initiate the action. If the need to coordinate with the regulatory agencies is necessary, the Reserve Manager will initiate that coordination. A report of the problem and action taken or proposed action

will be made to the RMC at the next regularly scheduled meeting, or, if the problem requires immediate action, a special RMC meeting may need to be convened.

- (3) For routine and/or long-term problems not requiring immediate action, and where the proposed remedy falls within the scope of this management plan, the Reserve Manager will prepare annual work plans to be approved by the RMC. Examples might include the type-conversion of coastal sage scrub to non-native grassland habitat, or the failure of oaks to reproduce effectively. In such situations, field management action will generally be deferred until after deliberations with the RMC.

For major management actions where the success of the action may not be obvious, the adaptive management strategy may also involve post-action assessment and may include monitoring to determine both success and the potential for incidental adverse impacts. Such situations might include, for example, monitoring of riparian restoration efforts or monitoring of areas following removal of exotics. Results of monitoring of success may also trigger changes in on going management actions.

#### **4.2 Long-term Management and Monitoring**

This section describes the long-term habitat management and monitoring program for the Reserve. The goals, objectives, and strategies identified here are based upon information in the Reserve MSHCP and Reserve historical supporting documentation. As previously stated, the overall goals of the Reserve are as follows:

- (1) To cooperatively manage the Reserve as a single ecological unit;
- (2) To manage the Reserve to promote quality and diversity of plants and animal communities within the Reserve, with an emphasis on restoring these communities to their natural condition (i.e., management for biodiversity);
- (3) To accommodate research on the Reserve, with a focus on ecological studies and studies of life history, habitat requirements, and factors affecting population viability of sensitive species that have practical application for Reserve management and operations and/or regional reserve planning;
- (4) To the extent feasible without compromising the above primary management goals, to provide opportunities for teaching and interpretive activities, historical, and cultural research and interpretation, and nature study and appreciation; and
- (5) To the extent feasible without compromising the above primary management goals, to provide for low-impact recreational opportunities in areas of the Reserve which are deemed appropriate for such activities by the Reserve Management Committee.

#### **4.2.1 Reserve Goals, Objectives, and Strategies**

##### **Goal 1: To cooperatively manage the Reserve as a single ecological unit.**

**Objective 1:** To the extent that funds are available, one of the RMC entities may consider acquisition of private in-holdings, boundary properties, acquisition of appropriate easements (that would benefit the Reserve), and/or negotiate land management agreements with private landowners. Such actions will be on a willing-buyer/willing-seller basis only.

**Strategy 1:** The Reserve Manager will notify the RMC of any properties for sale that may contribute to the goals of the Reserve.

**Objective 2:** To the extent that funds are available, the RMC will independently and/or cooperatively consider the acquisition and management of lands connecting the Reserve to other public and/or private lands dedicated to open space and wildlife protection.

**Strategy 1:** The Reserve Manager will notify the RMC and/or the RCA of any properties for sale that may contribute to Reserve connectivity.

**Objective 3:** The Reserve will monitor and assess the general status of selected covered and threatened and endangered species on the Reserve and take necessary and appropriate action to enhance habitats for such species when monitoring suggests that remedial action is warranted.

**Strategy 1:** The monitoring of selected covered species shall be an element of each year's annual work plan as time and budgets permit. Monitoring results for these species shall be discussed with the RMC prior to preparation of the annual work plan to determine if remedial action is needed. At that time the Reserve manager will consider the following management alternatives and provide recommendations to the RMC:

- Management to enhance habitat for the species at issue;
- Management to reduce sources of mortality to the species such as predators and/or parasites; and/or
- Management to temporarily enhance life history factors which may contribute to more robust populations (i.e., food, water, cover).

**Objective 4:** The Reserve will remove internal fencing and other potential barriers to wildlife movement.

**Strategy 1:** All unnecessary fences and other impediments and barriers to wildlife movement or trespass inducement will be removed and any habitat lost will be restored to the appropriate native habitat or allowed to recover without interference as described in Section 4.1.1 above to the extent necessary, practical, and/or feasible.

**Objective 5:** The Reserve will periodically (every 5 years) quantify the habitat categories on the Reserve and make plans for modifications, if needed.

**Strategy 1:** The Reserve will quantify each habitat type described in Section 2.2.2 using aerial photo mapping, color or false-color (that clearly distinguishes habitat types) infrared aerial photography (digital orthophotos at 1 meter resolution), or a comparable high-resolution medium, to examine the extent of habitat loss, gain, or other changes. If possible, the quality of the habitat will also be evaluated using ground-truthing, rapid-assessment techniques. Plans will then be formulated to make adjustments (prescribed burn, mowing, grazing, natural recovery, etc.) to increase or decrease ratios of habitats within the Reserve, if necessary. Some of the habitat acreages will be allowed to naturally convert from one habitat type to another following a natural succession pattern as discussed in Section 4.0 above. The goal will be to maintain the baseline habitats as identified in Section 2.2.2 above, with expansion or reduction by approximately 10% throughout the Reserve. Other habitats, such as the 1,315 acres of RCHCA conservation easements dedicated for Stephens' kangaroo rat management will be actively maintained.

**Objective 6:** The Reserve will implement a fuels management plan as a tool for habitat management.

**Strategy 1:** The purposes of fuels management on the Reserve shall be: 1) to control non-native grasslands; 2) as a tool to meet the goal of a mosaic of varying age-class habitats; and 3) to reduce the potential for catastrophic wildfire. Fuels management actions, such as controlled burns and fuel reduction, will be implemented in a manner to minimize adverse impacts to the overall ecosystem in general and to species utilizing the available habitat at the time of the management activity. The Reserve Manager will coordinate with CDF to establish and maintain a Fuels Management Plan and establish a Vegetation Management Plan Agreement with the California Department of Forestry and Fire Protection (CDF).

**Objective 7:** The Reserve Manager will monitor for and identify non-native species on the Reserve, assess their potential to adversely affect the Reserve's ecological integrity, assess potential methods of removing or controlling their effects, and take necessary actions for their control or removal.

**Strategy 1:** Non-native species will be removed from the Reserve (and replaced with native species [primarily in the case of plants] to the extent feasible). The Reserve will not actively manage to accommodate the occupation or use of Reserve habitats by non-native species except in the case of biological control, which would require Department of Fish and Game and Fish and Wildlife Service concurrence. The purposeful introduction of non-native species to the Reserve is prohibited and RMC members will fully exercise their authorities, separately and

jointly as appropriate, to protect the Reserve from such introductions. Details of selected methods for non-native species removal strategies can be found in Appendix 7.

**Objective 8:** The Reserve Manager will participate in regional ecological symposia, inter-reserve management groups, and other appropriate groups to share data and discuss regional ecological problems and management approaches to solving these problems.

**Strategy 1:** The Reserve Manager will keep apprised of current workshops, symposia, and meetings that are relevant to reserve management. As funding permits, the Reserve Manager should attend at least one professional conference related to reserve management per year.

**Objective 9:** The Reserve Manager will maintain an updated library of scientific publications related to the ecology of Mediterranean-type ecosystems and their management, results of research studies on the Reserve, other relevant regional documents, and all supporting documentation to this plan. The Reserve Manager will keep apprised of relevant publications and ensure their addition to the Reserve library.

**Strategy 1:** The library for the Reserve shall be fully searchable via a database and available for use by members of the RMC, researchers, and others whose use is deemed by the RMC to be appropriate. Relevant literature (i.e., research results, environmental studies, maps, reference material, etc.) shall be added to the library as they become available. Archaeological data from the Reserve is available to qualified professionals through the Eastern Information Center at U. C. Riverside.

**Objective 10:** The RMC shall protect archaeological and cultural resources on the Reserve.

**Strategy 1:** All potential impacts to archaeological or cultural resources shall be avoided to the maximum extent practicable. In addition, archaeological and cultural resources will be managed in accordance with Section 106 of the National Historic Preservation Act (NHPA).

**Objective 11:** The Reserve Manager will coordinate management activities with adjacent land owners such as the Bureau of Land Management and Finisterra Farms (Las Mañanitas).

**Goal 2: To manage the Reserve to promote quality and diversity of plants and animal communities within the Reserve, with an emphasis on restoring these communities to their natural condition (i.e., management for biodiversity).**

**Objective 1:** The RMC will manage habitat for Stephens' kangaroo rat populations on RCHCA lands and conservation easements throughout the Reserve by controlling dense areas of non-native grasslands, contingent upon available funding.

**Strategy 1:** Annual work plans will include details of non-native grass control in areas of the Reserve dedicated to Stephens' kangaroo rat. Mowing, grazing, herbicides, or prescribed burns will be used to control the non-native grasses and reduce thatch which will enhance the habitat for the Stephens' kangaroo rat, contingent upon available funding.

**Objective 2:** Populations of Stephens' kangaroo rat will be managed and monitored in compliance with management and monitoring methods directed by the RCHCA.

**Strategy 1:** Annual work plans will include details of Stephens' kangaroo rat monitoring and will be submitted to RCHCA for funding from the Reserve Stephens' kangaroo rat endowment.

**Objective 3:** The Reserve will fence and actively patrol its lands to minimize unauthorized use of the Reserve.

**Strategy 1:** Fencing and patrol: While the RMC wishes to be a good neighbor to the general public and to those whose property is adjacent to the Reserve, the Reserve will not allow unauthorized access to Reserve lands. Accordingly:

- The Reserve boundaries will be fenced, as appropriate, with barbed wire fencing and t-posts to the standards described by the Wildlife Society for wildlife movement (Kie et al. 1994). Deviations from this standard will be considered by the RMC on a case-by-case basis;
- Repair of damage to fencing from trespass, vandalism, or any other means will not be delayed for more than one budget cycle;
- Appropriate signage will be placed along the Reserve boundary prohibiting trespass and citing the appropriate State Penal Codes and County Ordinances;
- The Reserve staff will patrol the Reserve as provided for in the Reserve MSHCP on a regular basis;
- The response to an initial incident of simple trespass will be a warning and a request that the trespasser leave the Reserve. The trespasser will be given a brochure outlining the Reserve's public access policies and the penalties for repeated trespass. Subsequent trespass may result in citation under California Penal Code 602, if possible (currently, RCRPOSD Rangers are not authorized to issue legal citations, however a CDFG Warden or County Sheriff may be summoned to provide the citation); and
- Any trespass that results in tangible damage to Reserve facilities or habitats or involves action such as cutting of fences may result in citation by the appropriate authority.



**Objective 4:** To the extent that funds are available, the Reserve Manager will actively restore/reintroduce native species to appropriate areas of the Reserve.

**Strategy 1:** Restoration/reintroduction of natural system processes may include reintroduction of extirpated or declining species. Such reintroductions require careful consideration of the ability of the remnant natural area to support a minimum viable population of the species; genetic variability in the reintroduced stock; factors likely to limit the reintroduced populations; accidental introduction of diseases or parasites; and practical issues, such as the potential dispersal of animals from the intended release site. These factors will be considered with any proposed plant restoration or animal reintroduction.

**Strategy 2:** Plant restoration projects will be identified and implemented as funds are available. Restoration will be accomplished with native seeds, cuttings and/or transplants taken from local areas or the nearest similar habitat within the Reserve. No outside seed, cutting, or plant sources will be utilized unless expressly authorized by the RMC. The Reserve will conduct restoration activities of the following habitats as priorities (not listed in order of importance):

- Native habitats utilized or suitable for use by species listed as covered within the Reserve MSHCP;
- Oak woodland restoration;
- Native habitats utilized or suitable for use by species listed as threatened or endangered;
- Native riparian habitats;
- Native CSS habitats;
- All other native habitats.

Plant restoration will be conducted in a manner which will minimize collateral damage to other Reserve resources (e.g., tamarisk piles in areas inaccessible to vehicles will be burned on-site to minimize damage to riparian habitat [with coordination with the RMC MWD representative]). All restoration proposals requiring significant funding will be approved by the RMC through the annual work plan.

**Strategy 3:** Animal species reintroduction projects will be identified and implemented as funds are available.

- Any animal reintroduction will occur only with the RMC, and specifically the Resource Agency's, approval;
- Only animals that historically and naturally occurred on the Reserve will take place;
- Species will be reintroduced to their native habitats as long as significant conflicts with existing covered species are not anticipated.

**Objective 5:** Maintain and/or increase the number of acres supporting oak woodlands, where appropriate.

**Strategy 1:** Details of oak woodland restoration can be found in Appendix 6.

**Objective 6:** Maintain the baseline (see Table 1, §2.2.2) number of acres of each representative habitat type within Reserve boundaries.

**Strategy 1:** The Reserve Manager will utilize acceptable habitat management practices (through mowing, grazing, fire, restoration, or herbicides) to maintain the approximate baseline number of acres of each native habitat type on the Reserve with consideration given to dynamic habitat processes (i.e., senescence, type-conversion, etc.)

**Objective 7:** Whenever fiscally possible, take proactive action to maintain the native biodiversity within the Reserve.

**Strategy 1:** All mines and caves within Reserve boundaries that have a high probability or history of human disturbance shall have protective gates installed at the entrance which prevent humans from entering, but allow bat species to enter and exit. Prior to gate installation, all mines will be evaluated for the potential use of the mine by bat species. For mine shafts that are not being used by bats, the shaft shall be filled in or covered so as to eliminate trapping wildlife or people.

**Goal 3: To accommodate research on the Reserve, with a focus on ecological studies and studies of life history, habitat requirements, and factors affecting population viability of sensitive species that have practical application for Reserve management and operations and/or regional reserve planning.**

**Objective 1:** The Reserve Manager or RMC may allow researchers to conduct ecological studies on the Reserve.

**Strategy 1:** Conditions for research on the Reserve: The Reserve MSHCP recognizes that research may have some level of adverse impacts to Reserve habitats and species, and provides for such impacts to be accommodated. In general, research will be encouraged and permitted if the following criteria are met:

- Researchers have all required permits for the proposed work;
- Researchers agree to abide by all Reserve regulations (e.g., off-road travel restrictions, avoidance of archaeological and cultural resources, etc.) and other activities which may, in the opinion of the RMC and/or Reserve Manager, pose a threat to the Reserve, its habitats, and the species which inhabit the Reserve;

- The RMC and/or Reserve Manager find that the proposed research is both appropriate to be performed on the Reserve and is likely to yield new scientific information of value to the Reserve;
- The RMC and/or Reserve Manager further find that the methods proposed are appropriate for application to the Reserve and that they represent a reasonable and prudent approach to avoiding impacts associated with the research goals;
- Research funding is adequate to ensure that methodologies proposed can be implemented;
- Researchers agree to submit all raw data and research results to the Reserve's data base and library, including copies of all publications within one year of the end of the study, or when the research terminates; and
- Researchers allow the RMC and its member agencies access to their data on an ongoing basis for use in formulation and evaluation of specific management actions, except that this access shall not be construed to imply permission to make the data public.
- Research on cultural resources will not be permitted unless approved by the RMC.

**Goal 4: To the extent feasible without compromising the above primary management goals, to provide opportunities for teaching and interpretive activities, historical, and cultural research and interpretation, and nature study and appreciation.**

**Objective 1:** To the extent that funds are available, or can be obtained through outside sources, the Reserve may establish and maintain an active interpretive program, based at its interpretive center at Lake Skinner. This program will include development of appropriate interpretive trails linking the center with the Reserve and other natural areas. The primary goals of the Reserve's interpretive program shall be to (1) encourage people to explore and appreciate the Reserve in particular and wild lands in general, (2) instill an understanding and appreciation of fundamental ecological principles such as the nature and value of biodiversity, the nature and importance of ecological scale management, and the inter-relatedness of biotic communities, and (3) impart an appreciation for the application of science to understanding the natural world. Details of the Reserve Interpretive Program can be found in Appendix 8.

**Strategy 1: Reserve interpretive trails:** The RMC will cooperate with Metropolitan in the establishment of interpretive trails by providing input into trail location, design, and programs. Reserve personnel may utilize these interpretive trails for the Reserve's interpretive programs.

**Interpretive facilities and their uses:** The RMC will primarily maintain the Alamos Schoolhouse at Lake Skinner as its interpretive center, and secondarily as office space for MSR staff. The following uses may be conducted without prior RMC approval:

- Interpretive tours, lectures, and other interpretive programs under the supervision of the Reserve interpretive staff and/or volunteers, or RMC member agency representatives;
- Management meetings, scientific symposia, and other meetings which involve Reserve personnel, researchers, or others involved in Reserve management;
- Social gatherings intended to promote cooperative relationships among Reserve member agencies and/or the Reserve and local community groups or agencies.

The facilities may also be used for special public events with the prior approval of the RMC.

The Reserve interpretive center and its grounds are generally not available for private-party events, but may be used for such purposes if the event is not inconsistent with the Reserve's goals and objectives and (1) with prior approval by the RMC; and 2) upon payment of a rental and maintenance fee adequate to fully offset all building depreciation, maintenance, clean-up, supervision, administrative and other costs associated with the event. For the Alamos Schoolhouse, this does not preclude the opportunity for generating funds over and above expenses.

Interpretive tours of the Reserve: RMC member agencies may conduct such guided tours of the Reserve as necessary in the furtherance of their roles and responsibilities as RMC members, and in furtherance of their agencies mission. Further, the Reserve Manager may authorize special interpretive tours of the Reserve for the public, including tours to areas not served by the Reserve trail system, to the extent that such tours are consistent with the Reserve's goals and objectives and serve an interpretive purpose.

**Objective 2:** The RMC will cooperate with complementary interpretive programs, such as those at the Santa Rosa Plateau and Diamond Valley Lake.

**Strategy 1:** A primary focus of Reserve interpretation programs shall be on school-age children. Programs for the general public will be a secondary focus.

**Objective 3:** The RMC will allow appropriate guided educational and interpretive tours of the Reserve. As appropriate, the RMC may authorize special-event tours which may involve use of areas not generally open to the public.

**Strategy 1:** Authorized programs: Consistent with established policies and recognizing that opportunities for public contact, teaching, and interpretation may occur in a number of ways, the Reserve generally authorizes its designated interpretive personnel to conduct:

- In-school programs and in-field school programs;

- Programs at public events such as fairs and expositions;
- Programs for environmental and civic organizations and other general public groups, including, but not limited to homeowner's associations and public clubs.

**Objective 4:** The RMC will develop an outreach program to encourage and educate adjacent landowners on management of their property in a manner which minimizes the potential for introduction of non-native species, maintains a buffer zone of native habitats around development, and minimizes the adverse effects of development along the boundaries of the Reserve.

**Strategy 1:** The RMC's outreach program will be developed cooperatively by the RMC member agencies both to reflect the Reserve's goals, objectives, and policies and to reflect each member agency's goals, objectives, and policies. Reserve public outreach will therefore be coordinated closely with each RMC member agency Public Affairs Officer. All aspects of the Reserve's program will be based on achieving voluntary public acceptance and implementation of management for biodiversity.

**Goal 5: To the extent feasible without compromising the above primary management goals, to provide for low-impact recreational opportunities in areas of the Reserve which are deemed appropriate for such activities by the Reserve Management Committee.**

**Objective 1:** The RMC will work with MWD to design and site public trails and trail heads to minimize the potential for off-trail use and to minimize impacts to sensitive species and habitats.

**Strategy 1:** Trails compatibility with the Reserve's primary mission: Metropolitan is the lead agency for all MWD trails development activities on the Reserve and connecting to the Reserve via its recreation and operations facilities. RCPOSD is the lead agency for trails connecting to the Reserve from its leased lands at Lake Skinner and from the County Trail System. Basic trails development and use policies are outlined in the Reserve MSHCP (§4.1.4.4 – 4.1.4.7). In implementing these basic policies, the Reserve is committed to public access that is compatible with the primary wildlife protection and management purposes of the Reserve.

Public Access Policies:

- Trail access will be available to the general public only through areas authorized by the RMC;
- Consistent with the Reserve MSHCP, all public access to the Reserve will require payment of a trails access fee unless an alternative form of payment acceptable to the RMC is developed by Metropolitan and/or County Parks. Any alternative form of trails use fee must allow Reserve patrol personnel to readily identify authorized and unauthorized trail users;

- Revenues from the collection of fees for trails use, including fines imposed by the courts and/or judgments of the courts related to damages to the Reserve will be transferred from the receiving agency and deposited into the Reserve account (less the cost of collecting fees);
- The Reserve may designate segments of the trail system as interpretive trails and may allow public access to the segments so designated at no fee, however designation as interpretive trails and waiving fees requires concurrence from MWD; and
- Other recreation activities may be proposed and will be evaluated for their suitability per the criteria and methods described in the Reserve Public Use Policy (Appendix 12).

**Objective 2:** The RMC will cooperate with MWD in development of a public trail system in accordance with the terms and conditions of the Reserve MSHCP and Cooperative Management Agreement (CMA).

**Strategy 1:** MWD and the RMC will site and design trails to avoid significant impacts to sensitive habitats and sensitive species. By using topography and habitat type, trails will be sited and constructed in a manner which will limit opportunities for trail users to go off-trail. Consistent with the Reserve MSHCP, MWD will monitor trail use and impacts and report periodically to the RMC. If monitoring reveals significant impacts from trail use, the Reserve Manager and/or RMC may temporarily close trails or request that they be re-routed. In addition, MWD is responsible for operation, maintenance, signage, and patrol for trails constructed and implemented by MWD.

#### 4.2.2 Reserve Management Units

This section discusses the Reserve Management Units (RMU) based on the Wildfire Response Plan Management Units (Section 5.6 and Appendix 11) in terms of:

- The approximate number of acres in the unit;
- Representative habitats;
- Representative species and special issues; and
- Considerations regarding:
  - Habitat management issues;
  - Public access;
  - Trespass issues; and
  - Presence of Stephens' kangaroo rat conservation easements.

The Wildfire Response Plan Management Unit boundaries were delineated within each region based on the following criteria: 1) defensibility of the unit; 2) perimeters along roads or trails, along ridgelines, or on flat ground in a valley; 3) perimeters that are conducive to creating 30 – 60 foot fuel/fire breaks; and 4) where access, in most cases, is not a “dead-end”. In some cases, management units include areas outside of actual Reserve boundaries in order to make them defensible from a fire protection perspective. While map boundaries include private lands, it is



important to note that management activities and fire suppression and management activity recommendations apply only to Reserve lands and not those private lands adjacent to the Reserve. Further discussion of the Management Units with regard to wildfire response and fuels management may be found in Section 5.0 below.

**Management Unit 1:** This RMU is located in the northeastern corner of the Reserve, on the west side of the North Hills. This unit is approximately 93 acres and is comprised of primarily sage scrub habitat with some disturbed grasslands. This unit will be the northern portion of the future west DVL wildlife corridor.

In terms of public access, this unit has the DVL “Overlook” visitor’s site. Trespass is not currently an issue, but impacts from visitors to the Overlook include general human activity and the potential for trash and fires. Currently, very little habitat management will probably be necessary in this unit.

**Management Units 2, 3, 4, 5, 6, and 7:** These RMU’s are located along the North Hills and total approximately 1,490 acres. Habitats within these units include sage scrub, grassland and disturbed areas. The North Hills Trail (Section 7.1.1) traverses the northern edge of these units, so public access and the potential for trespass are present and likely. In addition, the DVL Lakeview Trail travels along the southern boundary of these units (but not within the Reserve), adjacent to the lake, also providing an opportunity for off-trail travel by people. Other, smaller and less-used trails bisect some of these units. It’s important to note that any trail within the Reserve presents an opportunity for interpretive activities and displays which will educate the general public and foster appreciation and respect for the natural resources of the Reserve.

The south facing slope of the North Hills exhibits the previously discussed, much drier form of the subassociation of sage scrub called “Riversidean”, where *Encelia farinosa* dominates the sage scrub composition. Due to the high human use of the North Hills in terms of horse riders, hikers, and DVL employees, interactions between wildlife and humans, and human impacts on wildlife are expected to be very high.

As previously stated, the North Hills Trail travels along the entire northern boundary of the North Hills within the Reserve. At each end of the trail, but outside of the Reserve, are the trailheads. The increased presence of the horses at the trailheads and along the North Hills Trail may increase the presence of brown-headed cowbirds (*Malothrus ater*) in the North Hills with associated impacts on nesting bird species such as the California gnatcatcher (*Polioptila californica californica*) which inhabit habitats of the North Hills. The presence of cowbirds will need to be monitored and, if necessary, a trapping program initiated.

**Management Unit 8:** This RMU is located on the east end of the North Hills and is approximately 70 acres. This unit will be the northern end of the east DVL wildlife corridor. Habitats include sage scrub and disturbed areas, mainly due to the on-going construction and activities of DVL operations. Important wildlife considerations between RMU 7 and 8 include the paved road that travels between the units and its associated high use by visitors accessing the DVL Marina, especially at early morning and late evening hours. It is expected that little management will be required within this unit until the wildlife corridor is complete. Once the

corridor is complete, habitat restoration of the disturbed areas will be necessary, but will be accomplished by MWD. Monitoring of road-killed wildlife is recommended along the Marina access road.

**Management Units 9 and 10:** Unit 9 is approximately 200 acres and Unit 10 is approximately 101 acres, and are currently highly disturbed habitats and may constitute the eastern and western DVL wildlife corridors in the future. The purpose of the corridors is to link the main body of the Reserve with the North Hills, thereby allowing wildlife movement between the two areas. MWD has been conducting restoration activities (seeding and weed control) within the proposed corridor areas.

**Management Unit 11:** This RMU is approximately 200 acres and is located southwest of DVL. Associated habitats include sage scrub, boulders, grassland, and disturbed areas. This RMU will be the southern end of the western wildlife corridor. This unit supports Stephens' kangaroo rat (RECON 1991) as well as many other species covered under the Reserve MCHCP.

**Management Unit 12:** This is a large management unit (2,360 acres) and is comprised of sage scrub, chaparral, grasslands, and small riparian areas. Many in-holdings are present throughout this unit. In addition, the Goldrich Trail (Section 7.1.1) travels through this unit and, in combination with the private parcels, introduces a high level of human influence and potential negative impacts. Illegal use of off-road vehicles has been a problem in the past in this unit. Further, the southern boundary of this unit is bordered by Rawson Road. This road is an unmaintained County road and is subject to dumping and illegal trespass.

**Management Units 13, 14, and 15:** These management units comprise the south hills of DVL. Habitats include sage scrub, chaparral, and annual grasslands. In addition, small riparian areas can be found in steep draws. These RMU's are fairly remote, with little to no current trespass problems. The DVL Lakeview Trail travels along the northern boundary of these units, but due to the fact that this section of the trail is at the furthest distance from the trailhead located at the northeast DVL Marina, and the terrain is very steep in areas, the probability of trespass or other human-caused problems is low. Unit 15 also contains part of a Stephens' kangaroo rat conservation easement.

**Management Units 16A and 16B:** These RMU's are on the east side of the Reserve and encompass part of the Crown Valley area. Unit 16A contains three buildings: 1) the old Shipley Office; 2) a building used to house RCRPOSD employees; and 3) a maintenance barn. The old Shipley Office is currently uninhabitable, but currently houses U.S. Geological Survey electronic equipment. This building will likely be removed in the near future. The Park District housing is a double-wide trailer. The Reserve gains no monetary benefit from the use of this trailer by Park District employees, but does benefit from the presence of a person who would alert Reserve staff if there were a problem in that area of the Reserve. The Maintenance Barn is a Reserve building and is often used by Reserve staff for projects in that area. This RMU is approximately 35 acres and, except for the areas around the buildings, contains some sage scrub but primarily annual grassland and associated Stephens' kangaroo rat conservation easement.

Unit 16B is approximately 670 acres to the east of Unit 16A and supports one of the largest areas of Stephens' kangaroo rat conservation easement. Habitats include primarily annual grassland and some areas of sage scrub. Burrowing owls (*Athene cunicularia*) have been reported in this unit. Several of the major research studies involving control of non-native grasslands have been in this unit (Appendix 1).

**Management Unit 17:** This RMU is approximately 710 acres and consists primarily of sage scrub, chaparral, and grasslands. Similar to Unit 12, this unit has many private properties throughout, and also is bordered by Rawson Road and its inherent problems (facilitating trespass, illegal activity, poaching, etc.). From a patrol perspective, Rawson Road is one of the most important areas on which to focus in order to discourage undesirable human activities. A portion of this unit is part of a Stephens' kangaroo rat conservation easement area.

**Management Unit 18:** Moving south from Unit 17 toward Lopez Canyon is RMU 18. This unit is approximately 495 acres and consists of primarily sage scrub and grasslands with the associated Stephens' kangaroo rat conservation easement. In spite of the fact that this unit is adjacent to the Reserve boundary and Crown Valley Road, little trespass seems to occur here. It's possible that this may be an artifact of the proximity to the Oakridge Ranches Homeowner's Association area and the "neighborhood watch" type of landowners within that Association.

**Management Unit 19:** Another large (1,790 acres) RMU, this unit supports some of the important oak woodland habitats in the Reserve. In addition to oak woodlands, this unit also supports representative portions of all of the habitat categories on the Reserve. The frequency of trespass within this unit is low, possibly due to the attentive nature of the landowner's to the east. On the east side of this unit, Black Mountain Peak road used to be passable by vehicle, but has since become impassable due to overgrown vegetation and erosion. It is the intent that this road will eventually disappear altogether as it is not necessary for Reserve management. One of the major creeks flows through the southern portion of this unit: Middle Creek. Middle Creek has been a significant winter roost location for black-shouldered kites (*Elanus caeruleus*: C. Moen, pers. obs.) and great blue heron (*Ardea herodias*: B. Wagner, pers. obs.) in the past. Black-shouldered kites are known to roost communally in the winter and the "Lake Skinner (Reserve)" population is considered an important population in the WRCMSHCP, but the document does not identify this Reserve as a winter roost site.

**Management Unit 20:** This RMU is approximately 710 acres and is primarily comprised of Las Mañanitas Ranch and its 205 acres of Stephens' kangaroo rat conservation easement. Las Mañanitas is comprised primarily of annual grassland and surrounding this private land are areas of sage scrub, oak woodland, and riparian habitats.

**Management Unit 21:** This RMU is approximately 945 acres of primarily sage scrub, chaparral, and rocky area habitats. In addition, there are many private in-holdings within this unit. Trespass by horse and motorcycle riders has been moderate to heavy along the old Guzzler Road. In addition, other trespass (motorcycle riders, horse riders, and off-road vehicles) has been heavy along Ridge Road on the east side of the unit.

**Management Unit 22:** This 1,215 acre unit is comprised mainly of sage scrub, chaparral, small areas of grassland, and one of the major streams within the Reserve, Rawson Creek, and its associated riparian and oak woodland areas. Trespass in this unit is very low and not currently considered a problem; however, there have been many reports of helicopters using this remote area to practice landings and low-altitude flying. Units 19 and 22 probably support the Reserve's larger mammal species such as mule deer (*Odocoileus hemionus*) and mountain lion (*Felis concolor*). It was in Rawson Creek that the presence of a primarily desert species, the red-spotted toad (*Bufo punctatus*) was documented (Fuller 1994). This finding is a testament to the unique nature of the Reserve as a transition area between desert and coastal habitats that was discussed in Section 1.5 above.

**Management Unit 23 and 24:** These RMU'S are approximately 1,290 acres (300 acres and 990 acres, respectively). These two units are comprised primarily of sage scrub, small areas of chaparral and annual grassland. In addition, oak woodland and riparian habitats occur along an unnamed stream near the east end of Unit 24. Trespass in Unit 24 has been moderate to heavy with horse and motorcycle riders cutting fences mainly along the old roads that travel on the north side of Bachelor Mountain to ride either east (further into the Reserve) or west to the top of Bachelor Mountain. The Bachelor Mountain area is one of two known significant populations of Quino checkerspot butterfly (*Euphydryas editha quino*) on the Reserve. This species is listed as endangered on the Federal endangered species list. In addition, Unit 24 also supports one of the very few significant populations of Munz's onion (*Allium munzii*), a species listed as endangered on the Federal endangered species list (Appendix 4), and threatened on the State endangered species list.

**Management Unit 25:** Management Unit 25 is 395 acres and surrounds the northeast arm of Lake Skinner. Habitats in this unit are variable, represented by sage scrub, annual grassland, and significant riparian habitats at the mouths of Middle Creek and Tualota Creek. Significant habitat management issues in this area include the infestation of tamarisk (*Tamarisk ramosissima*) around the edge of the lake and upstream into the two riparian areas. While the lake shore itself is not part of the Reserve (it is part of the MWD Operations Area), non-native species invasions within the operations area will negatively affect the Reserve through the introduction of the non-native seeds. In addition to tamarisk, pampas or jubata grass (*Cortaderia* spp.) is also becoming common along the lake shoreline.

**Management Unit 26:** This RMU is 910 acres, lies on the eastern border of the Reserve and is bisected by one of the major creeks in the Reserve: Tualota Creek. In addition to Tualota Creek, a portion of the Lake Skinner Equestrian Trail (Section 7.1.1) travels through this unit. Tualota Creek is an important local riparian corridor and may be used as a wildlife movement corridor for many species, including mountain lion (C. Moen, pers. obs.), to the east. In addition to the usual suite of riparian species within Tualota Creek in this unit, areas to the south of Tualota Creek along the Lake Skinner Equestrian Trail have been documented to support small populations of Quino checkerspot butterfly (Wagner and Osborne 1997, C. Moen, pers. obs.) Because Tualota Creek runs year-round in the areas near the "gorge", this densely vegetated riparian area has been used for illegal marijuana groves in the past. Past efforts to apprehend the individuals responsible for the illegal groves were unsuccessful. It's important to note that, in addition to the general disturbance to a regionally important habitat by the mere presence of

humans, an unfortunate technique associated with marijuana growing operations is the use of highly toxic rodenticides to protect the crop. These pesticides have very harmful impacts on wildlife species in addition to the damage caused by their use near a water source.

**Management Unit 27:** This RMU is 760 acres and is bisected by the Lake Skinner Equestrian Trail (Section 7.1.1), therefore horse-riders and hikers venture off-trail resulting in trespass and potential impacts to Reserve wildlife and habitats. In addition to the trail, two roads leading to Lake Skinner Park also occur within this unit. These roads are considered Park roads and are therefore maintained by Lake Skinner Park operations. Mortality of Reserve wildlife from vehicles along these roads occurs regularly. A significant population of Quino checkerspot butterfly occurs in the southwest portion of this unit. For this reason, Reserve personnel, who are familiar with avoiding impacts to this species, are responsible for weed abatement activities along the roads within this unit, including the “Park” roads. This unit is comprised primarily of sage scrub and annual grasslands along with patches of chaparral habitat on the Tualota Hills. Additional trespass occurs within this unit as a result of the “Stage Trail” which is a historic route through the Tualota Hills gorge. This trail is not a public trail, but many local people are familiar with it and use it to access the Reserve surreptitiously.

**Management Unit 28:** This RMU is 400 acres, but only a small portion of those acres are Reserve. The majority of this unit is comprised of Lake Skinner Park Recreation Area which includes camping, fishing, and hiking activities. Trespass activities from Park visitors are high in this unit. An MWD gravel pit is located in the southern portion of this unit, and MWD accesses this area on a regular basis through gates 108 and 110. Immediately to the east of the gravel pit is the USFWS Quino checkerspot butterfly monitoring site. This location is considered of high regional importance for this species and is monitored on an annual basis by the Reserve Manager and the U. S. Fish and Wildlife Service. In addition, there have been Quino checkerspot butterfly observed in the MWD gravel pit (Osborne 2003). The Reserve lands of this unit are primarily comprised of sage scrub and annual grassland.

**Management Unit 29 and 30:** These management units are approximately 685 acres (400 and 285 acres, respectively) and are comprised of sage scrub and annual grassland. These units are located in the hills south of Lake Skinner, and north of Borel Road. Included in this unit is the western portion of the Lake Skinner Equestrian Trail (Section 7.1.1) and the Equestrian Camp. Trespass into Reserve habitats from users of the trail and camp is currently low, but could increase as use of the trail increases. In addition, trespass from horse and motorcycle riders is high in Unit 30. These trespass events occur regularly from individuals cutting the southern Reserve boundary fence to access the Reserve. Reserve staff currently conducts weed-abatement activities along the southern border of the Reserve adjacent to two homes which were built without adequate fire clearance. In addition, the dumping of unwanted dogs and cats has occurred within this unit.

### **4.2.3 Habitat Monitoring**

The Reserve MSHCP identifies the monitoring of broad habitat categories as the primary management methodology (MSHCP §3.11.3). The seven broad habitat categories of the Reserve (i.e., oak woodland, riparian, sage scrub, grassland, chaparral, wetland, and disturbed) will be

evaluated using aerial photo mapping, color or false-color (that clearly distinguishes the various habitats) infrared aerial photography (digital orthophotos at 1 meter resolution), or a comparable high-resolution medium. An important factor for remote interpretation is that the main Reserve vegetation communities can be reliably characterized to evaluate changes over time. This analysis will take place every five years in order to track changes in habitats across the Reserve.

#### **4.2.4 Implementation of Habitat Management Strategies**

Sheep grazing, mowing, herbicides, and prescribed burns (§3.2 above) are all effective management tools to control annual grasslands, particularly in favor of native and non-native forbs and the creation of open habitat beneficial to many Reserve species, especially the Stephens' kangaroo rat. The ultimate effectiveness of the different methods likely depends more on timing and frequency of the applications than the method itself. Assuming that all four methods would be acceptable from the perspective of controlling non-native grasses, the decision of which to use is more a matter of cost and practicability.

Prescribed burning is probably the most effective tool (both in terms of time, resources, and cost) for controlling non-native grasses. To facilitate prescribed burns and other fuel reduction measures, a Vegetation Management Plan (VMP) agreement with the California Department of Forestry and Fire Protection (CDF) was completed on March 20, 2008 (Johnson et al.). This plan will be updated and renewed as required.

Sheep grazing and mowing are the second best recommended choice in terms of cost-effectiveness. Both have been shown to be effective in managing non-native grasslands at the Reserve in the past (Kelt et al. 2005). Both are controllable with proper application and can be used at relatively large scales. Mowing is more limited in application where terrains are more rugged and/or rocky. In addition, mowing has a greater potential for inadvertently igniting a fire, may cause soil disturbance (which may increase invasion of non-native plant species), and may cause other collateral damage such as mortality of snakes, lizards, etc. Sheep grazing has more flexibility because terrain and rockiness are not limiting factors. However, grazing requires proper and dependable controls (e.g., experienced shepherds, fencing, well-trained dogs, etc.) to avoid over-grazing and impacting non-target vegetation communities such as sage scrub. Timing is also more critical with sheep grazing because sheep prefer forbs to grasses and will not eat grass once the awns have developed. In addition, sheep can be a vector for non-native species and their presence has the potential to disturb soil, creating conditions conducive to non-native plant species invasions.

Grass-specific herbicide treatment (e.g., Fusilade®) has been demonstrated to be an effective control on non-native annual grasses and results in increased forb cover (Allen 2006). Herbicides also appear to have a more immediate effect than grazing or mowing. However, at this time the use of Fusilade on a large-scale basis is cost-prohibitive. In addition, more information regarding the legal use of this herbicide in aerial applications is needed. It may be possible to apply this herbicide using a tractor attachment, but this option needs to be further explored. Nonetheless, the current cost of the herbicide also makes this method unattractive for large-scale use at this time.



Wildfire management will also be a key factor in maintaining and enhancing habitat quality and must be considered in the overall management program. Wildfires will occur in the Reserve, and fire frequencies are expected to increase with increasing urbanization in areas adjacent to the Reserve. Long-term management will have to integrate active management methods such as grazing and mowing with fire management. For example, if a wildfire were to burn a portion of the Reserve that had been targeted for grazing or mowing because of the buildup of non-native grasses, and there was no risk to property or public safety, it may be decided to let the area burn. Following the burn, the Reserve Manager would need to monitor the recovery response of the area and determine when the area should again be treated with grazing or mowing. Conversely, it may be an excellent time to restore an area to sage scrub if that is desired. The timing and type of recovery or restoration would depend on several factors such as precipitation, timing of the burn, and vegetative conditions at the time of the burn. Post-fire monitoring will be crucial for properly planning future management in areas such as these. If, for example, the fire is followed by several years of drought, the area may not require management for a long period of time. However, if the fire is followed by years of high rainfall, non-native grasses and weeds may become dense and require extensive management within a short period of time.

Table 6 summarizes the recommended methods within each management unit. Generally, where the terrain allows, mowing should be used. Where the terrain is rugged and/or rocky, sheep grazing is the recommended method. Herbicide is recommended at two relatively small locations at this time.

Table 6. Recommended non-native grass control methods by Management Unit

<i>Mngt. Unit</i>	<i>Sheep Grazing</i>	<i>Mowing</i>	<i>Herbicide</i>	<i>Rx Burn</i>	<i>Notes</i>
1	√				Small area of annual grasses near south end
2					Minimal amount of annual grassland at this time
3		√			Grass control needed near northern boundary
4 - 11					Grass control not necessary at this time
12				√	Grass control needed at southern end of Goldrich Trail
13 - 15					Grass control not necessary at this time
16 A, B - 18		√		√	Large expanse of non-native grassland in the Crown Valley area
19					Grass control not necessary at this time
20					Non-native grasses currently being disked by landowner
21					Grass control not necessary at this time
22 - 24	√	√	√	√	Grass control needed at intersection of units and along southern portion of Unit 24. Herbicide recommended at Munz's onion site.
25 - 26					Grass control not necessary at this time
27-30	√	√	√	√	Grass control needed in patchy areas throughout the four units. Herbicide recommended at Quino checkerspot butterfly site.

As previously discussed, the application of management treatments requires proper timing for effectiveness. In general, both mowing and grazing should be applied during the peak annual grass growing season (typically winter and early spring) to maximize effectiveness of controlling

grasses and having the least impact on native and non-native forbs. Need and timing of applications will be the responsibility of the Reserve Manager based on the general monitoring of habitat conditions. In general, above-average precipitation results in increased vegetation cover, so in wet years the Reserve Manager should monitor vegetative conditions closely. Although there is no established formula for how much vegetative cover would trigger a management action for species such as the Stephens' kangaroo rat, O'Farrell (1997) suggests a general grass to forb ratio of greater than 1.5 as a reasonable trigger for implementing habitat management in favor of Stephens' kangaroo rat. It is reasonable to assume that most non-native grass management will benefit the majority of grassland species within the Reserve.

#### **4.2.5 Security and Access Control**

The general security problems for the Reserve were described in Section 4.2.2 above. Overall, the goals of security are to minimize trespass and the related habitat and species impacts in the Reserve. Reserve patrol and security activities should concentrate on:

- Irregular and/or unpredictable patrols in areas where trespass has been common in the past. For example, as previously discussed, Rawson Road, which bisects the Reserve is an area that has experienced vandalism, trespass, poaching, and theft in the past.
- Labeling and signage of roads within the Reserve to facilitate coordination between Reserve staff and the County Sheriff or CDF.
- Signage indicating No Trespassing at key access points and along the Reserve boundary pursuant to the County Ordinances and California Penal Code in order to facilitate citation, if needed. Reserve signs should be generic, with identification of the area as an ecological reserve only printed in small letters at the bottom of the sign.
- Pipe gates that protect locks, barbed wire fence, k-rails or large boulders at strategic areas.
- Repair fences that have been cut or damaged as soon as possible.
- Coordination with adjacent private landowners to establish a positive relationship and provide contact information so they can let Reserve staff know of potential illegal or undesirable activity.
- Removal of trash dumps as soon as possible and practicable.
- Coordination with Riverside County Sheriff regarding the types of activities to which they can respond. In addition, coordination with Sheriff and MWD security personnel assigned to DVL regarding how they can best be utilized and provide assistance.
- Coordination with CDF regarding access for fire-fighting and management (See Section 5.6 for Wildfire Response Plan.)

#### **4.2.6 Road Maintenance**

The Reserve has approximately 24 roads or road segments throughout the 14,000 acre Reserve area. Some of the roads are maintained by MWD and are typically roads that are important to MWD operations with respect to the two large reservoirs located on the Reserve. Other roads are maintained by MSR employees, local landowners, and/or the local homeowner's association. The primary users of the MSR road system are: MSR personnel; MWD employees; researchers; fire department personnel; and law enforcement personnel. Patrol access and fire response personnel access are the two most important functions of the Reserve roads. The Reserve is currently closed to general public use, except on the three established trails (see Section 7).

Rather than assigning a regular maintenance schedule for each road, maintenance on all roads will be at the discretion of the Reserve Manager and MWD. The Reserve Manager will evaluate road conditions and arrange for the appropriate road maintenance with the appropriate responsible party. In some cases, roads may need significant maintenance (e.g., weeding, grading, and repair of washouts or other erosion), in other cases, light maintenance may be all that is required (e.g., weed trimming with hand-held machines.)

Main roads through the Reserve are typically maintained by MWD. The agreement under which MWD maintains these roads can be found in the Reserve MSHCP (§3.14.3) where "MWD... will maintain unpaved roads which will provide access to the reservoir for operational purposes."

Details of individual road treatments can be found in Appendix 9. With the exception of three roads (Lopez Canyon Loop, Bachelor Mtn., and Tualota Creek roads) the roads maintained by MWD should be no wider than 14 feet. Fourteen feet is the width of road (from windrow to windrow) that can accommodate the grader used by MWD. Ruts that are 9 inches deep and 9 inches wide or less (of any length) will be repaired by first trying to use the soil that washed away, if that is insufficient, then the soil from the windrow. For ruts that are larger and that cannot be repaired using windrow material, additional fill will need to be supplied (upon approval by MWD Environmental Planning personnel.)

The depth of grading should be minimal. In other words, the operator should avoid scraping more than an inch of soil from the road. Windrows of the road should not exceed 12 inches high and only slightly wider at the base.

Vegetation along the edges of the road should be cleared to the width of the road in most areas (i.e., no vegetation should be infringing on the roadway.) This may be accomplished through the use of hand-crews or boom mowers. Removal of vegetation along road edges is conducted to allow the safe passage of vehicles, to reduce fire hazard, and to increase the value of the roads as fire-breaks. In addition, trees with limbs or crowns over the road and other brush should be cleared to a height of at least 14 feet to accommodate a fire truck.

The Reserve has many areas of clay soils which become very difficult to drive on when wet. Portions of roads with heavy clay sections may need to be treated with either decomposed granite or stone less than 1 inch in diameter to facilitate travel along the roads in all weather

conditions. Introduction of imported materials will need to be evaluated on a case-by-case basis and approved through proper MWD Environmental Planning channels.

Main roads maintained by MWD should expect to need some level of maintenance on an annual basis. Other roads may only need intermittent attention. Roads maintained by MSR employees are typically less used than main Reserve roads. Reserve staff will use a tractor and either mower deck or gannon to lightly maintain these roads. Very little surface dirt should be moved and extreme caution should be practiced to prevent damage to the substrate.

#### **4.2.6.1 Roadside Weed Abatement**

All vegetation encroaching on the road should be trimmed to the vertical edge of the road wherever the vegetation may interfere with the passage of a vehicle. Trimming of interior roadside weeds should not exceed five feet in dead brush and non-native grasslands and two feet past the road windrow in areas of live, native brush.

Trees which overhang roads should be trimmed to a height of at least 14 feet to accommodate a fire truck:



Weed abatement along public roads (roads where County Fire requires weed abatement) with Reserve parcels should be the responsibility of the underlying landowner (either conducting the weed abatement themselves or providing funds to Reserve staff to conduct the weed abatement) whereas Reserve interior road-side weed abatement may be conducted by Reserve staff. Weed abatement along Rawson Road should be determined in coordination with CDF and County Fire.

#### **4.2.6.2 Emergency Road Repairs**

In the event a road becomes impassable due to washouts from winter storms, the MSR staff may attempt to conduct repairs as long as the repairs do not entail significant modification of the road or significant movement of dirt. It's important to note that soil from the existing road or windrow must be used. If it is necessary to import dirt from another area, or if significant modifications to the road, dirt movement, or the need to impact riparian vegetation is necessary to make the road passable, the landowner will need to be consulted so that appropriate permitting and compliance with environmental regulations can be facilitated.

Roads within the Reserve may be subject to closure due to environmental conditions (i.e., heavy rains and/or erosion making the roads impassable), the presence of sensitive species, fallen trees, etc.

#### **4.2.6.3 Reserve Wildlife and Sensitive Species**

The speed limit on the Lake Skinner Park entrance road which travels through the Reserve is governed by the Park District. However, there is an established speed limit of not more than 15 miles per hour on unimproved roads of the Reserve. This speed limit will minimize negative impacts to Reserve wildlife species such as snakes, lizards, and tarantulas, among others. Snakes, lizards, and tarantulas are an important component of the Reserve ecosystem that are typically found on Reserve roads. Many of these animals are difficult to see and slow to get out of the way of an oncoming vehicle. Any individual conducting road maintenance activities should be aware of these animals and carry a shovel or other device to carefully move animals out of the way of harm.

The entrance road to Lake Skinner Park is bounded by the Reserve for approximately 2.2 miles. Two regionally important populations of an endangered butterfly (Quino checkerspot butterfly: *Euphydryas editha quino*) occur on both sides of the entrance road near Gate 108. Each year, Reserve staff endeavor to mow along the entrance road to reduce the threat of unintended ignition of fires from vehicles. Large portions of these road edges support *Plantago erecta* (dwarf plantain) which is the host plant for the butterfly. Mowing activities along this road should be avoided between February 1 and May 31 in order to minimize potential impacts to the butterfly.

The San Diego horned lizard (*Phrynosoma coronatum blainvillei*) is a cryptic animal and slow to move out of the way of an oncoming vehicle:



San Diego Horned Lizard (*Phrynosoma coronatum blainvillei*)

Snakes are often hidden by brush or weeds and will typically not move at all for an on-coming vehicle. It is necessary for travelers to gently and carefully remove these animals from the road with a shovel or grasper, being very careful not to get bitten by the animal.



Red diamond rattlesnake (*Crotalus ruber ruber*)

There is an important population of Munz's onion (*Allium munzii*) along the North Shore Lake Skinner Road. This plant occurs on both sides of the road and is identified by four upright PVC pipes (the location of the plant population is between the PVC indicators.) This area should be avoided by heavy machinery at all times and not be disturbed in any way between February 1 and July 15. Light weed-trimming along the road edge should not extend beyond two feet from the road edge.



Location (blue circle) of Munz's onion on the north shore of Lake Skinner



Munz's onion (*Allium munzii*)

#### **4.2.6.4 Special Events:**

Each year, Lake Skinner Park hosts the Temecula Valley Balloon and Wine Festival. This event draws upwards of 50 hot-air balloons which launch within Lake Skinner Park during the Festival. Frequently, unanticipated air currents cause the balloons to travel over the Reserve lands which surround Lake Skinner Park requiring the monitoring and retrieval of the balloons by MSR staff and emergency personnel. This necessitates that the Reserve roads surrounding Lake Skinner be in good condition for travel prior to the event every year around the first weekend in June. The Reserve Manager will work with MWD to ensure that roads that may be necessary for balloon retrieval will be in good travel condition prior to this event, and any event which similarly affects the Reserve. Prior to the Balloon and Wine Festival, balloon pilots will be given a map of the Reserve and a descriptive memo stating that they should maintain a minimum elevation above the Reserve vegetation of 50 feet and should not land in the Reserve. If a Reserve landing is unavoidable, they should be aware that retrieval of the balloon will be coordinated and regulated by Reserve staff. In addition, the information should indicate that they will be required to walk the balloon to the nearest road, and that smoking and disturbance of wildlife are prohibited.

### **4.3 Description of Monitoring Program**

The monitoring program can be found in Appendix 10. It's important to note that, given current levels of Reserve staffing (one Reserve Manager, one Patrol Ranger, and two Field Crew members), not all monitoring will be able to be conducted at all times. It will be incumbent upon the Reserve Manager and RMC to prioritize and schedule annual monitoring efforts based on need, staffing levels, and budget constraints. For additional information regarding staffing and specific activities, the reader is referred to Section 6.0 below. Options for monitoring schedules may include: 1) alternate activities between years in order to achieve data across the species of interest; 2) prioritize the species to be monitored; or 3) hire additional staff or consultants with biological training to assist in the monitoring.

#### **4.3.1 Las Mañanitas Stephens' kangaroo rat Monitoring**

As discussed in Section 2.1.3, Las Mañanitas Ranch includes 205 acres of Stephens' kangaroo rat conservation easement dedicated to the RCHCA. The RMC has the authority to access the property on a semi-annual basis to evaluate the conservation easement areas for compliance with the management agreement. The Reserve Manager is currently identified as the agent to conduct such evaluations.

Evaluations of the Stephens' kangaroo rat conservation easements at Las Mañanitas will generally consist of visual surveys and walk-over surveys to estimate occupancy of Stephens' kangaroo rat within the easements and compliance with the agreement in terms of approved and/or prohibited activities. The Reserve Manager may conduct visual and/or trapping surveys for up to five days (as described in the easement agreement). An annual report will be prepared and provided to the RMC regarding the findings on the property.



## **5.0 FIRE AND FUELS MANAGEMENT PLAN**

### **5.1 Introduction**

Wildland fires are a common environmental process in southern California with a long and extensive history. Southern California open space areas include vast tracts of shrublands and grasslands. Wildfire in Mediterranean-type ecosystems, which includes the Multi-Species Reserve, ultimately affects the structure and function of vegetation communities (Keeley and Keeley 1984). Available information strongly suggests that large wildfires have had, and will continue to have a substantial and recurring role in native California landscapes (Keeley and Fotheringham 2003). Supporting this are the facts that 1) native landscapes, from forests to grasslands, become highly flammable each fall; and 2) the climate in the region has been characterized by fire climatologists as the worst fire climate in the United States (Keeley 2004) with high winds (often referred to as “Santa Ana Conditions”) occurring during the fall after a six-month drought period each year.

Some research suggests that wildfire suppression efforts over the last several decades may have aided the accumulation of fuels in natural communities (Minnich 1983; Minnich and Chou 1997) and that creating mosaics of vegetation ages by prescribed burning reduces wildfire spread (Minnich 1998). However, some research indicates that large fires, such as the 2003 fires in San Diego and Riverside counties, are only minimally constrained by varying fuel loads during extreme fire weather which is inherent to the region (Moritz et al. 2004). Additionally, the increase in human populations in southern California will result in the increase of anthropogenic ignitions in the future. Therefore, based on research and the increase in human populations, it can be anticipated that large wildfires will be a management concern at the Reserve for a very long time.

While open space reserves provide immeasurable benefits to sensitive species and the regional environment, they may also represent potentially serious wildfire hazard to the adjacent and growing urban edge through the potential for extreme fire weather and the flammability of the vegetation. For this reason, the Reserve will work cooperatively with the California Department of Forestry and Fire Protection (CDF/CalFire) and adjacent landowners to minimize the fire and fuels risks inherent in the Wildland-Urban Interface (WUI). To reduce the costs and losses associated with wildfires, fire agencies allocate their limited resources to two primary strategies in the WUI. The first strategy is to maximize success of initial attack by funding additional suppression equipment and personnel. Alternately, pre-fire fuels treatments are a second strategy meant to reduce fire behavior, thereby increasing suppression success and decreasing the number of structures lost (Dicus and Scott 2006). The challenge of the Reserve will be to facilitate the second strategy to protect adjacent private landowners while at the same time maintaining high-quality habitat to further the goals of the Reserve.

### **5.2 Purpose and Need**

By definition, a Fire Management Plan (FMP) is a strategic plan that defines a program to manage wildland fires based on an area’s land management plan. FMP’s must address a full range of fire management activities that support ecosystem sustainability, values to be protected,

protection of firefighters and public safety, public health and environmental issues, and must be consistent with the resource management objectives and activities of the area. The intent of this FMP is to provide CDF/CalFire with information and recommendations for emergency fire response within and immediately adjacent to the Reserve boundaries and identify necessary weed abatement and fuels management procedures that can be implemented as preventative measures. More specifically, the purpose of this FMP is to provide a planning framework for pre-fire fuels management, fire prevention, fire suppression, and post-fire control activities within and adjacent to the Reserve lands. This framework will allow CDF/CalFire to meet fire protection responsibilities while simultaneously meeting Reserve habitat management goals, such as minimizing or avoiding catastrophic impacts to natural plant communities and sensitive species.

### **5.3 Fire and Fuels Management Goals and Objectives**

#### **5.3.1 Fire and Fuels Management Goals**

Fire is a natural component of many of the vegetation types present within the Reserve. However, increasing human populations in the areas around the Reserve have resulted in increasing anthropogenic ignitions, altering the natural fire regime and affecting the Reserve and their natural resources. In addition, the threat to public safety, which escalates in proportion to population increases, must be given the highest priority in an FMP. These factors necessitate that the Reserve take a proactive role with the goal of creating and adopting management strategies within the Reserve that address the following goals:

- Coordinate with CDF/CalFire regarding the goals of the Reserve and how to effectively fight wildfires in the Reserve while supporting those goals whenever possible;
- Avoid Reserve-wide, catastrophic wildfires that are contrary to the Reserve's ultimate goal of protecting and enhancing the populations of wildlife and quality of habitat;
- Restore or enhance the quality of degraded vegetation communities and habitat types in a manner consistent with overall conservation goals for species and natural communities;
- Minimize the loss of shrublands;
- Maintain and restore native grasslands;
- Remove non-native annual grasslands in favor of low-growing annual forbs and native grasses;
- Develop fuels reduction methods that are consistent with overall Reserve management goals;
- Provide for public safety through response plans and prevention activities; and
- Provide for adaptive fire management methodologies.

### **5.3.2 Fire and Fuels Management Objectives**

The following objectives have been formulated to achieve the long-term fire management goals for the Reserve. These objectives integrate important strategies for achievement of the overall Reserve goal of species and habitat protection, as well as required needs for public safety.

- Utilize available fuel reduction techniques such as grazing, mowing, herbicides, and prescribed fire, consistent with Reserve goals for habitat preservation, enhancement, and restoration;
- Develop response guidelines for CDF/CalFire (and other responding jurisdictions) that effectively guide responders to appropriate options for responding to incidents;
- Establish fuel modification areas (FMA's) typically associated with residential structures, also including, but not limited to, high value habitats, cultural resources, and critical ingress/egress routes;
- When necessary, the long-term, on-going, maintenance of fuel modification areas that serve as buffers within the WUI with a dual role of preventing wildfire from impacting residential areas as well as protecting the Reserve from fire originating outside of Reserve boundaries;
- Coordinate with and educate fire-fighting personnel regarding the Reserve's sensitive resources and overall management considerations through graphically-based, easy to use response maps and engagement in on-going pre-fire activities;
- Provide maps of the Reserve's sensitive biological resources and other sensitive areas that should be avoided to the maximum extent possible;
- Delineate fire management units (FMU's) for the Reserve based on defensible boundaries, existing location of sensitive species and areas, and other priority features;
- Prepare a concise map indicating boundaries, topography, vegetation types, and other major features, including roads and structures;
- Coordinate with CDF/CalFire to ensure that the Fire Response Map and Plan are integrated into their GIS system so that time-sensitive decisions can be quickly determined;
- Prepare fire management guidelines for each fire management unit including discussion of prevention, suppression, and post-suppression activities;
- Provide basic recommendations for minimizing impacts to biological resources when fighting fires on the Reserve which would include preferred access routes and natural resource priorities; and

- Provide current contact information to responding fire personnel in the event that fire management activities may affect priority resources.

## **5.4 Fire and Fuels Management Program**

A Wildfire Response Plan (WRP) (Appendix 11) has been prepared for the Reserve with information developed by the RMC and CDF/CalFire. The intent of the document is to provide CalFire with information and recommendations for emergency fire response within and immediately adjacent to Reserve boundaries.

### **5.4.1 Wildfire Response Plan**

The overall goal of the Wildfire Response Plan is to reduce potential damage to Reserve habitats and to work cooperatively with CDF/CalFire to provide information, resources, and assistance, whenever possible, in the event of a wildfire within or near the Reserve. To attempt to achieve this goal, maps that identify Fire Management Units within the Reserve and the associated preferred fire-fighting methods and information have been prepared. In addition, a list of emergency contacts that may assist CDF/CalFire in the event of a wildfire on or near the Reserve is provided. The RMC authorizes the Reserve Manager (or, in the absence of the Reserve Manager, the Reserve Patrol) to act as Resource Advisor in coordination with the Incident Commander in the event of a wildfire within the Reserve.

The objectives of the Wildfire Response Plan are:

1. To identify environmentally sensitive areas within the Reserve which may be inadvertently damaged by aggressive fire-fighting methods;
2. To reduce the potential damage to sensitive habitats and wildlife caused by fire-fighting methods within the Reserve;
3. To identify areas where structures and/or people may be in danger in the case of wildfire within the Reserve;
4. To identify access for fire-fighting;
5. To minimize the cost, difficulty, and uncertainty of fire-fighting efforts within the Reserve;
6. To identify management units within which a wildfire may be contained; and
7. To limit ground crew activities in difficult terrain to reduce potential injury to firefighters.

Due to the potential for significant impacts to Reserve species, habitats, and cultural resources, the Plan discourages the use of heavy equipment unless the California Department of Forestry

and Fire Prevention determines that this method is necessary to prevent loss of life or damage to structures.

Additional fire suppression guidelines for the Reserve include:

- Utilize minimum impact suppression techniques in all areas of the Reserve, except where necessary to save structures or protect human life. Every effort should be made to minimize stream course disturbance, sedimentation, and actions that will result in damage to the environment;
- Avoid the use of heavy equipment within the Reserve unless absolutely necessary. Bulldozers should only be used to protect structures and riparian areas during a wildfire. Preferably, protection of riparian areas during prescribed burns would be accomplished with the use of hand crews;
- Avoid using chemicals when there is a potential for direct stream contamination, or in areas of environmental sensitivity (consult with Reserve Manager regarding specific areas of sensitivity);
- Minimize the application of retardant near streams. Retardant drops should be at least 300 feet from all water sources. Do not drop retardant directly in streams or adjacent riparian areas. The use of foams should be completely avoided within the Reserve;
- Keep refueling, fuel storage, and fuel trucks at least 100 feet away from streams and riparian areas;
- Utilize suppression tactics (backburns or burnouts) to minimize fire severity in riparian areas; and
- Provide a Resource Advisor (Reserve Manager or Reserve Patrol) who will be readily available to the Incident Commander. This advisor will review Operational Plans to assess the potential effects of the planned actions.

The Wildfire Response Plan recognizes that CDF/CalFire and cooperating agencies have the discretion to take any action they determine is necessary to protect public health and safety during wildfire events. The fire-fighting recommendations, therefore, apply only to conditions when CDF/CalFire and cooperating agencies determine they can implement the recommended guidelines to the extent feasible without jeopardizing human life or property. It should be noted that the Fire Management Unit boundaries do not necessarily reflect Reserve boundaries. In addition, the Plan only makes recommendations for fire-fighting on the Reserve and does not make recommendations for activities related to private land surrounding the Reserve, or private in-holdings.

Units were delineated within each region based on the following criteria:

- Defensibility of the unit;

- Perimeters along roads or trails, along ridgelines, or on flat ground in a valley;
- Perimeters that are conducive to creating 30 – 60 foot fuel/fire breaks; and
- Where access, in most cases, is not a “dead-end”.

Units were also delineated based on general sensitivity guidelines based on: 1) biological sensitivity (the level of adverse impacts on the habitat by fire); 2) cultural resource sensitivity (the significance of the cultural site); and 3) health and safety sensitivity (the potential for structure or human impacts from fire). Table 1 of the Plan and associated maps (Appendix 11) identify Fire Management Units by number, preferred fire-fighting methods, and unit details. The goal for each unit is to contain the fire within the unit, whenever possible. The Wildfire Response Plan should be updated annually to ensure current information.

### **5.5 Wildfire Emergency: Primary Actions**

The Reserve Manager will work cooperatively with local CDF/CalFire crews to ensure that the information contained in the Wildfire Response Plan and associated maps are incorporated into the CDF/CalFire response system. When a fire is observed on the Reserve, the following information should be provided to the CDF/CalFire Incident Command Team.

- Current Reserve Wildfire Response Maps;
- The Fire Management Unit Number;
- Name and contact information for Reserve representative;
- Most direct access route(s);
- Fuels types within unit; and
- Sensitive resources in the area.

Providing timely and complete information to the Incident Commander will result in a higher likelihood that the desired response will be initiated. Current emergency contact information can be found in the Wildfire Response Plan (and will be updated annually).

### **5.6 Fire Response**

Wildfire Response Plans (and associated maps) should be provided to all local CDF/CalFire stations (Table 7) through the local Division Chief. In addition, the Reserve Manager and Reserve Patrol should familiarize themselves with the local fire department personnel. These relationships facilitate better understanding of the Reserve goals and can be invaluable tools in the event of a wildfire.

Table 7. Fire stations near the Multi-Species Reserve (listed in order of proximity to the Reserve)

<b>Station #</b>	<b>Station Name</b>	<b>Address</b>	<b>Phone number</b>
96	Glen Oaks	37700 Glen Oaks Rd., Temecula, CA 92592	(951) 302-7502
83	French Valley	37480 Winchester Rd Murrieta CA 92563	(951) 696-0962
73	Rancho California	27415 Enterprise Circle West Temecula CA 92590	(951) 699-0351

<b>Station #</b>	<b>Station Name</b>	<b>Address</b>	<b>Phone number</b>
28	Sage	35655 Sage Road Hemet CA 92544	(951) 767-0118
12	Temecula	28330 Mercedes Street Temecula CA 92591	(951) 676-2161
34	Winchester	32665 Haddock St Winchester CA 92596	(951) 926-6430
84	Parkview	30650 Pauba Rd Temecula CA 92592	(951) 693-0683
26	Little Lake	25954 Stanford St., Hemet, CA 92544	(951) 658-5200
1	Perris	210 W. San Jacinto Street Perris CA 92570	(951) 940-6970
25	San Jacinto	132 S San Jacinto Road San Jacinto CA 92583-3499	(951) 654-7912
27	Ryan Field	4710 West Stetson Avenue Hemet CA 92545	(951) 658-5218
52	Cottonwood	44222 Sage Road Aguanga CA 92536	(951) 767-9610
61	Wildomar	32637 Gruwell Street Elsinore CA 92595	(951) 678-1661
72	Valle Vista	25175 Fairview Avenue Hemet CA 92544	(951) 927-1241

The importance of building good working relationships with local fire stations cannot be overemphasized. However, in some cases (e.g., the Year 2003 southern California firestorm), it may not be the local fire departments that respond to a Reserve fire. For this reason, numerous copies of the Wildfire Response Plans and maps should be kept on-hand for distribution to those fire units that may be responding from outside of the area. The extra copies should be housed at the Multi-Species Reserve office as well as kept on-hand in Reserve vehicles.

This Wildfire Response Plan emphasizes the need for fire response to minimize impacts to natural and cultural resources, when possible, by using pre-planned fire suppression tactics and actions within the boundary of the Reserve. In some FMU's, additional fire breaks are not planned and the need for ground-disturbing activities can be carefully considered based on the location of roads and other valuable resources. Other FMU's are remote and will limit accessibility to CDF/CalFire engines. Response to these areas will also utilize the Wildfire Response Plan to minimize impacts to the Reserve and may, for example, include immediate response with helicopter and/or fixed-wing air support and hand crews providing onsite "mop-up" to protect sage scrub with minimal ground disturbance.

Response to the Reserve for fire suppression should include existing road access for fire fighting personnel, Type I engines, Type III engines, fire crews, and air attack (e.g., helicopters and air tankers). Fire suppression actions may include one or more of the following: direct attack with engines, fire crews, helicopters, and firing operations within the FMU's, according to the WRP. Line construction activities within the Reserve are best carried out by hand crews. Bulldozers and other heavy equipment should only be activated to protect structures or human lives. In some cases bulldozers may need to be used to improve roads for fire engine access. In very



limited cases, bulldozers may be used to cut fire line to protect extremely sensitive resources (e.g., a wildfire threatening the Quino checkerspot butterfly population between February 1 and August 30, when the species is most vulnerable).

### **5.6.1 Roads and Access**

There are three main roads which enter the main body of the Reserve:

- 1) Within the Lake Skinner Riverside County Park Recreation Area, near the Multi-Species Reserve office. This is a locked gate and is identified as gate number 100 on the map;
- 2) Crown Valley Road heading west off of De Portola Road. This road eventually becomes Rawson Road and heads west to Washington Street. However, there is a locked gate on a road heading south into the Reserve at the point where Crown Valley Road becomes Rawson Road (gate number 150); and
- 3) Rawson Road heading east from Washington Street.

For the North Hills, access may be obtained through gates at Warren Road (gate 132), the east dam via Searl Parkway and the west dam of Diamond Valley Lake via Construction Road.

There are approximately 34 gates within the Reserve, 23 of which have identifying numbers associated with them. The general locations of the numbered gates are detailed in Appendix 2 of the WRP.

### **5.6.2 Staging Areas**

Staging areas are important for Incident Command to organize, plan, and implement the fire fighting strategies. Their placement is also important because staging areas will likely result in high ground disturbance from personnel, vehicles, and equipment in a confined area. The location of the staging area is very unpredictable because it is dependent upon a number of factors which include, but are not limited to:

- Fire location;
- Expected fire direction of travel;
- Access;
- Expected resources needed; and
- Expected length of fire fighting event.

Therefore, key staging areas inside of the Reserve will be identified on the WRP maps, but in general, staging areas should be located off of the Reserve, whenever possible. If it is necessary to establish a staging area within the Reserve, every effort to reduce impacts will be made.

## **5.7 Long-term Strategic Fire Protection Plan**

The long-term strategic fire protection plan considers fire prevention activities, fire suppression with regard to fire effects on habitat, and post-fire monitoring and rehabilitation.

The long-term strategic fire protection plan for the Reserve must accomplish public safety while also meeting the goals of Reserve management. Due to the continued increasing development in areas near the Reserve, public safety requirements may require increasing fuel reduction activities in areas where the Reserve is adjacent to existing buildings and the private land has not made sufficient allowances for fuel or fire breaks. However, fuels management within new development that is planned adjacent to the Reserve should occur within the development boundaries and should not encroach on the Reserve, or be the responsibility of the Reserve to provide the fuel break (WRCMSHCP §6.4).

Areas identified for specific fire prevention and/or fuel reduction practices include those areas of the Reserve boundary where structures exist and where there has been a lack of planning to include the fuel modification zone on the private land side of the boundary. Fuel reduction practices include one, or a combination of, the following methods:

- **Sheep grazing:** Grazing is a valid fuel reduction method and is compatible with Reserve habitat management goals. It is important to carefully time the grazing (in order to optimize the effects to the target species), and to take measures to minimize the possibility of the introduction of other invasive species which may be in the sheep's hair or feces.
- **Mowing:** Mowing is one of the most common methods for reducing fuels loads and is compatible with Reserve habitat management goals, but may be of limited use in rocky or rugged terrain.
- **Prescribed Fire:** Prescribed fire may be the least expensive and most efficient form of fuel reduction, but advantages must be weighed against difficulties in implementing prescribed burns, potential for escape, public opposition, and propensity to result in non-native grass and weed reestablishment if implemented too frequently.
- **Gate and Access Road Signage:** Gates and signs with access road names and road quality will benefit CDF/CalFire responders and may result in a more rapid response to a wildfire event.
- **Thinning:** Thinning and shaded fuel breaks can reduce fuel continuity and loading by selective removal of dead and dying, overly dense horizontal and vertical branches, and exotics. This method is most useful in FMU lines and adjacent to private structures at the edge of the Reserve.
- **Fuel Breaks:** "Fuel breaks" are areas where the vegetation has been thinned. "Fire breaks" are typically a specific width (usually approximately 12 feet) and are cut to mineral soil. Fuel breaks, including shaded fuel breaks, can be very compatible with

Reserve goals and may even provide travel routes for wildlife through dense vegetation such as chaparral. It's important to note that fuel breaks are typically mowed and not cut down to bare soil, but any soil disturbance can provide a basis for the invasion of non-native plant species, so care must be taken to monitor and remove non-native species along fuel breaks once they are implemented.

- **Roadside Buffers:** Roads adjacent to or within the Reserve that are traveled regularly may be a source of fire ignition. These roadsides will require diligent annual maintenance in order to reduce the encroachment of wildfire into the Reserve.
- **Illegal Access:** Off-road vehicles and shooting are other potential sources for fire that must be managed through restricting access (fences, gates, etc.), more frequent patrols and higher profile presence of Reserve staff, along with increased and improved public education programs.
- **Private property owners adjacent to the Reserve will need to play an active role in reducing the potential hazard on properties within or adjacent to the Reserve.** It will also be beneficial if the public understands the management actions occurring on the Reserve, such as grazing, mowing, herbicides, and prescribed burns. As such, this FMP recommends a concerted effort to reach property owners that are situated in locations that may be affected by wildfire on the Reserve or that may serve as ignition points to Reserve fires. Educational material can be customized for these landowners to include discussion of the importance of the Reserve lands. Standard measures for implementing a 100-foot fuel modification zone (on their property, not overlapping onto Reserve land) can be provided from materials available through a local Fire Safe Council (<http://www.firesafecouncil.org/>).

#### **5.7.1 Annual Grass Control and Oak Woodland Management (FMU 15, 16, 18, 22, 23, 24, 27, 28, and 30)**

As illustrated on the vegetation distribution map (Figure 7; §2.2.2), several areas of the Reserve have many acres of non-native annual grassland. Some of these areas are grassland only, while others (oak woodland) are large oaks with annual grass understories. The largest areas of annual grassland occur in FMU 16, 18, 24, and 30, but smaller patches of annual grassland exist in other FMU's. The long-term goals for these non-native grasslands and oak woodlands is to provide an optimal disturbance pattern using the management tools described above and cost-effective restoration planting following fire that are consistent with creation of low-growing annual forbs and native grassland, where appropriate. It is the goal to maintain, enhance, or create open grassland, and control annual grasslands in oak woodlands, through periodic disturbance, potentially including sheep grazing, mowing, herbicides, and prescribed burns.

### **5.7.1.1 Habitat Quality Enhancement and Fire Hazard Reduction Methods**

Although the optimal disturbance regime will be determined through adaptive management and monitoring (§4.1 above), based on past research it is anticipated that annual grasslands will need to be maintained approximately every 5 years in order to enhance the habitat for those grassland species listed as covered by the Reserve MSHCP. A five year disturbance cycle can be accomplished through various methods, including mowing, grazing, and/or prescribed burns.

Conducted carefully (i.e., timing before grass sets seed and caution regarding the ignition of fire), mowing is a safe, acceptable method of fuel reduction. Areas conducive to mowing include, but are not limited to: along primary access roads as buffers; along the periphery of sage scrub dominated areas where management includes fire exclusion; as fuel modification areas around structures; or around known cultural resource sites which may be damaged by wildfire. Mowing techniques should seek to replicate grazing, with similar mow heights and patterns. Site terrain will be a limiting factor for the extents of mowing as will soil conditions. Mowing is not recommended when soil moisture levels are such that the weight of the mowing equipment cannot be supported and soil compaction and potential impacts to species such as Stephens' kangaroo rat burrows may result. Mowing equipment with wide rubber tires for high distribution of weight is preferred.

Sheep grazing can be a low impact and inexpensive alternative to fire and mowing. Grazing is an effective fuel reduction method that performs a dual function of reducing cover in heavily thatched grasslands and has been demonstrated to be an effective management method for enhancing grasslands for native wildlife species such as the Stephens' kangaroo rat. The use of grazing for habitat quality improvement and fuel reduction will require the preparation of a plan which considers timing, pre-grazing preparations, grazing units, and optimal grazing duration and rotation, amongst others. Currently, there is limited sheep grazing in Riverside County and therefore shepherds are in high demand. This may reduce the availability of sheep grazing as a management tool at the Reserve, although it might be possible for the Reserve to maintain its own sheep herd, on a limited basis.

Prescribed fire is a useful tool that is cost effective. Generally, where prescribed burns are feasible in annual grasslands, spring burns are recommended, but must be timed to avoid impacts to nesting birds and other wildlife impacts. Prescribed fire during late spring climatic and plant phenological conditions seems to provide the most significant improvements in community composition and structure (Wills et al. 2000). Initial fire return intervals may initially be approximately three years or less during what can be considered the restoration phase (where the density of annual grasses and the seed bank are reduced). As habitat improvement targets are approached, the fire regime may more closely resemble the historic pattern (approximately every 10 years), or it may be completely independent of the historic pattern due to the presence of the non-native grasses that will continue to opportunistically establish and have potentially changed the optimal fire frequency (Keeley et al. 2006).

## 5.7.2 Sage Scrub and Riparian Management

As illustrated on the vegetation distribution map (Figure 7; §2.2.2), the majority of the Reserve consists of sage scrub habitat. This vegetation type occurs in all FMU'S to some extent. The long-term goal for sage scrub and riparian habitats is to minimize disturbance except as appropriate for the reduction of non-native species. Sage scrub habitat degrades and type-converts to non-native grasslands if burned too frequently. Long-term restoration of sage scrub to higher quality habitat supports the Reserve's goal of conserving the California gnatcatcher and other sage scrub dependent species covered under the Reserve MSHCP. This may, however, simultaneously increase the potential for higher intensity fire within this habitat. Riparian habitats should be protected from all disturbances, including fire.

The degraded sage scrub habitats in the Reserve will need reduction of non-native annual grasses, which can be accomplished through a combination of mowing, grazing, and/or selective herbicide treatment. Too frequent disturbance levels have probably resulted in the establishment of these non-native grasses. It is important to note that without fire exclusion and lengthening of the fire return interval, establishment of non-native annual grasslands will not be reduced, but will be enhanced. The presence of intermixed non-native grasses in sage scrub increases the likelihood of burning and a shift of the typical crown fire (in brush) to a surface fire. This type of fire increases the survivorship of non-native seed banks due to the lower intensity and temperatures associated with light, flashy fuel fires (Keeley et al. 2005, Keeley et al. 2006). Increased fire frequency lowers the threshold beyond which native shrub cover cannot recover (Jacobson et al. 2004). Therefore, the restoration of sage scrub within the Reserve requires enhanced efforts at fire prevention and fire suppression. (Keeley et al. 2006).

### 5.7.2.1 Habitat Quality Enhancement and Fire Hazard Reduction Methods

Pre-fire prevention activities (fuels reduction, ignition management, habitat improvements) along with aggressive fire suppression tactics to minimize fire size and escape are primary practices recommended for sage scrub areas. Methods available for reducing fire effects in sage scrub and riparian dominated areas include mowing, grazing, and/or selective herbicide treatments. However, the primary method is the reduction in ignitions and the increase in response to wildfire.

**Ignition Reduction:** It is recommended that fuel modification buffers be provided for all primary and secondary roads that may affect the Reserve. In addition, controlled access of the Reserve must be managed through the use of gates and locks, fencing and signage. Trespass and unauthorized recreational activities must be minimized through a high presence of patrols by Reserve staff.

**Fire Suppression:** Fire suppression, in combination with other management methods, is the priority for most of the Reserve lands, particularly sage scrub, chaparral, oak woodlands, and riparian habitats. Lengthening the fire return cycle to an optimal frequency will require fuel reduction monitoring as a part of the overall adaptive management approach. The optimal fire frequency in sage scrub may be between 10 and 60 years or more. However, it may be difficult

to achieve the longer fire return intervals given the current and projected ignition sources that may affect the Reserve.

### **5.7.3 Chaparral Management (FMU's 14, 19, 22)**

As illustrated on the vegetation distribution map, chaparral is the second most common vegetation type in the Reserve. The long-term goal for chaparral habitat is to minimize disturbance except as appropriate for the reduction of non-native species. Some research indicates that chaparral is a fire-adapted system, however, it is possible to burn chaparral too frequently thus setting the stage for type-conversion. Different types of chaparral have adapted to specific fire regimes. A fire regime includes several important variables, including, but not limited to: 1) fire frequency; 2) intensity; and 3) seasonality. If the interval between fires is too short, chaparral is unable to restock its seed bank in the soil to properly recover. The time required between burns to insure chaparral recovery can be as long as 20 years for south facing slopes, or a minimum of 10 years for chaparral growing under ideal conditions (i.e., non-drought periods). Fires occurring more than once a decade may wipe out all non-sprouting chaparral shrubs (Keeley and Fotheringham 2003).

#### **5.7.3.1 Habitat Quality Enhancement and Fire Hazard Reduction Methods**

Pre-fire prevention activities (fuels reduction, ignition management, habitat improvements) along with aggressive fire suppression tactics to minimize fire size and escape are primary practices recommended for chaparral areas. Methods available for reducing fire effects in chaparral dominated areas include mowing, grazing, and herbicides. However, the primary method is the reduction in ignitions and the increase in response to wildfire.

### **5.8 Prescribed Fire Program**

Prescribed burning is considered one of the more economically feasible treatments, especially for annual grasslands. However, there are increasing constraints on its widespread use because of the hazards on human populated landscapes (Keeley et al. 2006). For this reason, prescribed burns should be done in a compartmentalized manner (i.e., small, manageable areas) under a Vegetation Management Plan agreement with CDF/CalFire. Another constraint on effective implementation of prescribed burns is concern for air quality (McPherson 1995). The Air Quality Management District (AQMD) has the authority to authorize or decline burns based on air quality parameters.

Because native and non-native grass species may respond very differently to fire based on timing, intensity, and frequency, a good understanding of plant morphology, phenology, and life history is required to select a successful burn prescription (Pyke et al. 2003). Life history determines the direct susceptibility of plants to fire. Optimizing longer-term control of invasives and establishment of desired native species would include a burning regime that promotes desirable plants as well as negatively affecting target weedy plants (Rice 2005). Burning annual grass seeds before they shatter and disseminate is a goal of restoration managers (Allen 1995, Menke 1992, Kan and Pollak 2000). This is facilitated by the tendency for higher burn

temperatures in a fine fuel (grass) canopy than at the soil surface. The key is to complete the burn prior to curing of the seed for maximal seed susceptibility to heating (Brooks 2001, Rice 2005). Methods to increase the duration or intensity of seed heating include backing fires, deferred grazing, and fuel additions (e.g., hay) across the burn area (Rice 2005). Fire intensity can be manipulated to some extent by season of burn and pre-treatments that influence fuel load (including intensive grazing to reduce fuel or rest from grazing to increase fuel), and by ignition strategies (i.e., using a headfire [driven by wind] versus a back fire [burning into the wind]) (D'Antonio et al. 2003). Intensity is also influenced by factors that cannot be controlled, such as slope, soil texture, and humidity and temperature (Daubenmire 1968). Controlled burns tend to be less intense than wildfires, and small fires less intense than large fires.

Prescribed burning should be considered as one alternative for habitat enhancement and fuel reduction at the Reserve. Grazing, mowing, and herbicides should be utilized as the first options for habitat management and prescribed fire only where appropriate, such as in annual grasslands. Prescribed fire is not recommended in areas directly adjacent to private property with structures due to the potential hazards associated with prescribed burns. It should only be considered for areas where large expanses of target habitats are available for burning with minimal risk to public safety and property. Within the larger areas, smaller blocks should be selected to enable wildlife use of unburned areas immediately following fire and loss of habitat.

Fire occurs in three forms: (1) natural fire which is caused by a natural occurrence such as a lightning strike; (2) a fire that is unplanned and human caused, with or without intent; and (3) planned, managed fires. Natural fire caused by lightning is very uncommon on the Reserve, but has occurred in the past (e.g., 1993 Winchester Fire). In addition, arson fires from off-Reserve locations (e.g., 2003 Mountain Fire) and fires caused by poorly-planned tractor work (e.g., 2005 Bella Fire and 2006 Borel Fire) have also occurred. If natural fire occurs on the Reserve under a pre-established prescription on FMU's that have a suitable prescription and the fire poses no threat to life or high value resources, the fire may be allowed to burn under consultation with CDF/CalFire. If unsafe conditions exist, and without suppression the fire has a high likelihood of burning into areas of fire exclusion or threatening valuable resources, then assertive suppression should be pursued. Intentional managed fires are planned ignitions for purposes of reducing fuels primarily for public safety or habitat improvement, will require a VMP, and are further regulated by all applicable laws (e.g., AQMD, etc.)

## **5.9 Post-Fire Activities**

### **5.9.1 Fire Suppression Repair and Erosion Control**

One of the first concerns following wildfire is stabilization of soils in the burn area. The urgency of remedial measures is directly proportional to the steepness of the slopes involved. A goal should be to have erosion control Best Management Practices (BMP's) in place as soon as possible and prior to the onset of winter rains. There are various erosion control BMP's available for slowing the rate of erosion.<sup>1</sup> The first and most time-sensitive method is to work with CDF/CalFire to identify the fire suppression repair needs such as rehabilitation of bulldozer fire breaks (includes installation of water bars to minimize erosion), repair to fences cut during

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<sup>1</sup> <http://www.epa.gov/seahome/erosion.html>



suppression activities, and the potential for restoration of native habitats using local, native seeds. Recent research indicates that mechanical rehabilitation treatments, including straw mulch, hay bales, and jute rolls are more favorable for reducing soil erosion than seeding or other treatments (Robichard et al. 2000). If care is not taken, mulching may introduce exotic species (Kruse et al. 2004) so the potential for significant erosion should be determined before making the decision to use mulching.

### **5.9.2 Research and Monitoring**

Because this FMP is based on strategies that are commonly utilized for fire management and for habitat enhancement but are untested on this Reserve, pre- and post-fire research and monitoring are required. The monitoring program outlined in Wills et al. (2000) provides a description of on-going studies of pre- and post-fire response of plants and animals on portions of the Lake Mathews-Estelle Mountain Reserve and may be used as a guide for this Reserve. Similar studies may be conducted on this Reserve, subject to available funding.

The following list identifies primary areas for research, experimentation, and monitoring:

#### **On-going Fire Management**

- Identify areas which are in need of fuels management;
- Experimentally determine the optimal fuels management frequency;
  - Experiment with four, five, and seven year mowing, grazing, and burning of annual grasslands in FMU's;
  - Evaluate the efficacy of "guided or controlled" wildfires to provide the benefits associated with prescribed burns;
  - Evaluate mowing and grazing effects on annual grasslands; and
  - Evaluate cost of native grass restoration.
- Maintain fire frequency between four and eight years to control non-native grasses;
- Establish two permanent plant transects in each FMU to be completed and analyzed annually; and
- Study protocol to be adjusted/terminated after determining that fire frequencies are detrimental or are suitable pursuant to adaptive management principles.

#### **Long-Term Monitoring**

- Plant Community Response
  - Collect qualitative and quantitative data using 50-meter line transects randomly distributed across the proposed burn unit;
  - Prior to prescribed burn and following the burn annually.

- Animal Community Response
  - Evaluate mammals using live-trapping techniques;
  - Evaluate birds using transects or point counts;
  - Evaluate amphibians and reptiles and ground vertebrates using pit-fall traps in arrays.

It will be the responsibility of the Reserve staff and RMC to review the monitoring results and adapt the FMP's implementation.

### **5.9.3 Data Management**

Data management is an important aspect for fire management on the Reserve. Whenever research and monitoring information is collected, it will be recorded within a secure database in a format that is compatible with statistical and trend analysis software applications. Data analysis results will, over time, become the basis for fire management program adaptations to more closely match the Reserve management goals should current recommendations prove inadequate. Data collected prior to, during, and following disturbance events should be made available to other reserves with similar habitat management goals so that larger data sets can be evaluated. Optimal disturbance return intervals may vary by site and comparisons among reserves will be important for long-term Multi-Species Reserve fire and habitat management.

## **6.0 ADMINISTRATION, DATA COLLECTION AND REPORTING, AND FUNDING**

### **6.1 Administration**

#### **6.1.1 Annual Work Plans**

The Reserve Manager will prepare annual work plans to be presented to and approved by the RMC in February of each year for the following fiscal year (fiscal years are defined as July 1 – June 30). The annual work plans will include, but not be limited to, the following information:

- Identification of the proposed management action;
- Anticipated begin and end dates of the management action;
- Personnel to complete the management action; and
- Estimated cost of the management action in terms of the number of staff hours and estimated costs of supplies and equipment.

#### **6.1.2 Reserve Personnel Job Descriptions**

As described in Section 1 of this Plan, the RMC is the responsible party for management of the Reserve. A Reserve Manager, Reserve Patrol, and two Field Crew members are currently responsible for on-the-ground management and patrol of the Reserve.

Duties of the Reserve Manager may include, but not be limited to:

- Manage the Reserve lands consistent with the Reserve Management Plan, Reserve MSHCP, and Stephens' kangaroo rat HCP;
- Preparation and implementation of annual work plans that are consistent with the Reserve Management Plan;
- Prepare updates to the Reserve Management Plan every 15 years, or as requested by the RMC;
- Coordinate and consult with other Stephens' kangaroo rat reserve managers and managing entities via the Reserve Managers Coordinating Committee;
- Coordinate and consult with other reserve managers and managing entities via the MSHCP/Reserve Manager's Coordinating Committee;
- Prepare regular management reports for the RMC (frequency to be directed by RMC);
- Attend Homeowner's Association meetings, as appropriate, to provide consultation and coordination;

- Conduct annual non-native species removal activities and prepare reports to appropriate wildlife agencies when necessary (e.g., cowbird trapping, etc.);
- Plan and implement all species monitoring pursuant to the Reserve Management Plan;
- Coordinate and conduct Reserve habitat evaluation every five years;
- Coordinate with the annual Balloon and Wine Festival organizers and any other local events to ensure that there are no impacts to Reserve lands;
- Periodically assess trail use and impacts and assess trail needs or concerns;
- Attend RMC meetings and prepare agendas and minutes;
- Supervise and manage Reserve personnel;
- Oversee activities of outside biologists and researchers on the Reserve, including the review and coordination of research applications;
- Review and coordinate public use permits and ensure compliance with established RMC Public Use Policy;
- Oversee management contractors such as shepherds, mowers, herbicide applicators, etc;
- Oversee security operations, including patrols, gating, fencing, and signage;
- Oversee cleanup operations at trash dumps, removal of abandoned cars, research study materials, etc;
- Coordinate with CDF/CalFire regarding fire management activities;
- Keep apprised of new technical reports and scientific literature pertinent to reserve management and local species;
- Maintain Reserve library;
- Pursue grant opportunities whenever possible;
- Track and facilitate mitigation bank sales, information, and maintain mitigation banking files;

- Compile Stephens' kangaroo rat management and monitoring information on an annual basis and prepare reports for submittal to RCHCA;
- Prepare annual budgets, track expenditures;
- Attend and provide technical training, as appropriate;
- Perform general office manager duties, including, but not limited to: procurement of supplies; maintenance of office equipment; file and records maintenance; coordinate and oversee building repairs, etc;
- Be responsible for overseeing and carrying out the management and monitoring data collection, storage, and analysis; and
- Assist with interpretive activities and/or public outreach.

Under the supervision of the Reserve Manager, the duties of the Reserve Patrol may include, but not be limited to:

- Conduct patrols and maintain security within the Reserve.

Other duties may include:

- Maintenance of herbicide applicators certification;
- Application of herbicides;
- Maintenance of vehicles and equipment;
- Removal of non-native species;
- Weed abatement;
- Road repair and maintenance;
- Act as Safety Officer for the Reserve office facilities; and
- Assist with interpretive activities and/or public outreach.

Under the supervision of the Reserve Manager, duties of the Field Crew may include, but not be limited to:

- Fence installation, repair, and removal;
- Installation of boundary signs;



- Weed abatement;
- Non-native species removal;
- Assist Patrol with various projects;
- Trash and dumping clean up;
- Equipment maintenance;
- Building repair and maintenance; and
- Miscellaneous duties as assigned.

## **6.2 Data Collection and Reporting**

### **6.2.1 Data Collection, Storage, and Analysis**

The Reserve Manager will be responsible for overseeing and carrying out the management and monitoring data collection, storage, and analysis. These functions are fundamental components of the habitat management plan, where feedback from prior management and monitoring actions are essential to adaptive management. Without reliable and valid methods for collecting, storing, and analyzing data, the management and monitoring efforts will be wasted. Although collection, storage, and analysis methods and technologies most certainly will evolve overtime, it is imperative that new methods are consistent with prior methods so that data sets are comparable and compatible for conducting statistical tests and trend analysis and drawing inferences. Based on information in Elzinga et al. (2001), the following subsections provide guidance for the collection, storage, and analysis of data that meets these goals.

#### **6.2.1.1 Data Collection**

Field data collected should be automated as much as possible. Currently, the most efficient method for field data collection is the use of data loggers, field computers, and/or Global Positioning System (GPS) units, depending on the type of data being collected (e.g., population counts, species composition, spatial information, etc.) Although loggers, field computers and GPS units are initially expensive, they more than compensate for their initial cost over the long-term in terms of quality control and assurance and reliability of the data collected. Data loggers and computers, for example, provide standardized or predesigned data formats and have the advantage of being directly downloadable to compatible software for conducting analysis without the need for manual transcription that inevitably results in data transcription and input errors. GPS units are invaluable for collection of spatial information that can be input directly into Geographical Information Software (GIS) applications for mapping and spatial analysis.

Software included with GPS units allows for creation of data dictionaries which, in turn, allow for standardization of data element definitions and database schemes. The use of data dictionaries can eliminate or minimize personal biases or transcription mistakes in the data set being recorded. Because data management, analysis, and reporting can be a substantial portion of the overall budget of a monitoring and management program, careful selection of field equipment is paramount for a cost efficient program.

#### **6.2.1.2 Data Storage and Management**

Data storage and management should be standardized to maintain a high level of quality assurance. This includes specific protocols for naming directories, subdirectories and files, for example keeping raw data files separate from summary and analysis files. All data files should be accompanied by metadata that describe in detail the data set in terms of the who, when, how, what, and where information in the data set. A backup system should be incorporated to minimize the risk of lost data and backup data should be stored both on and offsite. In addition, data should be stored and managed so that it can be shared, as appropriate and feasible, with other reserves. Consequently, the data management should be compatible with the data management methods used by the state and federal agencies. The State of California is developing a multi-taxa, multi-level integrated data management system for monitoring data collected throughout the state that will allow powerful queries by species, study type, habitat, or geography. With increasing sophistication in technology, it is possible for data collection entities to maintain a copy of the database and mirror those data in near real-time to a state database while maintaining local control over data entry and corrections (USGS 2004). Currently, for example, the CDFG uses a database system known as the Biogeographic Information and Observation System (BIOS).

#### **6.2.1.3 Data Analysis**

Data analysis will be tailored to the goals and objectives of the Reserve Management Plan. It is anticipated that much of the field data will be analyzed using a standard statistical package such as SAS or SPSS, but also using specialized software to address specific monitoring issues will be utilized as needed. For example, for long-term population trend analysis two software programs, TRENDS (Gibbs et al. 1998) and MONITOR (Gerrodette 1987), are available. Likewise, the program MARK (White and Burnham 1999) can be used to estimate populations using short-term capture/recapture data. The Reserve Manager will be responsible for identifying the analytic software that is appropriate for the management and monitoring data.

### **6.2.2 Program Implementation Tracking, Reporting, and Analysis**

Overall tracking and implementation of the Reserve Habitat Management Plan is a critical component of the plan that provides the information about whether the Plan is meeting its goals and objectives and helps complete the feedback loop between the Reserve Manager and the RMC. Tracking of the plan will be the primary responsibility

of the Reserve Manager, in coordination with the RMC. Tracking of the plan will include the following tasks:

- Preparation and ongoing revision of goals and objectives for the Reserve;
- Annual reports prepared by the Reserve Manager to be submitted to the RMC and RCHCA (with a goal of early-mid fall submittal to allow time to plan and implement spring management activities); and
- RMC and RCHCA review/feedback of the annual reports prepared by the Reserve Manager.

The annual reports will include, but not be limited to, the following information:

- Identification of management and monitoring priorities for that year;
- The sampling sites and data collected in terms of by whom, frequency, timing, and duration;
- A description of the data analysis and results;
- Synthesis and integration of the year's management and monitoring results with previous years as applicable (e.g., analyzing apparent trends, etc.);
- An evaluation of the year's work plan in relation to achieving or progressing toward the management and monitoring goals established in this Plan;
- Identification of significant problems or successes with the program that may alter the management and monitoring program approach, such as:
  - Whether the field protocols or analytic methods are satisfactorily addressing the management/monitoring goals and objectives and whether sampling or analysis methods need revision;
  - Whether the data indicate that any of the covered and/or listed species are declining at a rate that requires a management action; and
  - Whether the data indicate an earlier than expected positive response of a species to an active management action such that continued testing is unnecessary or becomes a lower priority; and
- Suggested changes and/or revisions to the Plan based on the points listed above.

### **6.3 Funding**

When the Reserve was initially established in 1992, funding was specifically designed as wasting endowments that were to be exhausted in the first ten years. The long-term funding was then to be implemented for perpetuity:

Wasting Endowments:

- MWD provided a \$13,886,000 endowment to fulfill the goals and objectives of the MSHCP. MWD administers these funds ("MSR" account);
- MWD provided a \$1,021,000 wasting endowment to the RCRPOSD for the Shipley Reserve to administer for the future protection and restoration of plants, wildlife, and their habitats on the Reserve ("SHP" account), and these funds have been expended. In addition, RCHCA provided a \$500,000 endowment to the

RCRPOSD to supplement the endowment provided by MWD (Stephens' kangaroo rat HCP, pp 183);

- MWD provided a \$479,000 endowment to the University of California at Riverside for research activities on the Reserve;

Future funds:

- RCHCA holds an additional \$500,000 non-wasting endowment for which part of the interest will be given to MSR for management of Stephens' kangaroo rat on the Reserve; and
- MWD will provide an annual sum of \$200,000 or 50% of the net income from recreation proceeds at DVL (whichever is larger) for long-term management of the Reserve. MWD began these payments in the 2003/2004 fiscal year.

Current operating funds are derived from three sources: 1) as of February 2007, the balance of Reserve account managed by MWD ("MSR" account) was \$6,000,000; 2) the \$500,000 endowment held by RCHCA has accrued approximately \$180,000 in interest; and 3) MWD is currently providing \$200,000 per year to the Reserve for management.

### **6.3.1 Additional Funding Sources**

#### **6.3.1.1 Habitat Credit Sales**

In 1994, the RMC resolved to establish mitigation banking on the Reserve (RMC Resolution 19). As outlined in the Resolution, the RMC may consider selling habitat and/or species credits, for mitigation purposes, on any new lands acquired with Reserve funds. The sale of any credits requires prior written agreements with the wildlife agencies pursuant to the USFWS's policy on mitigation banking and CDFG's policy on conservation banking.

Following land acquisition, the Reserve Manager will survey the property for biological resources. A vegetation community map will be prepared and the occurrence of any species listed as threatened or endangered by the State or under the Federal Endangered Species Act will be noted. The RMC will review the information from the Reserve Manager and determine, with concurrence from the underlying landowner, whether or not to pursue formal agreements with the wildlife agencies to permit the sale of habitat and/or species credits on the newly acquired property. The primary purpose of selling any habitat and/or species credits is to recoup the cost of acquiring and managing the land. The agency holding title to the land will be the lead agency in seeking the agreements with the wildlife agencies and may direct the Reserve Manager to gather additional information as needed. The fiscal terms of the credit sales (e.g., cost per credit, percentage of credit sale that is reserved for management, etc.) will be established within the agreements with the wildlife agencies.

### **6.3.1.2 Chaffey Settlement Agreement**

Part of the six million identified above includes one million dollars which was provided to the Reserve through a Settlement Agreement between the U. S. Fish and Wildlife Service and the Chaffey Joint Union High School District. The RMC agreed via a Statement of Intent that the settlement agreement money shall establish a non-wasting endowment (July 6, 2005, RMC meeting minutes).

### **6.3.1.3 Kalmia Street Property**

In 1996, the RMC provided \$1,000,000 towards the acquisition of 750 acres of land adjacent to Santa Rosa Plateau (Sylvan Meadows), with the provision that these funds would be returned to the RMC via either (a) the sale of wetland mitigation credits at Sylvan Meadows, or (b) the sale of a 100-acre trust parcel (Kalmia Property) (RMC Resolution 83). Initial estimates of the viability of wetland credit sales at Sylvan Meadows proved to be overly optimistic and this option was not pursued. In 1998, the RMC authorized the sale of the Kalmia Property, with the provision that its sale would be for a minimum of \$1,000,000. As of September 3, 2008, the sale is still pending.

## **6.3.2 Reserve Long-Term Financial Strategy**

The goal of the long-term financial strategy is to assure a perpetual income stream sufficient to conduct management at the current level. Income is based on a fixed annual contribution from MWD, interest from an MWD managed account, and interest from two Riverside County management endowments. The MWD managed account is divided into three portions: 1) a non-wasting endowment; 2) an expendable “rainy day fund” to be used to support management in years when there is insufficient income; and 3) an expendable “special projects” fund where income beyond that necessary to manage the reserve and balance the accounts can be accumulated<sup>1</sup>.

- Goals of the finance plan:
  - Provide for fiscal solvency for the Reserve for the foreseeable future;
    - Incorporate inflationary adjustments;
    - Use a 15-year time horizon for planning;
    - Provide a “cushion” for low-interest years; and
    - Account for inflation adjustment of interest bearing accounts.
  
- Components of the finance plan:
  - Income
    - Interest Income;
    - MWD annual contribution; and
    - Sale of habitat credits.

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<sup>1</sup> March 9, 2004 correspondence from Mark Pavelka in MSR files (2004/2005 budget file). Approved by RMC at the August 4, 2004, Reserve Management Committee meeting.

- Expenses
  - Inflation adjustment of interest bearing accounts;
  - Management of the Reserve;
  - Maximizing the “rainy day fund”; and
  - Special projects (e.g., grow endowment, fund research, land acquisition, etc.).

### **6.3.3 Staffing Requirements**

As described in Section 6.1 above, the Reserve currently supports one Reserve Manager, one Patrol Ranger, and two part time Field Crew members. This staff is considered the minimum number of people necessary to manage the Reserve at this time based on current management priorities. In the future, staffing levels will be based on management priorities and funding availability. The Reserve Manager will evaluate staffing needs periodically or as needed and report suggestions for changes to the RMC.

### **6.3.4 Equipment**

The Reserve Manager will maintain an inventory of Reserve equipment and will work with the RMC regarding necessary purchases.



## **7.0 PUBLIC ACCESS, OUTREACH, AND RECREATION**

### **7.1 Public Access**

The Reserve MSHCP (§4.1.4.4) contemplated a conceptual trail alignment. A trails plan being developed by MWD may differ (in number of trails, alignment of trails, and trail use policies [e.g., mountain bikes, equestrian, seasonal closures, etc.]) from the concepts provided in the Reserve MSHCP.

Currently, public use and/or recreation are not allowed on a majority of the Reserve. However, there are three trails that do provide public use within the Reserve (Figure 10). All three trails provide hiking, equestrian, and wildlife viewing opportunities for portions of the Reserve. Additional recreational opportunities may be provided, and will be evaluated based on consistency with the Reserve MSHCP and Public Use Policy (Appendix 12).

#### **7.1.1 Existing Trails**

There are currently three trails open for public use within the Reserve (Figure 10):

**Lake Skinner Trail:** This trail is accessed through Lake Skinner Regional Park and provides the public with hiking and horse-riding access along the south shore hills of Lake Skinner, along the west side of the Tualota Hills, and across Tualota Creek.

**Goldrich Trail:** This trail is accessed through one of the main public roads running through the midsection of the Reserve (Rawson Road). This trail provides hiking and equestrian access to the hills north of Rawson Road. The Goldrich Trail was constructed in 1994 and was intended to be a temporary trail to address concerns raised by Las Mañanitas regarding access to Reserve trails<sup>1</sup>. It is anticipated that this trail will be closed permanently once the final MWD trails plan is in place.

**North Hills Trail:** This trail is located on the north slope of the North Hills of Diamond Valley Lake. The trail can be accessed via either a west or east trailhead and provides hiking and equestrian activities, with views of Diamond Valley Lake.

In addition, MWD currently manages the 22-mile unpaved patrol road surrounding Diamond Valley Lake for public access. The entire length of the Lake View Trail is open to mountain biking and hiking, and portions of the road are available for shoreline fishing access. MWD controls access and maintains the Lake View Trail on the basis of operational, security, and safety considerations, as well as to ensure compatibility between public use and protection of Reserve resources.

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<sup>1</sup> Multi-Species Reserve Management Committee meeting minutes dated 11/3/1994; 12/31/04 draft management plan discussion notes dated October 18, 2005, page 57.

MWD also manages, with the concurrence of the RMC, seasonal hiking access to two trail loops west of the marina in the North Hills. The Wildflower Loop Trail is accessible from the Lake View Trail and is usually open between late February and early June.

MWD is currently working on a trails plan for the Reserve. Trails, and any recreation, on the Reserve will be an MWD activity permitted, but not directly managed by the Reserve. The Reserve will have oversight over the recreational use and may, through the RMC and MWD, alter, limit, or suspend the recreational activities permitted based on impacts (real or potential) to biological resources and conflicts between Reserve priorities.

It is anticipated that a trails proposal will consider only low intensity, passive trail uses and associated activities, and those activities will be the only recreation in the Reserve and will be restricted to designated areas. The emphasis will be on nature appreciation and observation. No general public access by motor vehicles will be allowed, and the only facilities provided will be trails, trailheads, sanitation, water supply for equestrians (trails outside of the watershed around Domenigoni Valley), bike riders (if approved), and hikers. MWD is responsible for avoiding impacts, which will be done through design, monitoring, segment closure, realignment, operations, and maintenance (including Patrol).

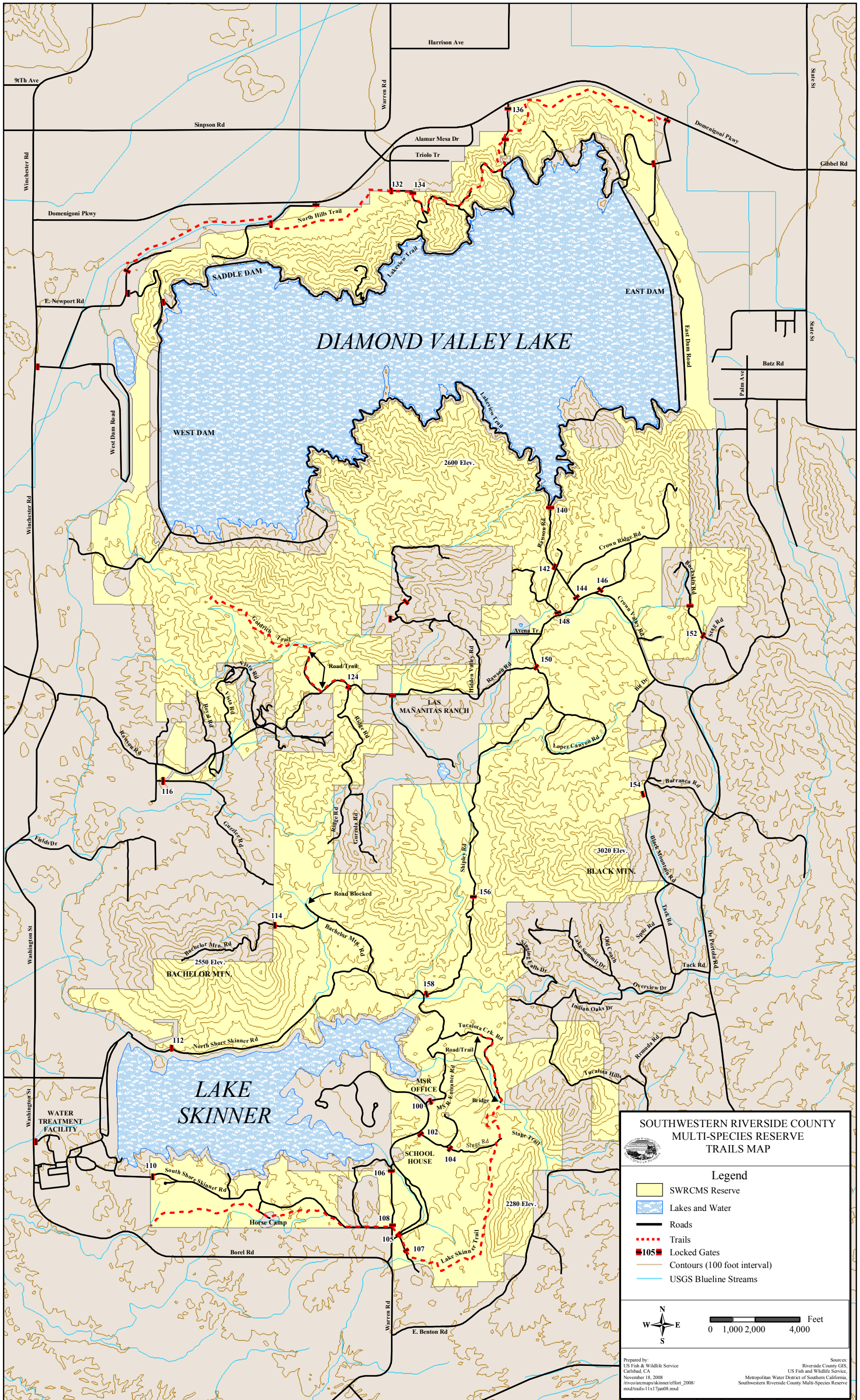


Figure 10

Figure 10. Public trails within the Southwestern Riverside County Multi-Species Reserve.

## **7.2 Outreach and Education**

### **7.2.1 Interpretive Program**

The primary goal of the interpretive program is to develop a sense of awareness and stewardship for the natural resources of the Reserve. This goal is achieved through the use of a variety of special programs, events, displays and exhibits for the general public. Programs that the Reserve Interpreter may offer to the general public, groups, and schools include: special topic lecture programs to be held monthly at the Reserve Interpretive Center; special topic guided hikes that showcase seasonal events (e.g., wildflower season and winter birds); and school programs that include programs such as guided nature hikes, hydrology, ecology, and local ethno-botany. Details of a conceptual interpretive program for the Multi-Species Reserve can be found in Appendix 8.

### **7.3 Future Uses**

Future plans for the Reserve include additional trails. In addition, requests for public and private uses may be proposed. All future uses must be evaluated in terms of the overall goal of the Reserve which is conservation of native species and their habitats. In order to evaluate all future proposals for use of the Reserve, the RMC has developed the Public Use Policy (Appendix 12).

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Name of Author or Principal Investigator		Title of Proposal or Research	Date of Proposal or Initial Notification	Results/Reports at MSR
Adkison, Steve	Private	National Audubon Society Christmas Bird Count: 12/18/2004	11/23/2004	Bird list in the research file
Adkison, Steve	Private	National Audubon Society Christmas Bird Count: 12/17/2005	12/9/2005	Bird list in the research file
Alberts, A.	San Diego Zoological Society	Conservation of the San Diego coast horned lizard on the [MSR]: foraging ecology, microhabitat use, genetics, and reproductive biology	1/1/1994	Progress report 1: Dec 1995 Progress report 2: Mar 1997 Progress report 3: Apr 1998 Final report: July 2004
Alberts, A.	San Diego Zoological Society	Coast horned lizard monitoring. Part of the " <a href="#">Animal responses to weed control as a restoration technique in coastal sage scrub at the [MSR]</a> " contract (4602/12)	7/22/1999	Progress report: Feb. 9, 2001 (U-18) See also: Alberts, A. 2004. Conservation of the San Diego coast horned lizard on the [MSR]. Results of this study begin on page 44.
Allen, E.	UCR	Testing techniques for weed control at the [MSR]: Part of the " <a href="#">Animal responses to weed control as a restoration technique in coastal sage scrub at the [MSR]</a> " contract (4602/12)	7/22/1999	<u>1997</u> : N dep effects on css. Symp. Proc. (G-15) <u>2000</u> : Air pollution and veg. change in social shrublands (I-23) <u>2001</u> Progress report (I-29) <u>2002</u> : Progress report (I-37) <u>2003</u> Progress report <u>July 1, 2003 - June 28, 2004</u> Progress Rpt. <u>2005</u> Progress report (V2) Landscape restoration in southern California forblands: Response of abandoned farmland to invasive annual grass control 1999-2004. <u>2003</u> : Ecological effects of nitrogen deposition in the western United States. BioScience. Numerous Symposia Proceedings <u>2004</u> : Progress Report (I-33) <u>2005</u> : Allen et al. Landscape restoration in so. Cal. forblands... Isr. J. Pl. Sci. (V-3)
Allen, E.	UCR	Purchase of EPI-Flourescence for installation on UCR-owned microscope	9/1/1997	This purchase related to Allen, E. "Effects of N fert on CSS", see Egerton-Warburton.
Allen, E. and C. Siguenza	UCR	Soil transplantation from UCR to MSR to reintroduce mycorrhizal fungi	11/13/1997	Study inconclusive: no reports

Allen, E. and R. Cox	UCR	Weed control and seeding study in CSS: Seed banks and native species emergence on the Shipley Reserve	1/1/1999	<p>2004: Progress Report (I-32)</p> <p>9/1/05: Landscape restoration in southern California forblands: Response of abandoned farmland to invasive annual grass control (H-24)</p> <p>9/2006: Dissertation (H-28)</p> <p>12/2007: J. Plant Ecol: Composition of soil seed banks in So. Cal. CSS and adj. exotic grassland (J-23)</p>
Allen, E. and R. Minnich	UCR	Interaction of nitrogen eutrophication and fire on invasive annuals in California coastal sage shrublands	unknown	February 1995 Progress Report Lake Skinner north shore N fert.
Allen, E. and T. Scott	UCR	Scientific review, monitoring, and research on the [MWD] Eastside landscaping project	9/25/1997	Funding was discont. by MWD prior to completion. A report was submitted with a native species planting plan for DVL rec areas. (E. Allen 8/24/06)
Allen, Edith	UCR	Effects of nitrogen fertilization on CSS: North shore of Lake Skinner and Tualota Hills	1/1/1994	<p>1995: Progress report</p> <p>1996: Proceedings: Nitrogen deposition effects on coastal sage scrub vegetation of southern California. USDA Gen. Tech. Rpt.</p> <p>1997: Nitrogen deposition effects on coastal sage vegetation of So. Cal.</p> <p>1998: Changes in soil inorganic nitrogen as related to atmospheric nitrogenous pollutants in So. Cal.</p> <p>2000: Air pollution and vegetation change in southern California.</p> <p>2000: Egerton-Warburton and Allen. Shifts in arbuscular mycorrhizal communities... Ec. Applic. (BB-4)</p> <p>2004: Progress Report (I-34)</p> <p>2004: Sirulnik's Dissertation (I-39)</p> <p>2005: Progress Report (research file)</p> <p>2006: Progress Report (research file)</p> <p>2007: Progress Report (research file)</p> <p>2007: Sirulnik et al. Changes in N cycling and microbial N with elevated N in exotic annual grasslands of so Cal. Appl. Soil Ecol. (MSR lib. D-14)</p> <p>2007: Sirulnik et al. Impacts of anthropogenic N additions on nitrogen mineralization from plant litter in exotic annual grasslands. Soil Biol. Biochem. (MSR Lib D-13)</p>

Allen, Edith, and A. Sirulnik	UCR	Effects of nitrogen additions on litter decomposition at Lake Skinner	2/1/2001	Year 2001 Project Report 2002: Effects of N addit. on litter decomp. Progress Report (G-17)
Allen, M.	UCR	Mycorrhizal studies	6/22/1905	12/7/04: Querejata and Allen. 2002-2003 final report. The role of hydraulic lift during the establishment of Quercus agrifolia seedlings (K-20). Querejata et al. 2007. Hydraulic lift may buffer rhizosphere hyphae against the negative effects of severe soil drying in a Cal. oak savanna (BB-5) Year 2004 Report
Allen, Michael	UCR	MSHCP monitoring protocol development and North Hills brown-headed cowbird evaluation	3/15/2004	Jan. 24, 2005: Gnatcatchers and cowbird surveys, North Hills. (N7) Aug. 12, 2005: Gnatcatchers and cowbird surveys, North Hills (in file) Jul. 26, 2005: two cd's of data (in file)
Allen, Michael	UCR	Environmental data management, storage and access	9/2/1999	No reports or other information for this contract
Applied Earthworks, Inc.	Applied Earthworks, Inc.	Archaeological surveys	unknown	<u>November 2001</u> : Cultural resources survey report
Bloom, Peter	Independent	Raptor banding	1/17/1998	No reports on file
Bramlet, D.		Habitat and land cover classification system for the [MSR] and adjacent areas	unknown	<u>January 1994</u> : Habitat and land cover classification system for the [MSR] and adjacent areas
Brown, Patricia	Private	Bat survey of proposed impact and mitigation sites of the Eastside Reservoir Project, Riverside County, California	unknown	Undated report: Surveys Aug 29-30, 1991
Brown, Tracey and Mathew Merscheim	U.C. San Marcos	Mechanisms of population decline in horned lizards.	11/4/2004	No reports on file
Burks, Roger	UCR	Parasitic wasp	3/7/2003	8/18/05: Journal article: New species of Pteromalidae and Torymidae from California.
Case, T., and D. Bolger	UCSD, and Dartmouth College	Mechanisms behind the deterioration of habitat suitability in fragmented coastal sage scrub habitat: the coastal horned lizard and the rufous crowned sparrow	10/1/1994	<u>1996</u> : Mechanisms behind the deterioration of habitat suitability in fragmented coastal sage scrub habitat: the rufous-crowned sparrow. <u>1997</u> : Sensitivity to residential edge effects of the So. Cal. Rufous crowned sparrow

Case, T., and R. Fisher	UCSD	Autecological studies of sensitive coastal sage scrub target herpetofauna at Metropolitan Water District Reserve Lands	10/14/1994	<u>1995</u> progress report <u>1996</u> final report <u>1997</u> annual report <u>2000</u> : Prey selection in horned lizards following the invasion of the Argentine ant in southern California. Ecol. Applic. 10:711-725 (U-12) <u>2001</u> : Effect of land cover, habitat fragmentation and ant colonies on the distribution and abundance of shrews in southern California. J. Anim. Ecol. 70:776-788 (N-5)
Chalekian, J.	SDSU	Patterns and process of a California sage scrub community	6/21/1905	<u>2002</u> : Thesis. Pattern and process in a California sage scrub community: the effects of local interactions
Cleary-Rose, Karin	WRCMSHC P Biol. Monitoring	Passerine nest search and monitoring	3/26/2008	
Cleary-Rose, Karin	WRCMSHC P Biol. Monitoring	Biological monitoring program: MSHCP monitoring development: Quino checkerspot butterflies	3/9/2006	<u>Summary report</u> : May 31, 2006. <u>Year 2006</u> survey results (MSRL P-32) <u>Year 2007</u> survey results (MSRL P-33)
Cleary-Rose, Karin	WRCMSHC P Biol. Monitoring	Biological monitoring program: MSHCP monitoring development: Burrowing owl surveys	3/24/2006	<u>Year 2006</u> summary report (MSRL M-57) <u>Year 2007</u> survey results (MSRL M-66)
Cleary-Rose, Karin	WRCMSHC P Biol. Monitoring	Biological monitoring program: MSHCP monitoring development: Riparian Point Count surveys	3/23/2006	<u>Year 2006</u> survey results (MSRL M-59) <u>Year 2007</u> survey results (MSRL M-68)
Cleary-Rose, Karin	WRCMSHC P Biol. Monitoring	Coastal Sage Scrub Bird Surveys	8/28/2006	<u>Year 2006</u> summary report (MSRL M-58) <u>Year 2007</u> survey report (MSRL M-67)
Cleary-Rose, Karin	WRCMSHC P Biol. Monitoring	Western pond turtle surveys in Lake Skinner	9/15/2006	<u>Year 2006</u> summary report (MSRL U-20)
Cleary-Rose, Karin	WRCMSHC P Biol. Monitoring	SKR trapping and veg surveys	8/9/2006	<u>Year 2006</u> summary report (MSRL S-26) <u>Year 2007</u> survey report (MSRL S-27)
Cleary-Rose, Karin	WRCMSHC P Biol. Monitoring	Vernal Pool Surveys	2/15/2008	
Cleary-Rose, Karin	WRCMSHC P Biol. Monitoring	Vegetation Community Assessment	Apr 9 2008	
Cleary-Rose, Karin	WRCMSHC P Biol. Monitoring	Nocturnal lizard surveys	9/29/2008	



Cleary-Rose, Karin	WRCMSHC P Biol. Monitoring	Biological monitoring program: MSHCP monitoring development: Rare Plant surveys	4/3/2006	<a href="#">Year 2006 survey results (MSRL H-29)</a> <a href="#">Year 2007 survey results (MSRL H-32)</a>
Cleary-Rose, Karin	WRCMSHC P Biol. Monitoring	Engelmann Oak Recruitment Surveys	10/18/2006	<a href="#">1/26/06: update, raw data, protocol</a> <a href="#">Year 2007 survey report (MSRL H-31)</a>
Cleary-Rose, Karin	WRCMSHC P Biol. Monitoring	Quino checkerspot butterfly sentinel site monitoring and larvae surveys	2/14/2008	
Cleary-Rose, Karin	WRCMSHC P Biol. Monitoring	Winter Raptor Surveys	12/12/2007	
Coe, S.	Sapphos Environmental	Bald eagle surveys 1994 - 1997	5/18/1994	<a href="#">June 12, 1997</a> : Final results of monitoring of a pair of breeding bald eagle at Skinner Filtration Plant in the 1996/1997 breeding season
Crowley, D., and E. Allen	UCR	Impact of atmospheric nitrogen deposition on carbon storage pathways along a nitrogen deposition gradient in coastal sage scrub soils	1/1/2004	No reports on file
Dixon, J. and S. Schroeter	Project Resources	1994 Spring post-burn vegetation survey	2/25/1994	<a href="#">April 1994</a> : Post-burn vegetation sampling, Addendum 1. <a href="#">May 27, 1994</a> : Post-burn vegetation sampling, Addendum 2 <a href="#">June 26, 1994</a> Final Report (C-8)
Egerton-Warburton, L. and E. Allen	UCR	For everything a season: Timing of smoke cues for stimulating germination in soil seedbanks	12/14/2000	<a href="#">2001</a> : Endo- and ecto-myc in Quercus, Myc. (BB-2) Year 2002 Report
Ellstrand, N.	UCR	Conservation biology of five rare plant species at the [MSR]	1/1/1992	1992-93, 1993-94, <a href="#">1995: Progress Report (H-27)</a> 1996
Fisher, R. and T. Case	UCSD	Reptile diversity and abundance methods: Part of the " <a href="#">Animal responses to weed control as a restoration technique in coastal sage scrub at the [MSR]</a> " contract	7/22/1999	1999 report <a href="#">2002</a> : Spatial patterns in the abund. of sdhl. Cons. Biol. (U-2)
Frank, D.	UCR- Extension	MWD Symposium: Schedule, promote, and implement the ESRP recreation business outreach symposium	11/10/1997	No reports on file
Frank, D.	UCR- Extension	Collect data from existing videos to convert to an animated presentation for future symposium.	11/10/1997	No reports on file
Gibeault, V., Pittenger, D., and R. Green	UCR	The development of efficient landscape and turfgrass irrigation practices	1/16/1997	No reports on file
Gibeault, V., Pittenger, D., and R. Green	UCR	Turfgrass and landscape irrigation studies	11/10/1997	No reports on file

Gillespie, I. and E. Allen	UCR	Erodium macrophyllum ecology, reintroduction, and effects of nitrogen	1/1/2000	(I-31) 2003: Final report. Understanding competitive relationships as a strategy for restoring Crown Valley: Using the rare forb Erodium macrophyllum as a model species. (C-14) 2004: Fire and competition in a southern California grassland: impacts on the rare forb Erodium macrophyllum. J. Appl. Ec. 2003: Gillespie, I. Ecology and restoration of Erodium macrophyllum. PhD Dissertation, UCR. (Z-3) (I-35) Undated: Using competitive hierarchies to restore a rare forb
Given, Doug, and S. Lydeen	USGS	Southern California seismic network	6/1/1993	no reports necessary
Gordon-Reedy, Patricia	Ogden	Potential for transplantaion of the smooth tarplant	unknown	No reports on file
Gordon-Reedy, Patricia	Ogden	Compile a disturbance history of vegetation on reserve lands	2/1/1995	1997: Disturbance history of vegetation on reserve land
Gordon-Reedy, Patricia	Ogden	Polygonum lapathifolium in Lake Skinner	10/8/1996	1997: Letter report on the presence of non-native <i>Polygonum lapathifolium</i> in Lake Skinner.
Griffith, J.	Griffith Wildlife Biology	Least Bell's vireo and southwestern willow flycatcher surveys 1995, 1999, 2000	4/28/1995	1995 Survey Report 1997 Survey Report 1998 results in cowbird report 1999 Survey Report 2000 Survey Report
Griffith, J.	Griffith Wildlife Biology	1995 Lake Mathews and Lake Skinner Brown-headed cowbird trapping	3/17/1995	1995 Report
Griffith, J.	Griffith Wildlife Biology	1996 [MSR] Lake Skinner and Eastside Reservoir project brown-headed cowbird control program	3/1/1996	1996 Report
Griffith, J.	Griffith Wildlife Biology	1997 Lake Skinner and Eastside reservoir project - North Hills Brown-headed cowbird control program	3/1/1997	1997 Report (M-17)
Griffith, J.	Griffith Wildlife Biology	1998 Lake Skinner and Eastside reservoir project - North Hills Brown-headed cowbird control program	3/16/1998	1998 Report
Griffith, J.	Griffith Wildlife Biology	1999 Lake Skinner and Eastside Reservoir Project - North Hills brown-headed cowbird control program	unknown	1999 Report
Griffith, J.	Griffith Wildlife Biology	2000 Lake Skinner and Eastside Reservoir Project - North Hills brown-headed cowbird control program	unknown	2000 Report (M-41)

Griffith, J.	Griffith Wildlife Biology	2001 Lake Skinner and Eastside Reservoir Project - North Hills brown-headed cowbird control program	unknown	2001 Report
Griffith, J.	Griffith Wildlife Biology	2002 Lake Skinner brown-headed cowbird control program	unknown	2002 Report
Haas, Chris		North Hills carnivore surveys	11/15/1999	No reports on file
Holway, D., A. Suarez, and T. Case	UCSD	Argentine ant surveys	unknown	2002: Role of abiotic factors in governing susceptibility to invasion: a test with Argentine ants
Hughes, David	BonTerra consulting	Riparian scrub habitat reference survey	8/22/2006	No reports on file
Kárén, O. and M. Allen	UCR	Effects of exotic grasses on mycorrhizae and oak recruitment in the Shipley-Skinner Reserve	11/15/1998	<u>June 2, 2000</u> : Final report: Effects of exotic grasses on mycorrhizae and oak recruitment <u>2001</u> : Endo- and ectomycorrhizas in <i>Quercus agrifolia</i> : patterns of root colonization and effects of seedling growth. Egerton-Warburton, L. and M. Allen. <i>Mycorrhiza</i> 11:283-290.
Keeley, J. and T. Brennan	USGS/BRD	Type conversion on Southern California Landscapes	6/29/2007	On-going, no reports received
Keeley, Jon	Occidental College	Demographic patterns of postfire recovery in coastal sage scrub and chaparral	10/10/1994	<u>June 15, 1998</u> : Demographic patterns of postfire recovery in coastal sage scrub and chaparral, summary report - 5 years postfire (c-10). <u>1998</u> : Mechanism of smoke-induced seed germination in a post-fire chaparral annual. <i>J. Ecol.</i> 86:27-36 <u>1997</u> : Trace gas emissions and smoke-induced seed germination. <i>Science</i> 276:1248-1250 <u>1998</u> : Smoke-induced seed germination in California chaparral. <i>Ecology</i> 79(7): 2320-2336

Kelt, Doug	U.C. Davis	Program for small mammals on the [MSR]	3/1/1996	<p><u>1996</u>: Summary of small mammal investigations at the Southwestern Riverside County Multi-Species Reserve</p> <p><u>1996</u>: Report of Activities Authorized under Recovery Permit PRT-816204 November/December 1996</p> <p><u>2001</u>: Dissertation: Experimental field studies in the conservation ecology of the endangered Stephens' kangaroo rat. R. Brock.</p> <p><u>2004</u>: Keystone effects of the endangered [SKR], Biol. Conserv. 116:131-139</p> <p><u>In Press</u>: Conservation and social structure of [SKR]: implications from burrow use behavior</p> <p>2005: Habitat Management for the endangered skr: the effect of mowing and grazing.</p>
King, Jamie	UCSD	Arthropod trapping (pit-fall) near Lake Skinner	5/1/1996	No reports on file
Klein, Anne	CDFG/CNPS	Vegetation classification, mapping, and field monitoring of western Riverside County	3/27/2003	No reports on file
Koepke, Josh	CDFG/MSC HP	California black walnut surveys	8/18/2005	Map in research file: one specimen found in Rawson Creek
Konno, Eddy	CDFG	Rodent trapping and herbicide treatments. Part of the " <b>Animal responses to weed control as a restoration technique in coastal sage scrub at the [MSR] " contract (4602/12).</b>	7/22/1999	Raw data and bar charts provided by Edie Allen 6/28/04
Lee, Myun-Bok	UCR	Effects of urbanization on riparian systems in an arid region	1/16/2007	Study withdrawn.
Losonczy Gorshtein, Edina	Cal State Los Angeles	Genetic diversity and population structure of the Engelmann Oak in southern California	11/21/2007	
Mayer, C. W.	U. C. Berkeley	Warm springs creek wildlife corridor identification model	unknown	<u>Spring 1996</u> : Thesis: Warm Springs Creek wildlife corridor identification model.
McKernan, Robert	San Bernardino County Museum	Brown-headed cowbird trapping: 1993, 1994, 1995	2/10/1993	<p><u>1994 Report</u></p> <p><u>1997</u>: Effects of nest parasitism by the brown-headed cowbird on nesting success of the California gnatcatcher. Condor 99:858-865</p>

Meixner, T., and Y. Wood	UCR	Abiotic controls on invasive species in mediterranean climates	10/1/2001	2005: Altered ecohydrologic response drives native shrub loss under conditions of elevated nitrogen deposition. J. Env. Qual. (Q-8)
Miller, Andrew	CDFG	Grasshopper sparrow survey and reproduction monitoring	5/1/2005	8/10/05: Grasshopper sparrow survey results 7/7/06: Grasshopper sparrow survey report 2005
Milroy, Lester	UCR	San Diego horned lizard monitoring	1/1/2001	No reports on file
Moen, C.	Southwestern Riverside County Multi-Species Reserve	MSR brown-headed cowbird trapping	1/8/2003	2003 Report 2004: Report (M-42)
Montalvo, A.	UCR	Can habitat and genetic divergence predict the relative importance of intrinsic and extrinsic factors on fitness after hybridization of California poppy with diverse life-histories?	4/10/2003	No reports on file
Montalvo, A. M.	UCR	California poppy seed collection	unknown	2002: The effect of fire and cold treatments on seed germination of annual and perennial populations of <i>Eschscholzia californica</i> in southern California. Madrono 49(4):207-227
Montalvo, A., S. Conard, and N. Ellstrand	USFS/UCR	Genetic and fitness consequences of transplantaion in coastal sage scrub	10/13/1994	<u>Quarterly progress report: 12/31/95</u> <u>Annual report, year 2: March 1996-97</u> <u>Oct. 1996 - Jan. 1997: Quarterly progress report (I-25).</u> <u>1997. Fitness consequences of non-local transplantation: Preliminary tests of the home-team advantage and outbreeding depression hypothesis. Progress report. 26 pp.</u>
Moore, Yvonne	UCR	Effects of seed supplementation on populations of the <i>Dulzura</i> kangaroo rat	unknown	June 2003: Master's thesis.

O'Farrell, Michael	O'Farrell Biological Consulting	Stephens' kangaroo rat habitat enhancement/management studies on the Shipley/Skinner Reserve	5/1/1991	<u>1992</u> : Establishment of a popn monit. Prog. For Skr. Trans. Wildl. Soc. (S-25) <u>1992</u> : 1992 progress report (S-29) <u>1993</u> : Progress Report (I-38) <u>1994</u> : Progress Report (S-21) <u>1995</u> : Progress Report (S-13) 1996 1997 <u>1991-1996</u> Final Report (S-4)
Osborne, K. and G. Pratt	Independent	Research on the biology of the Quino checkerspot butterfly	6/21/1905	
Platnick, N. I. and T. R. Prentice	UCR	Arthropod pit-fall traps near the northeast shore of Lake Skinner	unknown	<u>1999</u> : Research note: A new species of the spider genus Zelotes from California. J. Arachnology 27:672-674 (MSR Library P-17)
Prentice, Tom	UCR	Collection of at least 40 tarantulas from the Reserve for taxonomic studies	6/16/1997	No reports on file
Preston, Kristine	UCR/CCB	Testing ecological niche models for sensitive coastal sage scrub species (avian point counts)	2/13/2006	12/11/06: Preliminary final results. In research file. With CD.
Principe, Zach	The Nature Conservancy	Patterns of recruitment, regeneration, and reproduction of Engelmann Oak in Western Riverside and San Diego Counties through the monitoring of acorn production and juvenile oaks	12/15/2003	Zach Principe provided raw data; located in research file
Quinn, L. and J. Holt	UCR	Management and restoration of California riparian ecosystems	6/24/1905	No reports on file
Redak, R.	UCR	Arthropod recolonization <b>Part of the "Animal responses to weed control as a restoration technique in coastal sage scrub at the [MSR]" contract (4602/12)</b>	7/22/1999	2001: Progress report
Redak, R.	UCR	Three-year study of the effects of herbicide applications on invertebrate populations	10/1/1999	July 2004: Toxicity of fusilade to selected insects including painted ladies. 6 pp. INCOMPLETE
Redak, Rick, J. Rotenberry, T. Scott, and J. Pinto	UCR	Arthropod recolonization of California coastal sage scrub following fire	10/12/1994	2001: Prentice et al. Spiders from Riversidian coastal sage scrub with comparisons to diegan scrub fauna. Pan-Pacific Ent. 77(2):90-122. (P-31)



San Bernardino County Museum		<p>1) Study of California gnatcatcher life history and collection of habitat data at three sites in w. Riv. Co.: Lake Skinner, Motte Reserve, Lake Mathews</p> <p>2) 1st Amd: Study of the non-breeding season biology of the Cal. Gnat. In W. Riv. Co. <i>and</i> Life history studies <i>and</i> Arthropod availability studies.</p> <p>3) 2nd Amd: Continuation of the dispersal studies of the gnatcatcher</p> <p>4) 3rd Amd: Life history monitoring, regional habitat use and nest predator identification for the gnatcatcher</p> <p>5) 4th Amd: Life history studies of the California gnatcatcher in W. Riv. Co: 1996 breeding season.</p> <p>6) 5th Amd: Post-breeding dispersal</p>	<p>1) May 1993</p> <p>2) Undated</p> <p>3) Oct 94</p> <p>4) Jan 95</p> <p>5) Undated</p> <p>6) Unknown</p>	<p><u>January 1995</u>: Draft report: Nesting biology of the coastal California gnatcatcher in western Riverside County: 1993-1994 (M-46).</p> <p><u>1997</u>: Association of within-territory vegetation characteristics and fitness components of California gnatcatchers. Auk 114(4):601-609.</p> <p><u>Undated</u>: Correlations among life history and habitat characteristics of the California gnatcatcher. Unpubl. Rpt.</p>
Shepard, Richard	UCLA Friends of Archaeology Fellowship Committee	Rock Art and Sacred Landscape	12/20/1995	No reports on file
Shier, Debra	San Diego Zoological Society	Behavioral ecology and translocation of Stephens' kangaroo rat	4/28/2008	
Short, Ginny	UCR	Burrowing owl surveys	8/20/2003	Final report dated 4/24/2006 in research file. No owls found.
Smith, Felisa	Univ. New Mexico	5-year mammal sampling program for the [MSR]	unknown	May 1995. A five year sampling program for small mammals on the [MSR] (N-9)
Strahm, Spring	SDSU	Invasion, competition and spatial pattern of CSS	1/15/2003	No reports on file
Talluto, Matt	U.C. Irvine	The effects of increased fire frequency and nitrogen deposition on exotic grass invasion in coastal sage scrub	4/1/2005	3/27/06: Rec'd raw data. <b>Check for publication</b>
Thompson, Mayo	Univ. Nevada; Nevada Seismological Lab	Seismological survey	8/15/2007	
Treseder, K. and M. Allen	UCR	Effects of nitrogen deposition on the demography and community composition of mycorrhizal fungi in Shipley-Skinner Reserve	1/7/2000	No reports on file

U. S. Fish and Wildlife Service		1) Study of California gnatcatcher life history and collection of habitat use data at three sites in W. Riv. Co.: Lake Skinner, Motte, and Lake Mathews. 2) 1st Amd: Study of non-breeding season biology 3) 2nd Amd: Continuing life history studies and arthropod availability studies of the gnatcatcher 4) 3rd Amd: Arthropod availability study and dispersal studies of the gnatcatcher	1) Unknown 2) Undated 3) Undated 4) Oct 94	<u>September 1993</u> : Draft Report: Observations of perennial use versus availability for <i>Polioptila californica</i> at three sites in W. Riv. Co.(M-45) <u>January 1994</u> : Draft Report: Nesting biology of the coastal California gnatcatcher in W. Riv. Co. <u>January 1994</u> : Draft Report: Breeding habitat use by <i>Polioptila californica</i> in W. Riv. Co. <u>October 1994</u> : Draft Report: Dispersal and non-breeding habitat use by the coastal California gnatcatcher in W. Riv. Co.
U. S. Fish and Wildlife Service		Avian inventory and monitoring at the [MSR]	10/1/1994	2/21/06: Rec'd "Diversity measures on data sets from the [MSR]" and survey station location file.
U.S. Fish and Wildlife Service (Allison Anderson)	USFWS	Annual monitoring of Quino checkerspot butterfly populations on [MSR]	unknown	2001 Survey Report 2003 Report 2004 Report 2005 Captive Breeding Rpt (G.Pratt) 2006 summary report
Unfried, Thomas	UCR	Effects of different land-use types on coastal sage scrub breeding birds	3/22/2001	No reports on file
Wagner, W.	Wagner Biological Consulting	Quino checkerspot butterfly surveys	unknown	May 2, 1997: Letter report and associated maps. (P-30)
Wagner, W.	Wagner Biological Consulting	Reserve California gnatcatcher surveys and monitoring	unknown	1992, 1993, 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001 project reports
Wakeley, J. and K. Wiens	U.S. Army Corps of Engineers	Developing an avian index of biological integrity for riparian ecosystems in the Santa Margarita River Watershed	3/21/2003	Aug. 18, 2004 Final Report
Wills, R. and J. O'Leary	The Nature Conservancy and SDSU	Post-fire ecological studies: Laguna, California, Eagle, and Guejita fires, Orange, Riverside, and San Diego Counties, California	10/15/1994	No reports on file
Zemba, D. et al.	USFWS	California gnatcatcher investigations on Shipley Ranch, and near Lake Mathews	7/1/1991	<u>November 1992</u> : Draft Report: California gnatcatchers at three sites in western Riverside County

## **Appendix 2: Mitigation Banking**

The RMC has agreed several times to spend Reserve funds to acquire property and thus expand the size of the Reserve (e.g., see RMC Resolutions 19 and 31). On each newly acquired parcel of land, the RMC agreed to establish a “mitigation bank” whereby habitat and/or endangered species credits could be sold to recoup the cost of the original purchase and provide funding for management of the new land. Between 1994 and 2000, 1,605 acres of land were acquired with Reserve funding and designated as part of the Reserve mitigation bank (Table 1, Figure 1).

One of the primary purposes in pursuing land acquisitions was to expand the Reserve so the boundaries 1) followed topographical features that made it easier to defend against fire and non-native plant invasions, 2) followed logical features such as established roadways, and 3) protected entire watersheds. For example, acquisitions in the Oakridge Ranches Homeowner’s Association area (parcels 5, 7, 8, 9, 10, 11, 12, 13, 14, 16, 17, 18, 19, 20, 21, 22, 26, 28, and 29) and parcel 30 (not within the Association) were intended to extend the Reserve boundary to the east to a more definable and defensible position. However, the RMC has not been able to acquire all of the key parcels in this area, thus leaving some Reserve parcels orphaned or disjunct from the remainder of the Reserve.

Over 290 acres of credit have been sold to meet local, state, and federal environmental requirements (Table 1). The RMC is not obligated to sell the remaining mitigation credits from the mitigation bank lands. In fact, the RMC may consider selling one or more of the disjunct parcels to increase revenue, decrease expenses from homeowner’s association fees, and/or reduce the Reserve boundary to one that is more defensible. Because of this, the RMC has prioritized that credits be sold from the parcels more interior to the Reserve first, and commit lands at the periphery or disjunct from the Reserve last.

Currently, all lands designated as part of the mitigation bank are treated as part of the Reserve and managed accordingly.

Table 1: Mitigation Bank Information

MSR parcel number <sup>1</sup>	Ownership	Acquisition date	APN	Parcel Acreage	Purchase Price <sup>2</sup>	Date of Habitat Survey	Habitat and Credits	Unocc. RSS	RSS w/SKR	RSS w/CAGN	RSS w/SKR and CAGN	NNG w/SKR	NNG	Chap.	Willow Riparian	Ephem. Drainage	Oaks	Non-native trees	
1	RCHCA	Unknown ~Aug. 1994	466-280-001 466-300-007 466-300-008 467-110-018	445	\$1,800,000 (see Resolution 19)	12/23/1993 1/24/1994 2/17/1994 1/21/1994	Amt. of habitat at survey date	316	89.5				32			7.5			
							Credits sold	31.47	78				23.6			7.5			
							Credits available	284.53	11.5				8.4						
2	MWD	Jan. 1996	466-300-001	80	unknown	1/8/1996	Amt. of habitat at survey date	54						26					
							Credits sold												
							Credits available	54					26						
3	MWD	Jan. 1996	466-300-006	80	unknown	1/8/1996	Amt. of habitat at survey date	70				8				2			
							Credits sold	11.65				7							
							Credits available	58.35				1			2				
4	MWD	Dec. 1996	470-020-044 470-020-058	18.1	\$90,000	10/26/1998	Amt. of habitat at survey date	13.2				3.9					1		
							Credits sold					3.9							
							Credits available	13.20							1				
5	MWD	Aug. 1997	470-320-017	20.25	\$89,000	10/26/1998	Amt. of habitat at survey date	4.6				15.6							
							Credits sold												
							Credits available	4.6				15.6							
6	MWD	Aug. 1997	915-370-011	31.4	\$85,000	3/8/1998	Amt. of habitat at survey date	23.9						7.5					
							Credits sold	5											
							Credits available	18.9						7.5					
7	MWD	Aug. 1997	470-370-017	19.18	\$57,500	3/8/1998	Amt. of habitat at survey date	19.2											
							Credits sold												
							Credits available	19.2											
8	MWD	Sept. 1997	470-330-029	25.02	\$99,999	3/8/1998	Amt. of habitat at survey date	19.8				4.8			0.4				
							Credits sold					4.5							
							Credits available	19.8				0.3			0.4				
9	MWD	Dec. 1997	915-020-023	40.85	\$120,000	3/8/1998 10/29/1998	Amt. of habitat at survey date	4.2						36.6					
							Credits sold	4.2											
							Credits available							36.6					
10	MWD	Jan. 1998	915-020-017	41.15	\$106,100	3/8/1998 10/29/1998	Amt. of habitat at survey date	3.2						37.9					
							Credits sold	3.2											
							Credits available							37.9					
11	MWD	Jan. 1998	915-020-024	40.86	\$102,900	3/8/1998 10/29/1998	Amt. of habitat at survey date	28.8						12					
							Credits sold	28.8											
							Credits available							12					
12	MWD	Jan. 1998	470-370-019	20.13	\$90,000	3/8/1998	Amt. of habitat at survey date	19.3						0.8					
							Credits sold												
							Credits available	19.3						0.8					
13	MWD	Mar. 1998	915-020-018	40.08	\$72,000	3/8/1998 10/29/1998	Amt. of habitat at survey date	10.9						29.1					
							Credits sold												
							Credits available	10.90						29.1					
14	MWD	May 1998	915-020-021	43.25	\$77,850	3/8/1998 10/29/1998	Amt. of habitat at survey date	1.5						41.7					
							Credits sold	0.2											
							Credits available	1.30						41.7					
15	MWD	May 1998	915-030-003	120	\$178,500	10/30/1998	Amt. of habitat at survey date			60.6		0.8	1.1	42.7	8.6		6.2		
							Credits sold		60.6										
							Credits available				0.80	1.1	42.7	8.6	6.2				
16	MWD	Aug. 1998	470-320-030 470-320-031	19.56	\$68,500	10/26/1998	Amt. of habitat at survey date	10.1				9.4							
							Credits sold												
							Credits available	10.1				9.4							
17	MWD	Sept. 1998	915-020-005	39.31	\$60,000	3/8/1998 10/29/1998	Amt. of habitat at survey date	3.4						34.7			1.2		
							Credits sold	3.4											
							Credits available							34.7			1.2		
18	MWD	Oct. 1998	470-320-020	19.94	\$85,400	10/26/1998	Amt. of habitat at survey date	17.5				2.4							
							Credits sold												
							Credits available	17.5				2.4							

<sup>1</sup> Parcel numbers are identified on the Ownership Map

<sup>2</sup> Purchase price is the price paid for the land and does not include the fees associated with the sale  
(Revised 9/3/08)

MSR parcel number <sup>1</sup>	Ownership	Acquisition date	APN	Parcel Acreage	Purchase Price <sup>2</sup>	Date of Habitat Survey	Habitat and Credits	Unocc. RSS	RSS w/SKR	RSS w/CAGN	RSS w/SKR and CAGN	NNG w/SKR	NNG	Chap.	Willow Riparian	Ephem. Drainage	Oaks	Non-native trees
19	MWD	Nov. 1998	470-320-016	18.79	\$75,000	10/26/1998	Amt. of habitat at survey date	13.6				5.2						
							Credits sold				5.2							
							Credits available	13.6										
20	MWD	Dec. 1998	470-320-019	20.23	\$80,000	1-15-2004 1-20-2004	Amt. of habitat at survey date			19		1.2						
							Credits sold											
							Credits available			19		1.2						
21	MWD	Apr. 1999	470-320-028	18.79	\$92,100	1-20-2004 1-26-2004	Amt. of habitat at survey date	13.7						5.1				
							Credits sold											
							Credits available	13.7								5.1		
22	MWD	May 1999	470-320-027	22.87	\$95,000	1/20/2004	Amt. of habitat at survey date	22.1						0.8				
							Credits sold											
							Credits available	22.1							0.8			
23	MWD	June 1999	472-140-001	26	\$91,000	1/30/2004	Amt. of habitat at survey date	11.4	2.1	12.5								
							Credits sold			12.5								
							Credits available	11.4	2.1	0								
24	MWD	July 1999	472-140-006	17.55	\$52,650	1/30/2004	Amt. of habitat at survey date	3.4			14.1							
							Credits sold											
							Credits available	3.4			14.1							
25	MWD	Aug. 1999	472-140-012	20	\$60,000	1/30/2004	Amt. of habitat at survey date	17.2	2.8									
							Credits sold											
							Credits available	17.2	2.8									
26	MWD	Aug. 1999	470-320-026	20.88	\$42,000	1/20/2004	Amt. of habitat at survey date	19.1				1.6		0.2				
							Credits sold											
							Credits available	19.1				1.6		0.2				
27	MWD	Aug. 1999	472-140-019	20	\$69,000	1/30/2004	Amt. of habitat at survey date	11.1	1.4			4				3.5		
							Credits sold											
							Credits available	11.1	1.4			4				3.5		
28	MWD	Sept. 1999	470-320-021	18.97	\$82,000	1/20/2004	Amt. of habitat at survey date	16.8				1.7		0.5				
							Credits sold											
							Credits available	16.8				1.7		0.5				
29	MWD	Oct. 1999	915-030-013	37.23	\$75,000	2/27/2004	Amt. of habitat at survey date	15.9						21.1			0.2	
							Credits sold											
							Credits available	15.9						21.1			0.2	
30	MWD	Oct. 1999	470-030-003	160	\$640,000	1/26/2004	Amt. of habitat at survey date	154.8				5		0.2				
							Credits sold											
							Credits available	154.8				5		0.2				
31	MWD	Jan. 2000	472-140-018	20	\$67,500	1/30/2004	Amt. of habitat at survey date	14.8	1.2				1.8			1.1		1.1
							Credits sold											
							Credits available	14.8	1.2					1.8			1.1	
32	MWD	Nov. 2000	470-020-038	40	\$40,000	1/27/2004	Amt. of habitat at survey date	37.8				2.1					0.1	
							Credits sold											
							Credits available	37.8				2.1				0.1		
<b>Totals</b>				1605.39	\$2,943,999.00													
<b>Credits sold</b>							<b>87.92</b>	<b>78</b>	<b>73.1</b>	<b>0</b>	<b>44.2</b>	<b>0</b>	<b>0</b>	<b>7.5</b>	<b>0</b>	<b>0</b>	<b>0</b>	
<b>Credits available</b>							<b>883.38</b>	<b>19</b>	<b>19</b>	<b>14.1</b>	<b>53.5</b>	<b>2.9</b>	<b>296.9</b>	<b>9</b>	<b>6.6</b>	<b>8.7</b>	<b>1.1</b>	

<sup>1</sup> Parcel numbers are identified on the Ownership Map

<sup>2</sup> Purchase price is the price paid for the land and does not include the fees associated with the sale  
(Revised 9/3/08)

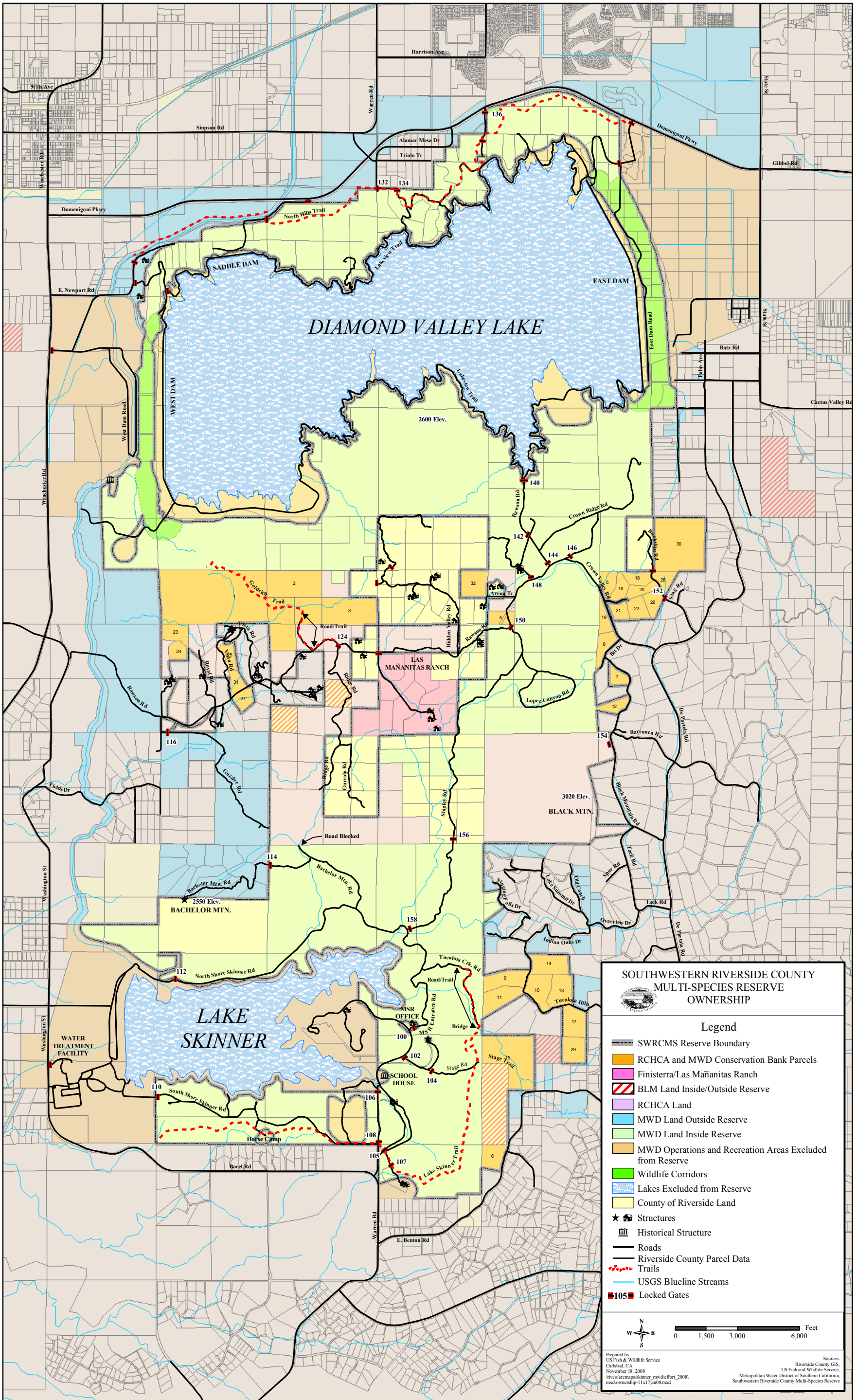
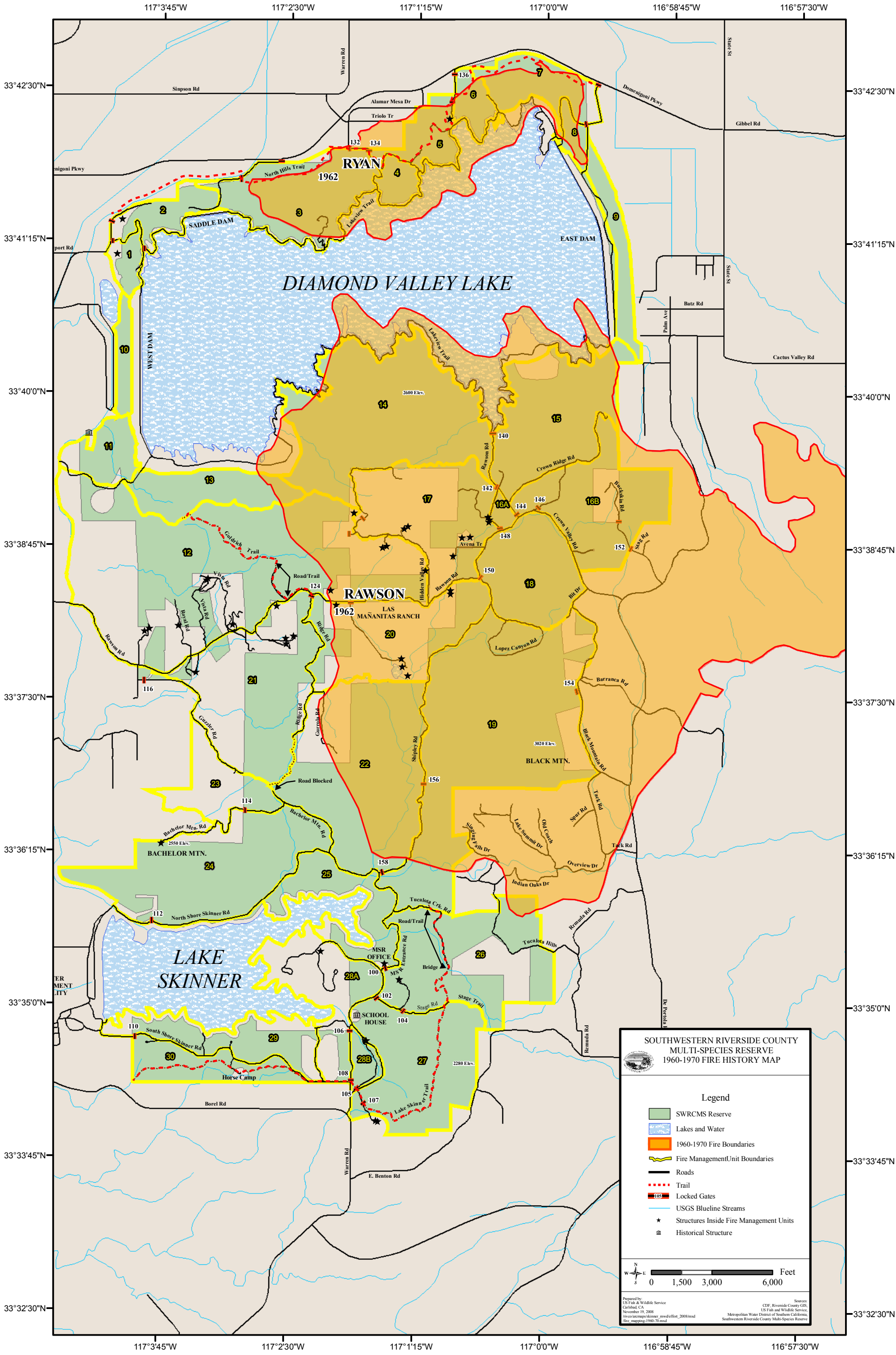


Figure 1

Figure 1 (Appendix 2). Mitigation bank parcels within the Southwestern Riverside County Multi-Species Reserve.





**SOUTHWESTERN RIVERSIDE COUNTY  
MULTI-SPECIES RESERVE  
1960-1970 FIRE HISTORY MAP**

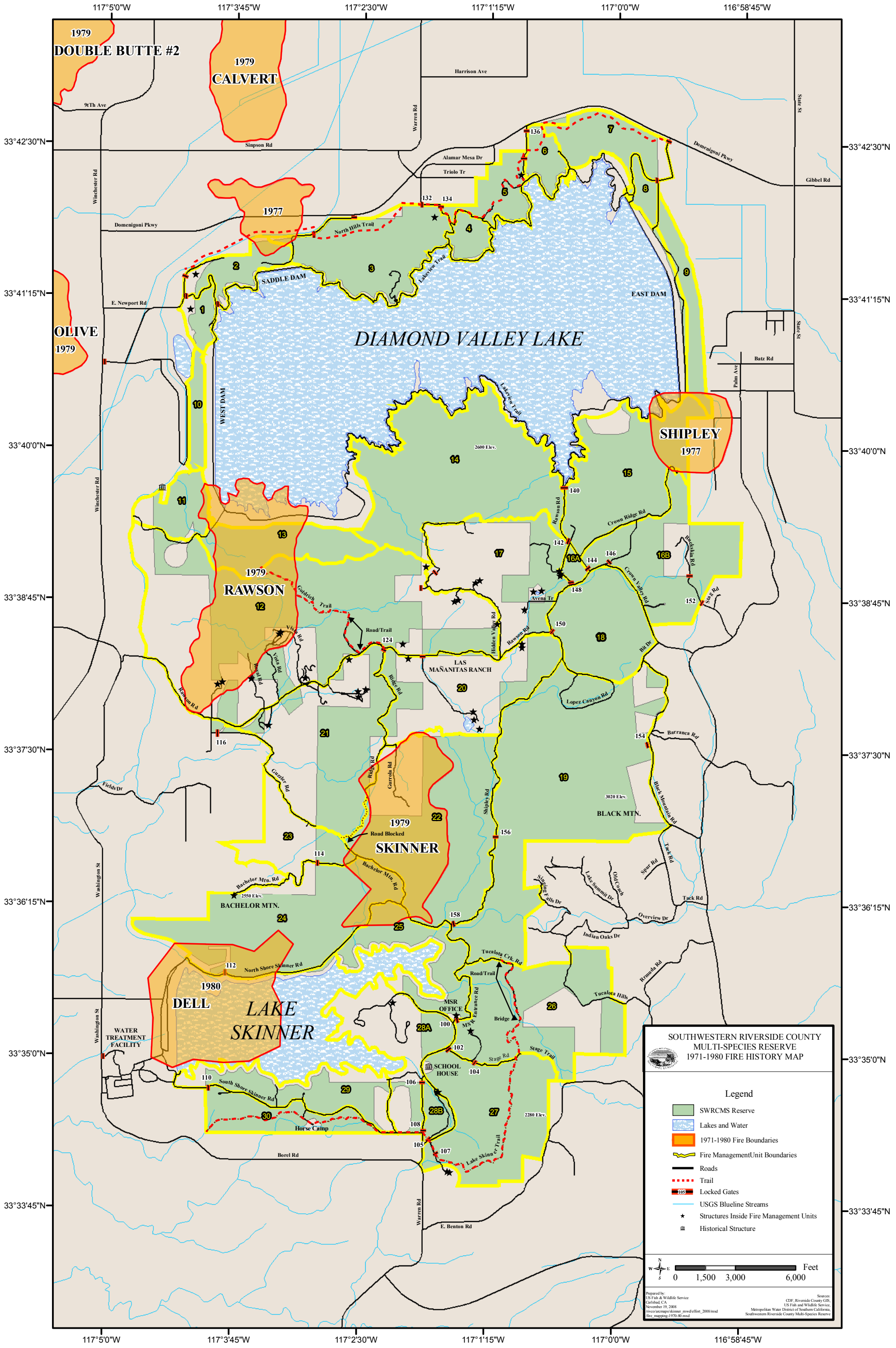
**Legend**

- SWRCMS Reserve
- Lakes and Water
- 1960-1970 Fire Boundaries
- Fire Management Unit Boundaries
- Roads
- Trail
- Locked Gates
- USGS Blue Line Streams
- Structures Inside Fire Management Units
- Historical Structure

0 1,500 3,000 6,000 Feet

Prepared by: US Fish & Wildlife Service, Carlsbad, CA, November 19, 2008. Source: CDF, Riverside County GIS, US Fish and Wildlife Service, Metropolitan Water District of Southern California, Southwestern Riverside County Multi-Species Reserve.





**SOUTHWESTERN RIVERSIDE COUNTY  
MULTI-SPECIES RESERVE  
1971-1980 FIRE HISTORY MAP**

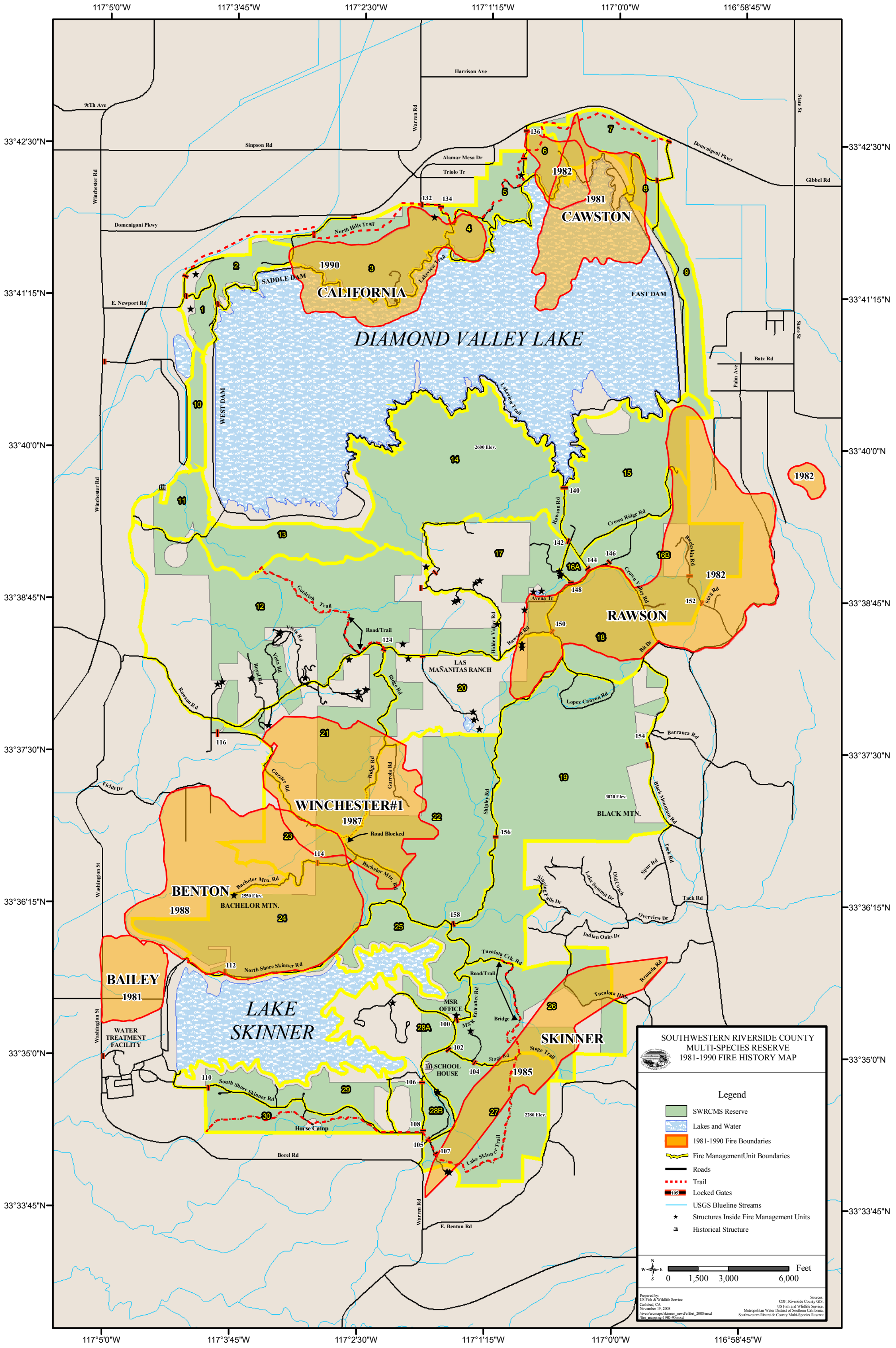
**Legend**

- SWRCMS Reserve
- Lakes and Water
- 1971-1980 Fire Boundaries
- Fire Management Unit Boundaries
- Roads
- Trail
- Locked Gates
- USGS Blueline Streams
- Structures Inside Fire Management Units
- Historical Structure

0 1,500 3,000 6,000 Feet

Prepared by:  
US Fish & Wildlife Service  
Carlsbad, CA  
November 14, 2008  
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fire\_mapping\1970-80.mxd

Sources:  
CDF, Riverside County GIS  
US Fish and Wildlife Service  
Metropolitan Water District of Southern California  
Southwestern Riverside County Multi-Species Reserve



**SOUTHWESTERN RIVERSIDE COUNTY  
MULTI-SPECIES RESERVE  
1981-1990 FIRE HISTORY MAP**

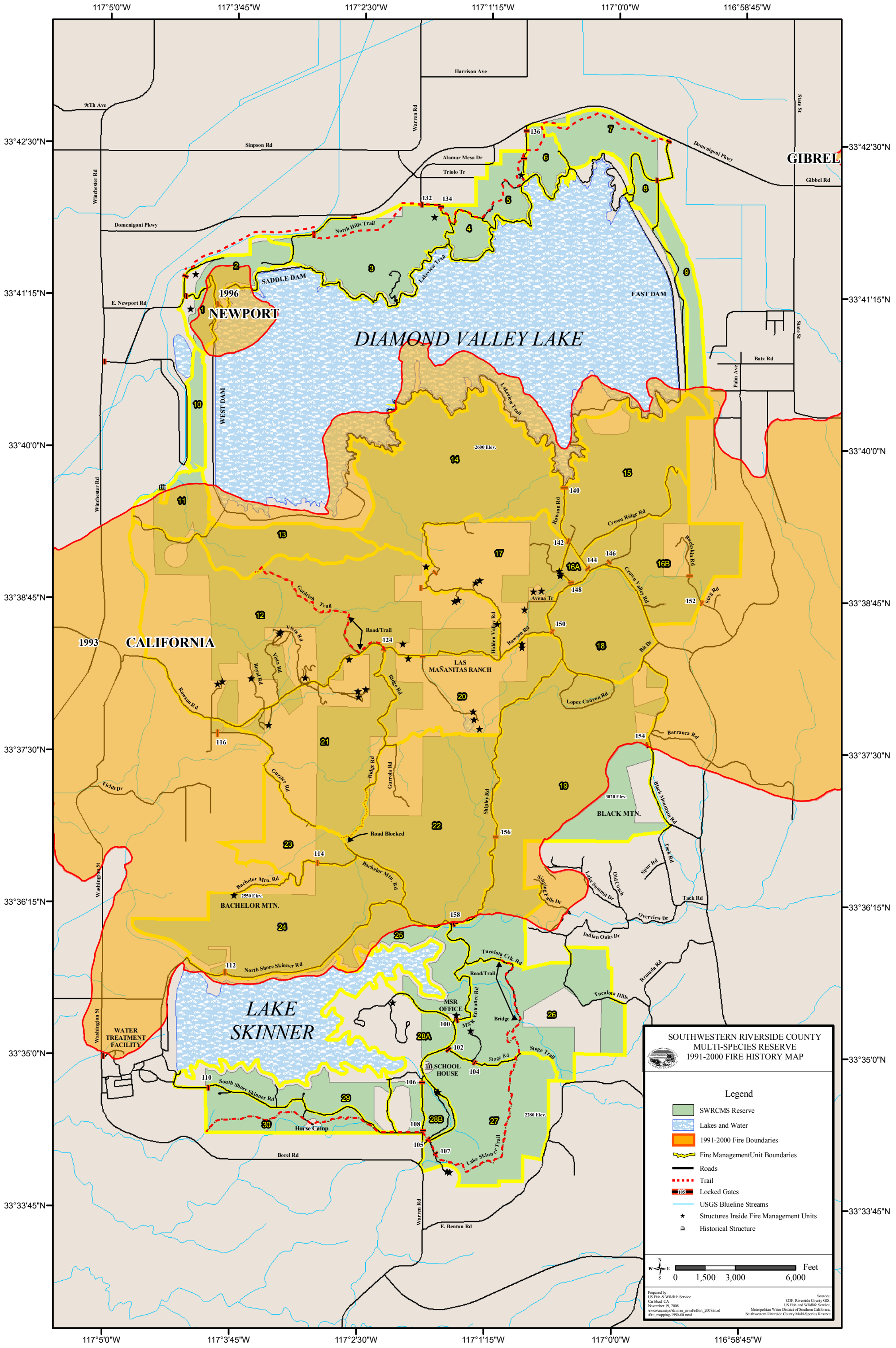
**Legend**

- SWRCMS Reserve
- Lakes and Water
- 1981-1990 Fire Boundaries
- Fire Management Unit Boundaries
- Roads
- Trail
- Locked Gates
- USGS Blueline Streams
- Structures Inside Fire Management Units
- Historical Structure

Feet  
 0 1,500 3,000 6,000

Prepared by: US Fish & Wildlife Service, Carlsbad, CA, November 19, 2008. [http://arcmap.com/arcmap/akinter\\_mxd/def/fort\\_2008.mxd](http://arcmap.com/arcmap/akinter_mxd/def/fort_2008.mxd)  
 Sources: CDF, Riverside County GIS, US Fish and Wildlife Service, Metropolitan Water District of Southern California, Southwestern Riverside County Multi-Species Reserve. [http://arcmap.com/arcmap/akinter\\_mxd/def/fort\\_2008.mxd](http://arcmap.com/arcmap/akinter_mxd/def/fort_2008.mxd)





**SOUTHWESTERN RIVERSIDE COUNTY  
MULTI-SPECIES RESERVE  
1991-2000 FIRE HISTORY MAP**

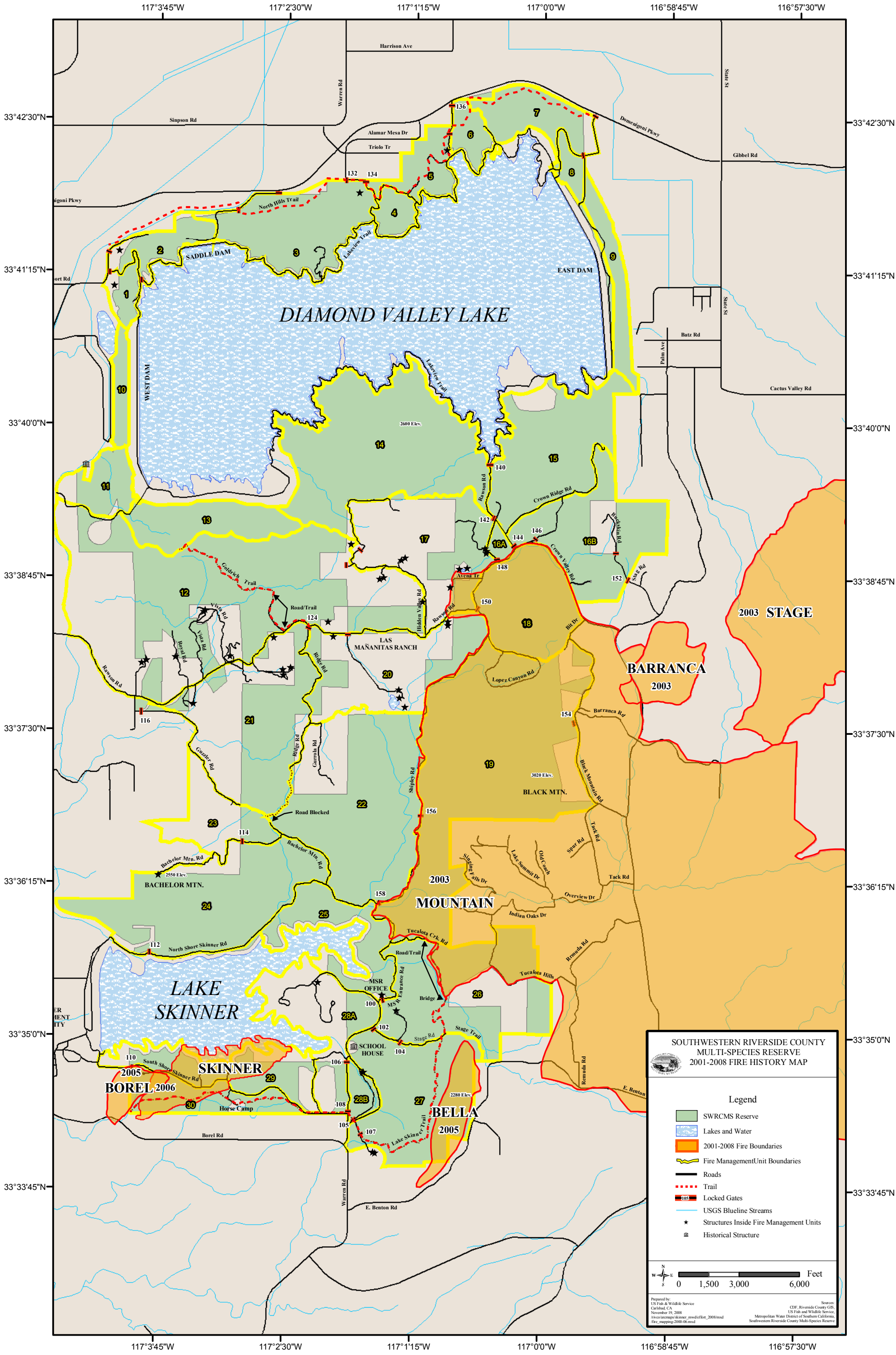
**Legend**

- SWRCMS Reserve
- Lakes and Water
- 1991-2000 Fire Boundaries
- Fire Management Unit Boundaries
- Roads
- Trail
- Locked Gates
- USGS Blueline Streams
- Structures Inside Fire Management Units
- Historical Structure

0 1,500 3,000 6,000 Feet

Prepared by:  
US Fish & Wildlife Service  
Carlsbad, CA  
November 19, 2008  
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File: mapimg-1990-01.mxd

Sources:  
CDF, Riverside County GIS  
US Fish and Wildlife Service  
Metropolitan Water District of Southern California  
Southwestern Riverside County Multi-Species Reserve



## Appendix 4: Native species known or expected to occur on the Reserve, their conservation status, and associated habitats

Species of concern are those species which are either federally or state listed under endangered species acts, or those that are listed in the California Native Plant Society, or those which used to fall under the Federal Category “C1 or C2”. The “C2” category is no longer used by the Federal government, but used to designate species for which the USFWS had information indicating that protection under the federal Endangered Species Act may be warranted but for which it lacked sufficient information on status and threats to determine if elevation to “C1 – Candidate” status was warranted.

This list is incomplete at this time. Additional information needs to be added with regard to associated habitats. Field guides, anecdotal information, and the results of research done on the Reserve were used to compile this list. In some cases (e.g. insects) only unusual or notable species were listed.

Species Name	Status	Known to Occur	Expected to Occur	Habitat
<b>PLANTS</b>				
• <b>Ferns</b>				
<i>Dryopteris arguta</i> (coastal wood fern)		X		CHP, OF, Rocky areas
<i>Polypodium californicum</i> (California polypody)		X		CHP, OF, Rocky areas
<i>Cheilanthes covillei</i> (Coville’s lipfern)		X		CHP, OF, Rocky areas
<i>Cheilanthes newberryi</i> (cottonfern)		X		CHP, OF, Rocky areas
<i>Pellaea andromedaefolia</i> (coffee fern)		X		CHP, OF, Rocky areas
<i>Pellaea mucronata</i> (bird’s foot cliff brake)		X		CHP, OF, Rocky areas
<i>Pentagramma triangularis</i> (goldenback fern)		X		CHP, OF, Rocky areas
• <b>Spikemoss</b>				
<i>Selaginella bigelovii</i> (mossfern)		X		Rocky slopes, cracks in boulders
• <b>Amaranthaceae</b>				
<i>Amaranthus blitoides</i> (prostate pigweed)			X	DIS
• <b>Anacardiaceae</b>				
<i>Malosma laurina</i> (laurel sumac)		X		CSS, CHP
<i>Rhus ovata</i> (sugar bush)		X		CSS, CHP, OF
<i>Rhus trilobata</i> (squaw bush)		X		RF, CSS
<i>Toxicodendron diversilobum</i> (poison oak)		X		RF
• <b>Apiaceae</b>				

Species Name	Status	Known to Occur	Expected to Occur	Habitat
<i>Apiastrum angustifolium</i> (mock parsley)		X		Shade of shrubs on clay soils
<i>Bowlesia incana</i> (bowlesia)		X		CSS, CHP
<i>Caucalis microcarpa</i> (XX)		X		CHP, Tuc. Hills.
<i>Daucus pusillus</i> (rattlesnake weed)		X		CSS
<i>Lomatium dasycarpum</i> (woolly-fruited lomatium)		X		G
<i>Sanicula bipinnatifida</i> (purple sanicle)		X		G, CSS
<i>Sanicula crassicaulis</i> (Pacific sanicle)		X		G, CSS
<i>Sanicula tuberosa</i> (tuberous sanicle)		X		G
<i>Tauschia arguta</i> (southern tauschia)		X		Rocky slopes, CHP
• <b>Asclepiadaceae</b>				
<i>Asclepias californica</i> (woolly milkweed)		X		G, CSS, CHP
<i>Sarcostemma cynanchoides</i> ssp. <i>hartwegii</i> (climbing milkweed)		X		Dry, sandy, rocky arroyos
• <b>Asteraceae</b>				
<i>Acourtia microcephala</i> (sacapellote)		X		CHP
<i>Ambrosia psilostachya</i> (western ragweed)		X		RF
<i>Ancistrocarphus filagineus</i> (woolly fishhooks)		X		Clay soils
<i>Artemisia californica</i> (California sagebrush)		X		CSS
<i>Artemisia douglasiana</i> (mugwort)		X		
<i>Artemisia dracunculus</i> (tarragon)		X		
<i>Baccharis emoryi</i> (Emory's baccharis)		X		RF
<i>Baccharis salicifolia</i> (mulefat)		X		RF
<i>Bebbia juncea</i> (sweet bush)		X		CSS
<i>Calycoseris parryi</i> (yellow tack-stem)		X		
<i>Chaenactis artemisiaefolia</i> (white pincushion)		X		
<i>Chaenactis glabriuscula</i> (yellow pincushion)		X		CHP
<i>Cirsium occidentale</i> (cobweb thistle)		X		Among boulders along ridgetops
<i>Conyza cnadensis</i> (common horsetail)		X		DIS
<i>Encelia farinosa</i> (brittlebush)		X		CSS
<i>Ericameria linearifolia</i> (narrow-leaf goldenbush)		X		
<i>Ericameria palmeri</i> ssp. <i>pachylepis</i> (box springs goldenbush)		X		G
<i>Erigeron foliosus</i> (leafy daisy)		X		
<i>Eriophyllum confertiflorum</i> (golden yarrow)		X		CHP
<i>Eriophyllum wallacei</i> (Wallace's woolly daisy)		X		



Species Name	Status	Known to Occur	Expected to Occur	Habitat
<i>Euthamia occidentalis</i> (western goldenrod)		X		
<i>Filago arizonica</i> (Arizona filago)		X		Clay soils
<i>Filago californica</i> (California fluff weed)		X		RF, CSS, Open areas
<i>Gnaphalium bicolor</i> (bi-colored cudweed)		X		Brushy slopes
<i>Gnaphalium californicum</i> (California cudweed)		X		Brushy slopes
<i>Gnaphalium canescens</i> (white everlasting)		X		CHP, Boulder areas
<i>Gnaphalium luteo-album</i> (weedy cudweed)		X		Edge of water
<i>Gnaphalium palustre</i> (lowland cudweed)		X		
<i>Gnaphalium stramineum</i> (cotton batting plant)		X		
<i>Gutierrezia californica</i> (California matchweed)		X		
<i>Hazardia squarrosa</i> (saw-toothed goldenbush)		X		
<i>Helianthus annuus</i> (western sunflower)		X		RF, seeps
<i>Helianthus gracilentus</i> (slender sunflower)		X		CHP
<i>Hemizonia fasciculata</i> (fascicled tarweed)		X		G
<i>Hemizonia kelloggii</i> (Kellog's tarplant)		X		
<i>Hemizonia paniculata</i> (San Diego tarweed)		X		G
<i>Hemizonia pungens</i> ssp. <i>laevis</i> (Smooth tarplant)	CNPS 1B	X		G below 500 feet.
<i>Isocoma menziesii</i> var. <i>menziesii</i> (coastal goldenbush)		X		
<i>Lasthenia californica</i> (coastal goldfields)		X		CSS, G
<i>Lasthenia coronaria</i> (southern goldfields)		X		
<i>Layia platyglossa</i> (common tidy tips)		X		Fire follower, CSS, CHP
<i>Lepidospartum squamatum</i> (scalebroom)		X		
<i>Lessingia filaginifolia</i> (cudweed aster)		X		CSS, CHP, G
<i>Lessingia glandulifera</i> (valley lessingia)		X		CSS, CHP, G
<i>Malacothrix californica</i> (desert dandelion)		X		
<i>Malacothrix clevelandii</i> (Cleveland's malacothrix)		X		
<i>Micropus californicus</i> (slender cottonweed)		X		

Species Name	Status	Known to Occur	Expected to Occur	Habitat
<i>Microseris douglasii</i> var. <i>platycarpa</i> (Small-flowered microseris)	CNPS 4	X		CSS, G
<i>Osmodenia tenella</i> (rosin weed)		X		
<i>Pluchea sericea</i> (arrowweed)		X		
<i>Porophyllum gracile</i> (odora)		X		
<i>Rafinesquia californica</i> (California chicory)		X		
<i>Senecio californicus</i> (California butterweed)		X		
<i>Senecio flaccidus</i> var. <i>douglasii</i> (sand wash butterweed)		X		
<i>Stebbinsoseris heterocarpha</i> (derived microseris)		X		
<i>Stephanomeria exigua</i> (Dean's wreath plant)		X		
<i>Stephanomeria virgata</i> (tall wreath plant)		X		
<i>Stylocline gnaphalioides</i> (everlasting nest straw)		X		
<i>Tetradymia comosa</i> (cotton thorn)		X		
<i>Uropappus lindleyi</i> (silver puffs)		X		
• <b>Boraginaceae</b>				
<i>Amsinckia menziesii</i> var. <i>intermedia</i> (rancher's fiddleneck)		X		
<i>Cryptantha intermedia</i> (common cryptantha)		X		
<i>Cryptantha microstachys</i> (Tejon cryptantha)		X		
<i>Cryptantha muricata</i> (prickly cryptantha)		X		
<i>Harpagonella palmeri</i> var. <i>palmeri</i> (Palmer's grapplinghook)	CNPS 2	X		CSS, CHP, G; typically on open clay slopes and burn areas below 3,300 feet elevation.
<i>Heliotropium curassavicum</i> (salt heliotrope)		X		
<i>Pectocarya linearis</i> var. <i>ferocula</i> (slender comb-bur)		X		
<i>Pectocarya penicillata</i> (winged pectocarya)		X		
<i>Plagiobothrys canescens</i> (valley popcorn flower)		X		
<i>Plagiobothrys collinus</i> var. <i>californicus</i> (California popcorn flower)		X		
<i>Plagiobothrys tenellus</i> (slender popcorn flower)		X		
<i>Plagiobothrys nothofulvus</i> (rusty popcorn flower)		X		
• <b>Brassicaceae</b>				
<i>Athysanus pusillus</i> (dwarf athysanus)		X		

Species Name	Status	Known to Occur	Expected to Occur	Habitat
<i>Caulanthus heterophyllus</i> var. <i>pseudosimulans</i> (false Payson's jewelflower)		X		CSS, CHP
<i>Caulanthus simulans</i> (Payson's jewelflower)	CNPS 4	X		Rocky areas of CHP below 5,000 feet elevation.
<i>Descurainia pinnata</i> (tansy mustard)		X		
<i>Draba cuneifolia</i> (desert whitlow)		X		
<i>Guillenia lasiophylla</i> (California mustard)		X		
<i>Lepidium lasiocarpum</i> var. <i>lasiocarpum</i> (sand peppergrass)		X		
<i>Lepidium nitidum</i> (shining peppergrass)		X		
<i>Lepidium virginicum</i> (wild peppergrass)		X		
<i>Rorippa nasturtium-aquaticum</i> (white water-cress)		X		
<i>Thysanocarpus curvipes</i> (elegant lacepod)		X		
<i>Thysanocarpus laciniatus</i> (notched finge pod)		X		
<i>Tropidocarpum gracile</i> (dobie pod)		X		
• <b>Cactaceae</b>				
<i>Opuntia littoralis</i> var. <i>vaseyi</i> (coastal prickly pear)		X		
<i>Opuntia parryi</i> var. <i>parryi</i> (valley cholla)		X		
• <b>Campanulaceae</b>				
<i>Nemacladus ramosissimus</i> (Nuttall's threadplant)		X		
<i>Githopsis diffusa</i> (southern blue cup)		X		
<i>Githopsis diffusa</i> ssp. <i>candida</i> (white blue cup)		X		
<i>Triodanis biflora</i> (small-flower venus looking glass)		X		
• <b>Caprifoliaceae</b>				
<i>Lonicera subspicata</i> (southern honeysuckle)		X		
<i>Sambucus mexicana</i> (Mexican elderberry)		X		Edge of RF, shaded slopes, arroyos
• <b>Caryophyllaceae</b>				
<i>Loeflingia squarrosa</i> (loeflingia)		X		
<i>Silene laciniata</i> (southern pink)		X		
<i>Spergularia marina</i> (salt marsh sand spurry)		X		
• <b>Chenopodiaceae</b>				
<i>Atriplex coronata</i> var. <i>notatior</i> (San Jacinto Valley crownscale)	FE, CNPS 1B		X	Alkali flats
<i>Atriplex serenana</i> var. <i>serenana</i> (bracted saltbush)		X		
<i>Chenopodium californicum</i>		X		

Species Name	Status	Known to Occur	Expected to Occur	Habitat
(California goosefoot)				
• <b>Cistaceae</b>				
<i>Helianthus scoparium</i> (peak rush-rose)		X		
• <b>Convolvulaceae</b>				
<i>Calystegia macrostegia ssp. arida</i> (western morning glory)		X		
<i>Convolvulus simulans</i> (Small-flowered morning-glory)	CNPS 4	X		CSS, G
• <b>Crassulaceae</b>				
<i>Crassula connata</i> (pygmy sand weed)		X		
<i>Dudleya lanceolata</i> (lance-leaved dudleya)		X		
<i>Dudleya pulverulenta</i> (Clark's live-forever)		X		Rocks and cliffs
• <b>Cucurbitaceae</b>				
<i>Cucurbita foetidissima</i> (coyote melon)		X		
<i>Marah macrocarpus</i> (man root)		X		
• <b>Cuscutaceae</b>				
<i>Cuscuta californica</i> (witch's hair)		X		
<i>Cuscuta dodder</i> (pretty dodder)		X		
• <b>Ericaceae</b>				
<i>Arctostaphylos glandulosa</i> (eastwood manzanita)		X		
<i>Arctostaphylos glauca</i> (bigberry manzanita)		X		
• <b>Euphorbiaceae</b>				
<i>Chamaesyce albomarginata</i> (rattlesnake weed)		X		
<i>Chamaesyce polycarpa</i> (small-seed sandmat)		X		
<i>Croton californicus</i> (California croton)		X		
<i>Eremocarpus setigerus</i> (dove weed)		X		
<i>Stillingia linearifolia</i> (stillingia)		X		
• <b>Fabaceae</b>				
<i>Astragalus didymocarpus</i> (two-seeded milkvetch)		X		
<i>Astragalus gambelianus</i> (Gambel's locoweed)		X		
<i>Astragalus pomonensis</i> (Pomona locoweed)		X		CSS
<i>Lotus argophyllus</i> (silverleaf lotus)		X		
<i>Lotus hamatus</i> (grab lotus)		X		
<i>Lotus heermannii</i> (southern woolly lotus)		X		
<i>Lotus purshianus</i> (Spanish clover)		X		
<i>Lotus scoparius</i> (deerweed)		X		
<i>Lotus strigosus</i> (hirsute lotus)		X		
<i>Lotus wrangelianus</i> (California		X		

Species Name	Status	Known to Occur	Expected to Occur	Habitat
lotus)				
<i>Lupinus bicolor</i> (miniature lupine)		X		
<i>Lupinus concinnus</i> (bajada lupine)		X		
<i>Lupinus hirsutissimus</i> (stinging lupine)		X		
<i>Lupinus succulentus</i> (arroyo lupine)		X		G
<i>Lupinus truncates</i> (collar lupine)		X		
<i>Trifolium albopurpureum</i> (rancheria clover)		X		
<i>Trifolium ciliolatum</i> (tree clover)		X		
<i>Trifolium gracilentum</i> (pin-point clover)		X		
<i>Trifolium obtusiflorum</i> (creek clover)		X		
<i>Trifolium willdenovii</i> (tomcat clover)		X		
• <b>Fagaceae</b>				
<i>Quercus agrifolia</i> (coast live oak)		X		OF
<i>Quercus berberidifolia</i> (scrub oak)		X		
<i>Quercus engelmannii</i> (Englemann oak)	CNPS 4	X		Canyons and open slopes of southern oak woodland below 4,000 feet elevation.
• <b>Frankeniaceae</b>				
<i>Frankenia salina</i> (alkali heath)		X		
• <b>Garryaceae</b>				
<i>Garrya veatchii</i> (Silk tassel bush)		X		
• <b>Gentianaceae</b>				
<i>Centaureum venustum</i> (canchalagua)		X		
• <b>Geraniaceae</b>				
<i>Erodium macrophyllum</i> (large-leaved erodium)		X		
• <b>Hydrophyllaceae</b>				
<i>Emmenanthe penduliflora</i> (whispering bells)		X		
<i>Eriodictyon crassifolium</i> (hoary-leaved yerba santa)		X		
<i>Eucrypta chrysanthemifolia</i> (common eucrypta)		X		
<i>Nemophila menziesii</i> (baby blue eyes)		X		
<i>Phacelia brachyloba</i> (short-lobed phacelia)		X		
<i>Phacelia cicutaria</i> (caterpillar phacelia)		X		
<i>Phacelia distans</i> (wild heliotrope)		X		
<i>Phacelia minor</i> (Canterbury bells)		X		
<i>Phacelia ramosissima</i> (branching phacelia)		X		
• <b>Juglandaceae</b>				
<i>Juglans californica californica</i> (Southern California walnut)		X		

Species Name	Status	Known to Occur	Expected to Occur	Habitat
<b>• Lamiaceae</b>				
<i>Lepechinia cardiophylla</i> (heart-leaved pitcher sage)		X		CHP
<i>Monardella lanceolata</i> (mustang mint)		X		
<i>Salvia apiana</i> (white sage)		X		
<i>Salvia carduacea</i> (thistle sage)		X		
<i>Salvia columbariae</i> (chia)		X		
<i>Salvia mellifera</i> (black sage)		X		
<i>Scutellaria tuberosa</i> (Danny's skullcap)		X		
<i>Stachys rigida</i> (rigid hedge nettle)		X		
<i>Trichostema lanceolatum</i> (vinegar weed)		X		
<b>• Malvaceae</b>				
<i>Malacothamnus fasciculatus</i> (lax-flowered bushmallow)		X		CSS, CHP
<i>Malvella leprosa</i> (alkali mallow)		X		
<b>• Nyctaginaceae</b>				
<i>Abronia villosa</i> (sand verbena)		X		
<i>Mirabilis californica</i> var. <i>californica</i> (wishbone bush)		X		CSS, CHP
<b>• Oleaceae</b>				
<i>Fraxinus latifolia</i> (Oregon ash)		X		
<b>• Onograceae</b>				
<i>Camissonia bistorta</i> (California sun cup)		X		
<i>Camissonia californica</i> (mustard primrose)		X		
<i>Camissonia hirtella</i> (field suncup)		X		
<i>Camissonia ignota</i> (petioled primrose)		X		
<i>Camissonia strigulosa</i> (strigulose primrose)		X		
<i>Clarkia epilobioides</i> (willow-herb clarkia)		X		
<i>Clarkia purpurea</i> ssp. <i>quadrivulnera</i> (four spot clarkia)		X		
<i>Epilobium canum</i> (California fuchsia)		X		
<i>Epilobium ciliatum</i> (green willow-herb)		X		
<b>• Paeoniaceae</b>				
<i>Paeonia californica</i> (California paeony)		X		
<b>• Papaveraceae</b>				
<i>Argemone munita</i> (prickly poppy)		X		
<i>Eschscholzia californica</i> (California poppy)		X		
<i>Papaver californicum</i> (fire poppy)		X		
<i>Platystemon californicus</i> (California cream cups)		X		



Species Name	Status	Known to Occur	Expected to Occur	Habitat
<i>Romneya coulteri</i> (Coulter's matilija poppy)	CNPS 4	X		CHP, CSS
• <b>Plantaginaceae</b>				
<i>Plantago erecta</i> (California plantain)		X		
• <b>Platanaceae</b>				
<i>Platanus racemosa</i> (western sycamore)		X		
• <b>Polemoniaceae</b>				
<i>Eriastrum sapphirinum</i> (sapphire woolly star)		X		
<i>Gilia angelensis</i> (grassland gilia)		X		
<i>Gilia australis</i> (southern gilia)		X		
<i>Gilia capitata</i> (ball gilia)		X		
<i>Gilia diegensis</i> (San diego gilia)		X		
<i>Linanthus androsaceus</i> (spreading baby stars)		X		
<i>Linanthus dianthiflorus</i> (ground pink)		X		
<i>Linanthus lemmonii</i> (Lemmon's linanthus)		X		
<i>Linanthus pygmaeus</i> (pygmy linanthus)		X		
<i>Navarretia atractyloides</i> (skunkweed)		X		
• <b>Polygonaceae</b>				
<i>Chorizanthe parryi</i> var. <i>parryi</i> (Parry's spineflower)	CNPS 3	X		CSS
<i>Chorizanthe polygonoides</i> ssp. <i>longispina</i> (long-spined [knotweed] spineflower)	CNPS 1B	X		CHP, CSS, G
<i>Chorizanthe staticoides</i> (Turkish rugging)		X		
<i>Eriogonum elongatum</i> (long-stemmed buckwheat)		X		
<i>Eriogonum fasciculatum</i> var. <i>foliolosum</i> (interior flat-topped buckwheat)		X		
<i>Eriogonum gracile</i> (slender buckwheat)		X		
<i>Eriogonum davidsonii</i> (Davidson's buckwheat)		X		
<i>Lastarriaea coriacea</i> (leathery spineflower)		X		
<i>Polygonum lapathifolia</i> (willow smartweed)		X		
<i>Polygonum aviculare</i> (common knotweed)		X		
<i>Pterostegia drymarioides</i> (granny's hairnet)		X		
<i>Rumex salicifolius</i> (willow dock)		X		
• <b>Portulacaceae</b>				

Species Name	Status	Known to Occur	Expected to Occur	Habitat
<i>Calandrinia ciliate</i> (red maids)		X		
<i>Calyptridium monandrum</i> (sand cress)		X		
<i>Claytonia parviflora</i> (narrow-leaved miner's lettuce)		X		
<i>Claytonia perfoliata</i> (miner's lettuce)		X		
• <b>Ranunculaceae</b>				
<i>Clematis pauciflora</i> (small-leaved virgin's bower)		X		
<i>Delphinium parryi</i> (Parry's larkspur)		X		
<i>Thalictrum fendleri</i> (meadow rue)		X		
• <b>Rhamnaceae</b>				
<i>Ceanothus crassifolius</i> (hoary-leaved ceanothus)		X		CSS, CHP
<i>Ceanothus cuneatus</i> (buck brush)		X		
<i>Rhamnus crocea</i> (spiny redberry)		X		CHP, CSS
<i>Rhamnus ilicifolia</i> (holly-leaved redberry)		X		
<i>Ceanothus tomentosus</i> (Ramona lilac)		X		
• <b>Rosaceae</b>				
<i>Adenostoma fasciculatum</i> (chamise)		X		
<i>Adenostoma sparsifolium</i> (red shank)		X		
<i>Aphanes occidentalis</i> (western lady's mantle)		X		
<i>Cercocarpus betuloides</i> (mountain mahogany)		X		
<i>Heteromeles arbutifolia</i> (toyon)		X		
<i>Prunus ilicifolia</i> (holly-leaved cherry)		X		
<i>Rosa californica</i> (wild rose)		X		
• <b>Rubiaceae</b>				
<i>Galium angustifolium</i> (chaparral bedstraw)		X		
<i>Gallium nuttallii</i> (Nuttall's bedstraw)		X		
• <b>Salicaceae</b>				
<i>Populus fremontii</i> (Fremont cottonwood)		X		
<i>Salix exigua</i> (narrow-leaved willow)		X		
<i>Salix gooddingii</i> (black willow)		X		
<i>Salix lasiolepis</i> (arroyo willow)		X		
<i>Salix laevigata</i> (red willow)		X		
• <b>Saxifragaceae</b>				
<i>Jepsonia parryi</i> (coast jepsonia)		X		
<i>Lithophragma affinis</i> (woodland star)		X		
<i>Ribes indecorum</i> (white-flowered gooseberry)		X		

Species Name	Status	Known to Occur	Expected to Occur	Habitat
<i>Ribes malvaceum</i> (chaparral currant)		X		
• <b>Scrophulariaceae</b>				
<i>Antirrhinum coulterianum</i> (white snapdragon)		X		CSS, CHP
<i>Antirrhinum kelloggii</i> (climbing snapdragon)		X		
<i>Antirrhinum nuttallianum</i> (Nuttall's snapdragon)		X		
<i>Castilleja affinis</i> (Indian paintbrush)		X		
<i>Castilleja exserta</i> (owl's clover)		X		
<i>Castilleja foliolosa</i> (fox paintbrush)		X		
<i>Collinsia heterophylla</i> (Chinese houses)		X		
<i>Keckiella antirrhinoides</i> (yellow bush penstemon)		X		
<i>Linaria canadensis</i> (larger blue toadflax)		X		
<i>Mimulus aurantiacus</i> (San Diego monkey flower)		X		
<i>Mimulus brevipes</i> (slope semaphore)		X		
<i>Mimulus diffuses</i> (Palomar monkeyflower)	CNPS 4	X		CHP
<i>Mimulus cardinalis</i> (scarlet monkey flower)		X		
<i>Mimulus fremontii</i> (Fremont's monkey flower)		X		
<i>Mimulus guttatus</i> (seep monkey flower)		X		
<i>Mimulus pilosus</i> (downy monkey flower)		X		
<i>Penstemon centranthifolius</i> (scarlet bugler)		X		
<i>Penstemon spectabilis</i> (royal penstemon)		X		
<i>Scrophularia californica</i> (California figwort)		X		
<i>Veronica peregrine ssp. xalapensis</i> (Mexican speedwell)		X		
• <b>Solanaceae</b>				
<i>Datura wrightii</i> (jimson weed)		X		
<i>Nicotiana quadrivalvis</i> (Bigelow's tobacco)		X		
<i>Physalis crassifolia</i> (thick-leaved ground cherry)		X		
<i>Solanum xanti</i> (chaparral nightshade)		X		
• <b>Urticaceae</b>				
<i>Hesperocnide tenella</i> (western nettle)		X		
<i>Parietaria floridana</i> (western pellitory)		X		
<i>Urtica dioica ssp. holosericea</i> (giant		X		

Species Name	Status	Known to Occur	Expected to Occur	Habitat
nettle)				
• <b>Valerianaceae</b>				
<i>Plectritis ciliosa</i> (long-spurred plectritis)		X		
• <b>Verbenaceae</b>				
<i>Verbena lasiostachys</i> (western verbena)		X		
• <b>Violaceae</b>				
<i>Viola pedunculata</i> (Johnny jump-up)		X		
• <b>Vitaceae</b>				
<i>Vitis girdiana</i> (desert wild grape)		X		
• <b>Cyperaceae</b>				
<i>Cyperus eragrostis</i> (tall flat sedge)		X		
<i>Eleocharis palustris</i> (pale spike-rush)		X		
<i>Scirpinus americanus</i> (Olney's bulrush)		X		
<i>Scirpus acutus</i> var. <i>occidentalis</i> (common bulrush)		X		
<i>Scirpus californicus</i> (California bulrush)		X		
• <b>Juncaceae</b>				
<i>Juncus bufonius</i> (toad rush)		X		
<i>Juncus mexicanus</i> (Mexican rush)		X		
<i>Juncus rugulosus</i> (wrinkled rush)		X		
<i>Juncus textiles</i> (basket rush)		X		
<i>Juncus xiphioides</i> (iris-leaved rush)		X		
• <b>Liliaceae</b>				
<i>Allium haematochiton</i> (red-skinned onion)		X		
<i>Allium munzii</i> (Munz's onion)	FE, ST, CNPS 1B	X		G, CSS
<i>Allium peninsulare</i> (red-flowered onion)		X		
<i>Brodiaea jolonensis</i> (mesa brodiaea)		X		
<i>Bloomeria crocea</i> (golden stars)		X		
<i>Calochortus plummerae</i> (Plummer's mariposa lily)		X		
<i>Calochortus splendens</i> (splendid mariposa lily)		X		
<i>Chlorogalum parviflorum</i> (small-flower soap plant)		X		
<i>Chlorogalum pomeridianum</i> (wavy-leaved soap plant)		X		
<i>Dichelostemma capitata</i> (blue dicks)		X		CSS
<i>Fritillaria biflora</i> (Chocolate lily)	CNPS 1B	X		
<i>Mullia maritime</i> (common mullia)		X		
<i>Yucca whipplei</i> (Whipple's yucca)		X		CSS, CHP
• <b>Poaceae</b>				
<i>Achnatherum coronatum</i> (giant stipa)		X		

Species Name	Status	Known to Occur	Expected to Occur	Habitat
<i>Aristida purpurea</i> (purple three-awn)		X		
<i>Bromus carinatus</i> (California brome)		X		
<i>Distichlis spicata</i> (salt grass)		X		
<i>Elymus glaucus</i> (blue wild rye)		X		
<i>Koeleria macrantha</i> (June grass)		X		
<i>Leymus condensatus</i> (giant wild rye)		X		
<i>Leymus triticoides</i> (beardless wild rye)		X		
<i>Melica frutescens</i> (tall melic)		X		
<i>Melica imperfecta</i> (coast melic)		X		
<i>Muhlenbergia mirosperma</i> (littleseed muhly)		X		RF
<i>Muhlenbergia rigens</i> (deergrass)		X		
<i>Nassella lepida</i> (foothill needle grass)		X		CHP, oak grassland
<i>Nassella pulchra</i> (purple needle grass)		X		CHP, G, oak woodland
<i>Poa secunda</i> (malpais blue grass)		X		CHP
<i>Vulpia microstachys</i> var. <i>pauciflora</i> (Pacific fescue)		X		
<i>Vulpia octoflora</i> (six-weeks fescue)		X		
• <b>Typhaceae</b>				
<i>Typha domingensis</i> (slender-leaved cat-tail)		X		
<b>INVERTEBRATES</b>				
• <b>Ants</b>				
<i>Pogonomyrmex rugosus</i> (rough harvester ant)		X		
<i>Pogonomyrmex californicus</i> (California harvester ant)		X		
<i>Pogonomyrmex subnitidus</i>		X		
<i>Messor andrei</i>		X		
<i>Messor pergandei</i> (common seed harvester)		X		
<i>Crematogaster californica</i>		X		
<i>Solenopsis xyloni</i> (southern fire ant)		X		
<i>Solenopsis molesta</i>		X		
<i>Pheidole vistana</i>		X		
<i>Leptothorax andrei</i>		X		
<i>Camponotus</i> spp.		X		
<i>Myrmecocystus</i> spp.		X		
<i>Formica</i> spp.		X		
<i>Neivamyrmex californicus</i> (California army ant)		X		
<i>Tapinoma sessile</i>		X		
<i>Dorymyrmex insanus</i>		X		
<i>Dorymyrmex bicolor</i>		X		
<i>Forelius maccooki</i>		X		

Species Name	Status	Known to Occur	Expected to Occur	Habitat
<b>• Butterflies</b>				
Desert orangetip butterfly ( <i>Anthocharis cethura</i> )		X		G, CSS
Quino checkerspot butterfly ( <i>Euphydryas editha quino</i> )	FE	X		CSS, G
Monarch ( <i>Danaus plexippus</i> )		X		
Gulf fritillary ( <i>Agraulis vanillae</i> )			X	
Henne's checkerspot ( <i>Occidryas chalcedona</i> )			X	
California patch ( <i>Chlosyne californica</i> )		X		
Wright's checkerspot ( <i>Thessalia leanira wrighti</i> )		X		
Satyr anglewing ( <i>Polygonia satyrus</i> )		X		
California tortoise shell ( <i>Nyphalis californica</i> )		X		
Mourning cloak ( <i>Nyphalis antiopa</i> )		X		
Red admiral ( <i>Vanessa atalanta</i> )		X		
Painted lady ( <i>Vanessa cardui</i> )		X		
American painted lady ( <i>Vanessa virginiensis</i> )		X		
West coast lady ( <i>Vanessa annabella</i> )		X		
Buckeye ( <i>Junonia coenia</i> )		X		
Lorquin's admiral ( <i>Basilarchia lorquini</i> )		X		
California sister ( <i>Adelpha bredowii californica</i> )		X		
Anise swallowtail ( <i>Papilio zelicaon</i> )		X		
Western tiger swallowtail ( <i>Papilio rutulus</i> )		X		
Pale swallowtail ( <i>Papilio eurymedon</i> )		X		
Common white ( <i>Pontia protodice</i> )		X		
Sara orangetip ( <i>Anthocharis sara</i> )		X		
Behr's metalmark ( <i>Apodemia mormo virgulti</i> )		X		
Electra buckmoth		X		
<b>• Spiders</b>				
<b>Ctenizidae</b>				
<i>Bothriocyrtum californicum</i>		X		CSS
<b>Cyrtacheniidae</b>				
<i>Aptostichus atomarius</i>		X		CSS
<b>Theraphosidae</b>				
<i>Aphonopelma steindachneri</i>		X		CSS
<b>Agelenidae</b>				
<i>Agelenopsis aperta</i>		X		CSS
<i>Calilena stylophora</i>		X		CSS
<i>Rualena balboae</i>		X		CSS
<b>Anyphaenidae</b>				
<i>Anyphaena californica</i>		X		CSS



Species Name	Status	Known to Occur	Expected to Occur	Habitat
<b>Araneidae</b>				
<i>Argiope argentata</i>		X		CSS
<i>Argiope trifasciata</i>		X		CSS
<i>Cyclosa turbinata</i>		X		CSS
<i>Eustala californiensis</i>		X		CSS
<i>Eustala conchlea</i>		X		CSS
<i>Eustala rosae</i>		X		CSS
<i>Hypsosinga funbris</i>		X		CSS
<i>Larinia directa</i>		X		CSS
<i>Mastophora cornigera</i>		X		CSS
<i>Metepeira crassipes</i>		X		CSS
<i>Metepeira foxi</i>		X		CSS
<i>Metepeira grandiose grandiose</i>		X		CSS
<i>Neoscona crucifera</i>		X		CSS
<i>Newoscona oaxacensis</i>		X		CSS
<b>Caponiidae</b>				
<i>Orthonops zebra</i>		X		CSS
<b>Corinnidae</b>				
<i>Castianeira athena</i>		X		CSS
<i>Castianeira occidentis</i>		X		CSS
<b>Dictynidae</b>				
<i>Blabomma sanctum</i>		X		CSS
<i>Cicurina utahana</i>		X		CSS
<i>Dictyna abundans</i>		X		CSS
<i>Dictyna agressa</i>		X		CSS
<i>Dictyna calcarata</i>		X		CSS
<i>Dictyna cholla</i>		X		CSS
<i>Dictyna sierra</i>		X		CSS
<i>Emblyna consulta</i>		X		CSS
<i>Emblyna hoya</i>		X		CSS
<i>Emplyna linda</i>		X		CSS
<i>Emblyna reticulate</i>		X		CSS
<i>Mallos pearcei</i>		X		CSS
<i>Tivyna moaba</i>		X		CSS
<i>Tricholathys jacinto</i>		X		CSS
<i>Tricholathys monterea</i>		X		CSS
<i>Yorima angelica</i>		X		CSS
<b>Diguetidae</b>				
<i>Diguetia canites</i>		X		CSS
<i>Dysdera crocata</i>		X		CSS
<b>Filistatidae</b>				
<i>Filistatinella</i> sp.		X		CSS
<b>Gnaphosidae</b>				
<i>Callilepis gosoga</i>		X		CSS
<i>Cesonia classica</i>		X		CSS
<i>Drassyllus fractus</i>		X		CSS
<i>Drassyllus insularis</i>		X		CSS
<i>Drassyllus lamprus</i>		X		CSS
<i>Gnaphosa californica</i>		X		CSS
<i>Haplodrassus maculates</i>		X		CSS
<i>Herpyllus hesperolus</i>		X		CSS
<i>Herpyllus propinquus</i>		X		CSS

Species Name	Status	Known to Occur	Expected to Occur	Habitat
<i>Micaria deserticola</i>		X		CSS
<i>Micaria gosiuta</i>		X		CSS
<i>Micaria icenoglei</i>		X		CSS
<i>Micaria jeanae</i>		X		CSS
<i>Nodocion utus</i>		X		CSS
<i>Scopoides catharius</i>		X		CSS
<i>Zelotes gynethus</i>		X		CSS
<i>Zelotes monochus</i>		X		CSS
<i>Zelotes skinnerensis</i>		X		CSS
<b>Hahniidae</b>				
<i>Neoantistea santana</i>		X		CSS
<b>Heteropodidae</b>				
<i>Olios schistus</i>		X		CSS
<b>Homalonychidae</b>				
<i>Homalonychus theologus</i>		X		CSS
<b>Linyphiidae</b>				
<i>Ceraticelus</i> sp.		X		CSS
<i>Erigone autumnalis</i>		X		CSS
<i>Erigone dentosa</i>		X		CSS
<i>Frontinella pyramitela</i>		X		CSS
<i>Linyphantes aliso</i>		X		CSS
<i>Linyphantes microps</i>		X		CSS
<i>Meioneta</i> sp.		X		CSS
<i>Microlinyphia mandibulata punctata</i>		X		CSS
<i>Spirembolus erratus</i>		X		CSS
<i>Spirembolus phylax</i>		X		CSS
<i>Spirembolus pusillus</i>		X		CSS
<i>Spirembolus tortuosus</i>		X		CSS
<i>Spirembolus redondo</i>		X		CSS
<i>Tennesseellum formicum</i>		X		CSS
<i>Wubana drassoides</i>		X		CSS
<b>Liocranidae</b>				CSS
<i>Drassinella gertschi</i>		X		CSS
<i>Phrurotimpus mateonus</i>		X		CSS
<i>Scotinella kastoni</i>		X		CSS
<b>Lycosidae</b>				
<i>Alopecosa kochi</i>		X		CSS
<i>Pardosa californica</i>		X		CSS
<i>Pardosa ramulosa</i>		X		CSS
<i>Schizocosa maxima</i>		X		CSS
<i>Schizocosa mccooki</i>		X		CSS
<b>Mimetidae</b>				
<i>Mimetus hesperus</i>		X		CSS
<b>Miturgidae</b>				
<i>Cheiracanthium inclusum</i>		X		CSS
<i>Syspira synthetica</i>		X		CSS
<b>Oonopidae</b>				
<i>Oonops</i> sp.		X		CSS
<i>Scaphiella hespera</i>		X		CSS
<b>Oxyopidae</b>				
<i>Oxyopes salticus</i>		X		CSS

Species Name	Status	Known to Occur	Expected to Occur	Habitat
<i>Oxyopes scalaris</i>		X		CSS
<i>Oxyopes tridens</i>		X		CSS
<i>Peucetia longipalpis</i>		X		CSS
<i>Peucetia viridens</i>		X		CSS
<b>Philodromidae</b>				
<i>Apollophanes texanus</i>		X		CSS
<i>Ebo albocaudatus</i>		X		CSS
<i>Ebo andreaannae</i>		X		CSS
<i>Ebo californicus</i>		X		CSS
<i>Ebo evansae</i>		X		CSS
<i>Ebo mexicanus</i>		X		CSS
<i>Philodromus californicus</i>		X		CSS
<i>Philodromus chamisis</i>		X		CSS
<i>Thanatus formicinus</i>		X		CSS
<i>Tibellus chamberlini</i>		X		CSS
<b>Pholcidae</b>				
<i>Holocnemus pluchei</i>		X		CSS
<i>Physocyclus californicus</i>		X		CSS
<i>Psilochorus</i> sp.		X		CSS
<b>Plectreuridae</b>				
<i>Plectreurys conifera</i>		X		CSS
<b>Salticidae</b>				
<i>Habronattus californicus</i>		X		CSS
<i>Habronattus hirsutus</i>		X		CSS
<i>Habronattus pyrrithrix</i>		X		CSS
<i>Habronattus schlingeri</i>		X		CSS
<i>Habronattus tranquillus</i>		X		CSS
<i>Menemerus bivittatus</i>		X		CSS
<i>Metaphidippus chera</i>		X		CSS
<i>Metaphidippus manni</i>		X		CSS
<i>Metaphidippus vitis</i>		X		CSS
<i>Pelegrina aeneola</i>		X		CSS
<i>Pellenes limatus</i>		X		CSS
<i>Phidippus ardens</i>		X		CSS
<i>Phidippus californicus</i>		X		CSS
<i>Phidippus johnsoni</i>		X		CSS
<i>Phidippus nikites</i>		X		CSS
<i>Phidippus octopunctatus</i>		X		CSS
<i>Salticus palpalis</i>		X		CSS
<i>Sarinda cutleri</i>		X		CSS
<i>Sitticus dorsatus</i>		X		CSS
<i>Synageles occidentalis</i>		X		CSS
<b>Tengellidae</b>				
<i>Anachemmis dolichopus</i>		X		CSS
<b>Tetragnathidae</b>				
<i>Tetragnatha guatemalensis</i>		X		CSS
<i>Tetragnatha pallescens</i>		X		CSS
<i>Tetragnatha versicolor</i>		X		CSS
<b>Theridiidae</b>				
<i>Achaeearanea tepidariorum</i>		X		CSS
<i>Dipoena abdita</i>		X		CSS
<i>Enoplognatha selma</i>		X		CSS

Species Name	Status	Known to Occur	Expected to Occur	Habitat
<i>Euryopsis californica</i>		X		CSS
<i>Latrodectus hesperus</i>		X		CSS
<i>Steatoda washona</i>		X		CSS
<i>Theridion dilutum</i>		X		CSS
<i>Theridion llano</i>		X		CSS
<i>Theridion melanurum</i>		X		CSS
<i>Theridion rabuni</i>		X		CSS
<i>Tidarren haemorrhoidale</i>		X		CSS
<i>Thomisidae</i>		X		CSS
<i>Misumenops aikoae</i>		X		CSS
<i>Misumenops californicus</i>		X		CSS
<i>Misumenops deserti</i>		X		CSS
<i>Misumenops importunes belkini</i>		X		CSS
<i>Misumenops lepidus</i>		X		CSS
<i>Misumenops rothi</i>		X		CSS
<i>Xysticus californicus</i>		X		CSS
<i>Xysticus gertschi</i>		X		CSS
<i>Xysticus montanensis</i>		X		CSS
<b>• Wasps</b>				
Parasitic wasp ( <i>Meximalus skinnerensis</i> )		X		CSS
<b>HERPETOFAUNA</b>				
<b>• Salamanders</b>				
Pacific slender salamander ( <i>Batrachoseps pacificus</i> )		X		CSS, RF
<b>• Frogs and Toads</b>				
Pacific treefrog ( <i>Hyla regilla</i> )		X		Ponds, reservoirs, slow moving streams.
Western spadefoot toad ( <i>Scaphiopus hammondi</i> )	CSC	X		Ponds, reservoirs, slow moving streams.
Western toad ( <i>Bufo boreas</i> )		X		CSS, CHP, OF, RF, near water
<b>• Turtles</b>				
Southwestern pond turtle ( <i>Actinemys marmorata pallida</i> )	CSC	X		Ponds, reservoirs, slow moving streams.
<b>• Lizards</b>				
Banded gecko ( <i>Coleonyx variegates</i> )		X		CHP
Southern alligator lizard ( <i>Gerrhonotus multicarinatus</i> )		X		G, CHP, OF
Western skink ( <i>Eumeces skiltonianus</i> )		X		G, OF
California legless lizard ( <i>Anniella pulchra</i> )		X		CHP, G, RF
Coastal western whiptail ( <i>Cnemidophorus tigris multiscutatus</i> )	C2	X		G, CSS, RF, DIS
Granite spiny lizard ( <i>Sceloporus orcutti</i> )		X		Rocky areas
Orange throated whiptail ( <i>Cnemidophorus hyperythrus</i> )	CSC	X		CSS, CHP, G

Species Name	Status	Known to Occur	Expected to Occur	Habitat
<i>beldingi</i>				
San Diego horned lizard ( <i>Phrynosoma coronatum blainvillii</i> )	CSC	X		CSS, CHP
Side-blotched lizard ( <i>Uta stansburiana</i> )		X		Rocky areas
Western fence lizard ( <i>Sceloporus occidentalis</i> )		X		Rocky areas
California legless lizard ( <i>Anniella pulchra</i> )		X		Loose soils, drainages and hillsides
• <b>Snakes</b>				
California kingsnake ( <i>Lampropeltis getulus</i> )		X		OF, CHP, CSS
Southern pacific rattlesnake ( <i>Crotalus viridis helleri</i> )		X		CSS, G, CHP, OF, RF: mostly rocky areas
San Diego gopher snake ( <i>Pituophis melanoleucus</i> )		X		CSS, G, CHP, OF, RF
Western ringneck snake ( <i>Diadophis punctatus</i> )		X		Moist habitats in OF, G, CHP, RF
Coachwhip ( <i>Masticophis flagellum</i> )		X		CSS, CHP, G, OF, RF
Western black-headed snake ( <i>Tantilla planiceps</i> )		X		G, OF, CHP, CSS
Patch-nosed snake ( <i>Salvadora hexalepis</i> )		X		CHP, CSS, G
Coastal rosy boa ( <i>Lichanura trivirgata roseofusca</i> )		X		CSS, G, DIS
Northern red diamond rattlesnake ( <i>Crotalus ruber ruber</i> )	CSC	X		G, CSS, DIS
Two-striped garter snake ( <i>Thamnophis hammondi</i> )		X		Near streams
Western long-nosed snake ( <i>Rhinocheilus lecontei</i> )		X		CSS
<b>BIRDS</b>				
• <b>Hérons</b>				
Great blue heron ( <i>Ardea herodias</i> )		X		RF, streams
Green heron ( <i>Butorides striatus</i> )		X		RF, streams
Cattle egret ( <i>Bubulcus ibis</i> )		X		G
Snowy Egret ( <i>Egretta thula</i> )		X		G
Great egret ( <i>Casmerodius albus</i> )		X		RF, G
• <b>American Vultures</b>				
Turkey vulture ( <i>Cathartes aura</i> )		X		All MSR habitats
• <b>Kites, Hawks, Eagles</b>				
Bald eagle ( <i>Haliaeetus leucocephalus</i> )	SE, CFP, BEPA	X		Lakes and reservoirs
Golden eagle ( <i>Aquila chrysaetos</i> )	CSC, BEPA, CFP	X		CSS, CHP, G, AG
Black shouldered kite ( <i>Elanus caeruleus</i> )	CFP	X		RF, G
Northern harrier ( <i>Circus cyaneus</i> )	CSC	X		CSS, G, AG
Sharp-shinned hawk ( <i>Accipiter striatus</i> )	CSC	X		CSS, RF
Cooper's hawk ( <i>Accipiter cooperi</i> )	CSC	X		RF, OF, G, AG

Species Name	Status	Known to Occur	Expected to Occur	Habitat
Red-shoulder hawk ( <i>Buteo lineatus</i> )		X		RF, OF
Red-tailed hawk ( <i>Buteo jamaicensis</i> )		X		RF, OF, G
Swainson's hawk ( <i>Buteo swainsoni</i> )	ST, CSC	X		G, AG, RF
Rough-legged hawk ( <i>Buteo lagopus</i> )		X		G
Ferruginous hawk ( <i>Buteo regalis</i> )	CSC	X		G, AG
Osprey ( <i>Pandion haliaetus</i> )		X		OW
• <b>Falcons</b>				
American kestrel ( <i>Falco sparverius</i> )		X		G
Merlin ( <i>Falco columbarius</i> )		X		G, OF, RF
Peregrine falcon ( <i>Falco peregrinus</i> )			X	OW, G, OF
Prairie falcon ( <i>Falco mexicanus</i> )	CSC	X		CSS, G, AG
• <b>Ptarmigans</b>				
California quail ( <i>Callipepla californica</i> )		X		CSS, CHP, OF, G
Wild turkey ( <i>Meleagris gallopavo</i> )		X		OF, RF, G
• <b>Pigeons and Doves</b>				
Band tailed pigeon ( <i>Columba fasciata</i> )		X		OF
Mourning dove ( <i>Zenaida macroura</i> )		X		G
• <b>Cuckoos</b>				
Yellow-billed cuckoo ( <i>Coccyzus americanus</i> )	SE		X	RF
Greater roadrunner ( <i>Geococcyx californianus</i> )		X		CSS, CHP, G
• <b>Owls</b>				
Barn owl ( <i>Tyto alba</i> )		X		G, OF
Short-eared owl ( <i>Asio flammeus</i> )	CSC	X		G, OF, RP
Long-eared owl ( <i>Asio otus</i> )	CSC		X	RF, OF
Great horned owl ( <i>Bubo virginianus</i> )		X		OF
Western screech owl ( <i>Otus kennicottii</i> )		X		OF, RP, G
Burrowing owl ( <i>Athene cunicularia</i> )	CSC	X		G, OF, AG
• <b>Nightjars</b>				
Common poorwill ( <i>Phalaenoptilus nuttallii</i> )	CSC	X		G, AG, DIS
Common nighthawk ( <i>Chordeiles minor</i> )		X		G, CHP, CSS
Lesser nighthawk ( <i>Chordeiles acutipennis</i> )		X		G, CHP, CSS
• <b>Swifts</b>				
White throated swift ( <i>Aeronautes saxatalis</i> )			X	CHP, rocky areas, cliffs
• <b>Hummingbirds</b>				
Black-chinned hummingbird ( <i>Archilochus alexandri</i> )		X		
Costa's hummingbird ( <i>Calypte costae</i> )		X		CSS
Anna's hummingbird ( <i>Calypte anna</i> )			X	CSS
• <b>Kingfishers</b>				

Species Name	Status	Known to Occur	Expected to Occur	Habitat
Belted kingfisher ( <i>Ceryle alcyon</i> )		X		OW, RF
• <b>Woodpeckers</b>				
Northern flicker ( <i>Colaptes auratus</i> )		X		
Acorn woodpecker ( <i>Melanerpes formicivorus</i> )		X		OF
Lewis' woodpecker ( <i>Melanerpes lewis</i> )			X	OF
Downy woodpecker ( <i>Picoides pubescens</i> )			X	O
• <b>Tyrant flycatchers</b>				
Western kingbird ( <i>Tyrannus verticalis</i> )		X		G, CSS, CHP
Ash-throated flycatcher ( <i>Myiarchus cinerascens</i> )		X		G, CSS, CHP
Black phoebe ( <i>Sayornis nigricans</i> )		X		OF, CSS, CHP
Say's phoebe ( <i>Sayornis saya</i> )	CSC	X		RF, OF, CSS, CHP
Southwestern willow flycatcher ( <i>Empidonax traillii eximius</i> )	FE, SE, CSC	X		RF
Cassin's kingbird ( <i>Tyrannus vociferans</i> )		X		OF, RF, G
• <b>Larks</b>				
California horned lark ( <i>Eremophila alpestris actia</i> )	CSC	X		G, CSS, AG, DIS
• <b>Swallows</b>				
Tree swallow ( <i>Tachycineta bicolor</i> )			X	RF
Violet-green swallow ( <i>Tachycineta thalassina</i> )			X	RF
Cliff swallow ( <i>Hirundo pyrrhonota</i> )		X		
• <b>Jays, Crows</b>				
Scrub jay ( <i>Aphelocoma coerulescens</i> )		X		RF, OF, CSS, CHP
American crow ( <i>Corvus brachyrhynchos</i> )		X		All MSR habitats
Common raven ( <i>Corvus corax</i> )		X		RF, OF
• <b>Titmice</b>				
Plain titmouse ( <i>Parus inornatus</i> )		X		OF
• <b>Bushtit</b>				
Bushtit ( <i>Psaltriparus minimus</i> )		X		CHP, OF
• <b>Nuthatches</b>				
White breasted nuthatch ( <i>Sitta carolinensis</i> )			X	OF
• <b>Wrens</b>				
House wren ( <i>Troglodytes aedon</i> )		X		CSS, CHP, OF
Bewick's wren ( <i>Thryomanes bewickii</i> )			X	G, RF, OF
Canyon wren ( <i>Catherpes mexicanus</i> )		X		RF, rocky areas
Coastal cactus wren ( <i>Campylorhynchus brunneicapillus sandiegoense</i> )			X	CSS, CHP
• <b>Thrushes</b>				
Blue-gray gnatcatcher ( <i>Polioptila</i> )		X		CSS, CHP



Species Name	Status	Known to Occur	Expected to Occur	Habitat
<i>caerulea</i> )				
California gnatcatcher ( <i>Polioptila californica californica</i> )	CSC	X		CSS
Western bluebird ( <i>Sialia mexicana</i> )		X		G, OF
Mountain bluebird ( <i>Sialia currucoides</i> )		X		G, OF
Ruby-crowned kinglet ( <i>Regulus calendula</i> )		X		RF, OF
• <b>Shrikes</b>				
Loggerhead shrike ( <i>Lanius ludovicianus</i> )	CSC	X		CSS, CHP, G, AG, DIS
• <b>Mimic Thrushes</b>				
Northern mockingbird ( <i>Mimus polyglottos</i> )		X		G, CSS, AG, CHP, DIS
California thrasher ( <i>Toxostoma redivivum</i> )		X		CSS, CHP, G
• <b>Silky Flycatchers</b>				
Phainopepla ( <i>Phainopepla nitens</i> )		X		CSS, CHP, OF, G
• <b>Vireos</b>				
Least Bell's vireo ( <i>Vireo bellii pusillus</i> )	FE, SE	X		RF
Solitary vireo ( <i>Vireo solitarius</i> )		X		RF, OF
• <b>Warblers, Sparrows</b>				
Yellow-rumped warbler ( <i>Dendroica coronata</i> )		X		G
Black-throated gray warbler ( <i>Dendroica nigrescens</i> )			X	CSS, CHP, OF
Yellow warbler ( <i>Dendroica petechia</i> )		X		RF, OF
Common yellowthroat ( <i>Geothlypis trichas</i> )		X		RF
Yellow-breasted chat ( <i>Icteria virens</i> )		X		RF
Blue Grosbeak ( <i>Guiraca caerulea</i> )		X		G, RF
Lazuli bunting ( <i>Passerina amoeba</i> )		X		G, RF
Spotted towhee ( <i>Pipilo erythrophthalmus</i> )		X		CSS, CHP
Brown towhee ( <i>Pipilo fuscus</i> )		X		CSS, CHP
Grasshopper sparrow ( <i>Ammodramus bairdii</i> )		X		G
Savannah sparrow ( <i>Passerculus sandwichensis</i> )		X		G
Song sparrow ( <i>Melospiza melodia</i> )		X		RF, G, CSS
Lark sparrow ( <i>Chondestes grammacus</i> )		X		G, AG
Bell's sage sparrow ( <i>Amphispiza belli belli</i> )	CSC	X		CSS, CHP
Rufous-crowned sparrow ( <i>Aimophila ruficeps</i> )	CSC	X		G, CSS
Chipping sparrow ( <i>Spizella passerine</i> )		X		G, CSS, CHP
Black-chinned sparrow ( <i>Spizella</i> )		X		CHP, CSS

Species Name	Status	Known to Occur	Expected to Occur	Habitat
<i>atroregularis</i> )				
White crowned sparrow ( <i>Zonotrichia leucophrys</i> )		X		G, CSS, CHP
Golden crowned sparrow ( <i>Zonotrichia atricapilla</i> )		X		RF, G, CHP, CSS
Fox sparrow ( <i>Passerella iliaca</i> )		X		CHP, OF
• <b>Blackbirds, Orioles</b>				
Western meadowlark ( <i>Sturnella neglecta</i> )		X		G
Red-winged blackbird ( <i>Agelaius phoeniceus</i> )		X		Streams, RF
Tricolored blackbird ( <i>Agelaius tricolor</i> )		X		Streams, RF
Brewer's blackbird ( <i>Euphagus cyanocephalus</i> )		X		G
Scott's oriole ( <i>Icterus parisorum</i> )		X		RF
Northern oriole ( <i>Icterus galbula</i> )		X		RF
Hooded oriole ( <i>Icterus cucullatus</i> )		X		RF
Western tanager ( <i>Piranga ludoviciana</i> )		X		RF
• <b>Finches</b>				
American goldfinch ( <i>Carduelis tristis</i> )		X		CSS, RF, CHP
Lesser goldfinch ( <i>Carduelis psaltria</i> )			X	CSS, RF, CHP
Lawrence's goldfinch ( <i>Carduelis lawrencei</i> )		X		RF, CSS, CHP
House finch ( <i>Carpodacus mexicanus</i> )		X		RF, CSS, CHP, OF
<b>MAMMALS</b>				
<b>Marsupiala</b>				
Virginia opossum ( <i>Didelphis virginiana</i> )		X		All Reserve habitats.
<b>Insectivora</b>				
Long-tailed shrew ( <i>Notiosorex</i> sp.)			X	
Ornate shrew ( <i>Sorex ornatus</i> )		X		
Desert shrew ( <i>Notiosorex crawfordi</i> )		X		
Broad-footed mole ( <i>Scapanus latimanus</i> )			X	
<b>Chiroptera</b>				
Pallid bat ( <i>Antrozous pallidus</i> )	CSC	X		G, OF
Spotted bat ( <i>Euderma maculatum</i> )	CSC		X	CHP, rocky outcroppings, RF
Townsend's western big-eared bat ( <i>Corynorhinus townsendii townsendii</i> )	CSC	X		OF, caves
Western mastiff bat ( <i>Eumops perotis</i> )	CSC	X		CHP, rocks
California leaf-nosed bat ( <i>Macrotus californicus</i> )			X	Mines
Pocketed free-tailed bat ( <i>Nyctinomops femorosaccus</i> )			X	

Species Name	Status	Known to Occur	Expected to Occur	Habitat
California myotis ( <i>Myotis californicus</i> )			X	
Small-footed myotis ( <i>Myotis ciliolabrum</i> )		X		
Yuma myotis ( <i>Myotis yumanensis</i> )			X	
Western pipistrelle ( <i>Pipistrellus hesperus</i> )		X		
Big brown bat ( <i>Eptesicus fuscus</i> )		X		
Red bat ( <i>Lasiurus blossevillii</i> )	CSC (proposed)		X	
Hoary bat ( <i>Lasiurus cinereus</i> )			X	
Mexican free-tailed bat ( <i>Tadarida brasiliensis</i> )		X		
<b>Carnivora</b>				
Gray fox ( <i>Urocyon cinereoargenteus</i> )		X		
Raccoon ( <i>Procyon lotor</i> )		X		
Striped skunk ( <i>Mephitis mephitis</i> )		X		
Spotted skunk ( <i>Spilogale putorius</i> )		X		
Long-tailed weasel ( <i>Mustela frenata</i> )		X		Rocky areas, RF
American badger ( <i>Taxidea taxus</i> )		X		G
Mountain lion ( <i>Felis concolor</i> )	CDFG "Specially protected mammal" under Fish and Game code 4800	X		Occurs in a wide variety of habitats.
Bobcat ( <i>Lynx rufus</i> )		X		Many Reserve habitats
Coyote ( <i>Canis latrans</i> )		X		Occurs in a wide variety of habitats.
<b>Artiodactyla</b>				
Mule deer ( <i>Odocoileus hemionus</i> )		X		All Reserve habitats
<b>Rodentia</b>				
California ground squirrel ( <i>Spermophilus beecheyi</i> )		X		All Reserve habitats
Chaparral chipmunk ( <i>Tamias obscurus</i> )			X	
Botta's pocket gopher ( <i>Thomomys bottae</i> )		X		
Dulzura kangaroo rat ( <i>Dipodomys simulans</i> )		X		CHP, CSS
Stephens' kangaroo rat ( <i>Dipodomys stephensi</i> )	ST, FE	X		G, CSS
California pocket mouse ( <i>Perognathus californicus</i> )			X	CSS
Northwestern San Diego pocket mouse ( <i>Chaetodipus fallax fallax</i> )	CSC	X		CSS, G, CHP
Dusky-footed woodrat ( <i>Neotoma fuscipes</i> )		X		CSS, CHP, RF, OF

Species Name	Status	Known to Occur	Expected to Occur	Habitat
Desert woodrat ( <i>Neotoma lepida</i> )			X	CSS, CHP, RF, OF
Southern grasshopper mouse ( <i>Onychomys torridus ramona</i> )	CSC	X		CSS, G
Brush mouse ( <i>Peromyscus boylii</i> )			X	
Parasitic mouse ( <i>Peromyscus californicus</i> )		X		
Cactus mouse ( <i>Peromyscus eremicus</i> )			X	
Deer mouse ( <i>Peromyscus maniculatus</i> )		X		
Pinon mouse ( <i>Peromyscus truei</i> )			X	
Harvest mouse ( <i>Reithrodontomys megalotis</i> )			X	
Los Angeles pocket mouse ( <i>Perognathus longimembris brevinasus</i> )	CSC	X		CSS, G
<b>Lagomorpha</b>				
San Diego black-tailed jackrabbit ( <i>Lepus californicus bennettii</i> )	CSC	X		G, CSS, DIS
Audubon's cottontail ( <i>Sylvilagus audubonii</i> )		X		
Brush rabbit ( <i>Sylvilagus bachmani</i> )		X		

Status Codes

BEPA	Bald and Golden Eagle Protection Act
CFP	California Fully Protected species
CNPS	California Native Plant Society list: (1B) and (2) Rare or endangered (3) more information is needed (4)limited distribution
CSC	Species of Special Concern (CDFG designation)
FE	Listed as Endangered under the Federal Endangered Species Act
FT	Listed as Threatened under the Federal Endangered Species Act
SE	Listed as Endangered under the State Endangered Species Act
ST	Listed as Threatened under the State Endangered Species Act

Habitat Codes

AG	Agriculture
CHP	Chamise and mixed chaparral
CSS	Coastal sage scrub
DIS	Disturbed
G	Annual grassland
OF	Coast live and Engelmann oak forest
OW	Open water/shoreline
RF	Riparian forest

Sources used:

SKR/HCP  
D. Bramlett Reserve Plant List (Oct 1996)  
A. Sanders, UCR Herbarium checklist (January 2000)  
MSHCP Incidental Observations from 2005 surveys  
MSR research reports

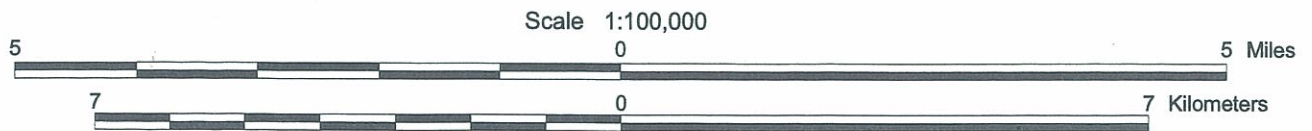
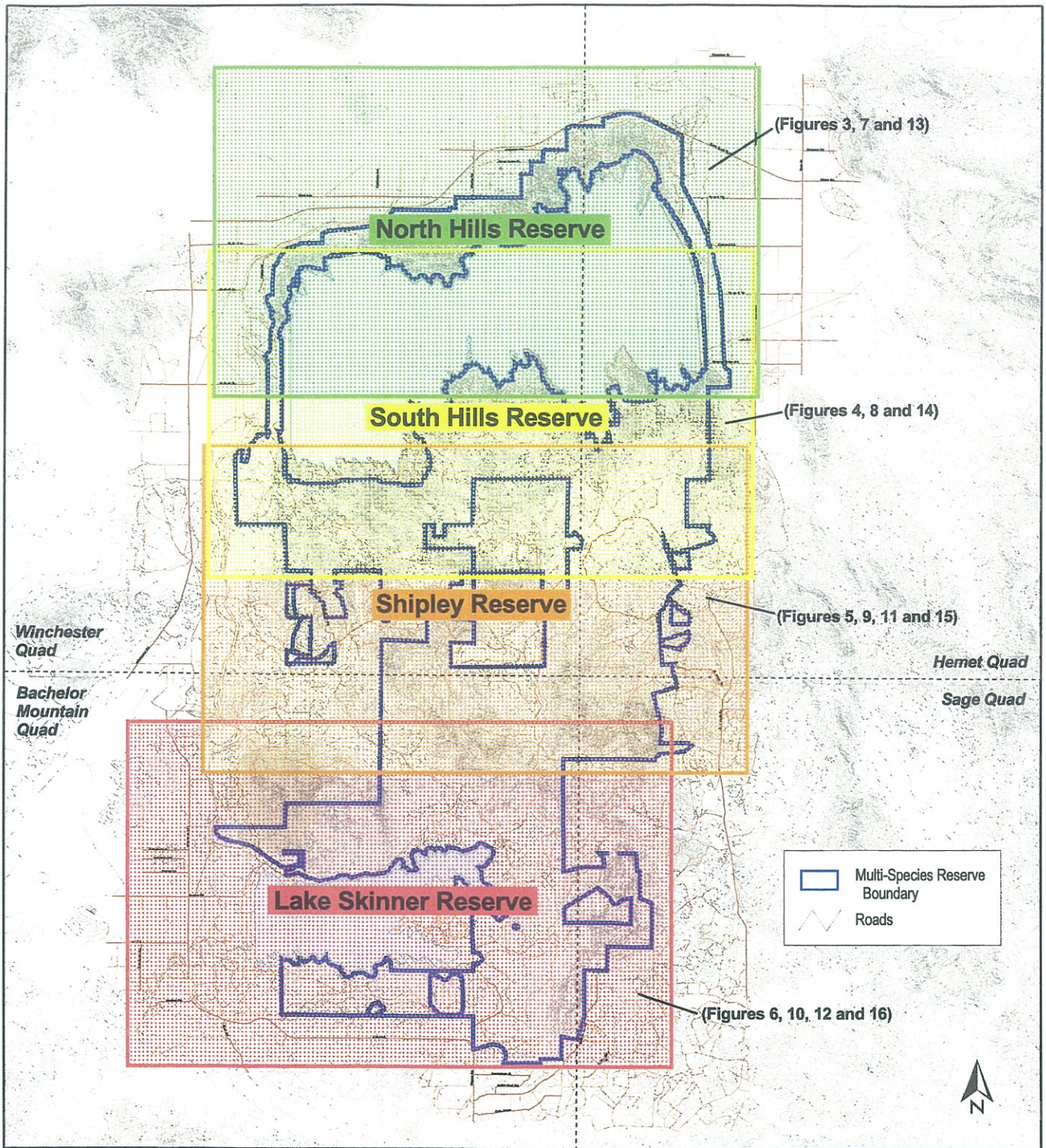
Reserve Manager's W. Riv. Co. species compiled from USFWS list  
Reserve Manager's blue book of species notes  
and reported observations

## Appendix 5. Multi-Species Reserve Archaeological Surveys

As referenced in §2.9, archaeological surveys were conducted on the Multi-Species Reserve from February 1992 to November 1995 by Applied Earthworks (2001). The boundary identified in the Archaeology report is based on the year 2000 boundary where land acquisitions subsequent to the archaeological surveys increased the Reserve boundary to the east. This boundary erroneously included the BLM parcel northeast of the intersection of Tualata Hills and Tualata Creek (T7S, R1W, Sec 8, NE 1/4).

As described in §2.1.1.2, BLM was a signatory to the Stephens' kangaroo rat HCP and thereby agreed to include six BLM parcels within the Reserve. The 1996 Stephens kangaroo rat HCP prescribed the reserve boundary and incorporated those BLM parcels within the reserve boundary; however, the BLM parcel northeast of the intersection of Tualata Hills and Tualata Creek was not included at the time because it was not adjacent to other reserve parcels. Currently, that specific BLM parcel remains outside of the Reserve boundary and is not subject to this Management Plan.





Contour interval is 25 feet

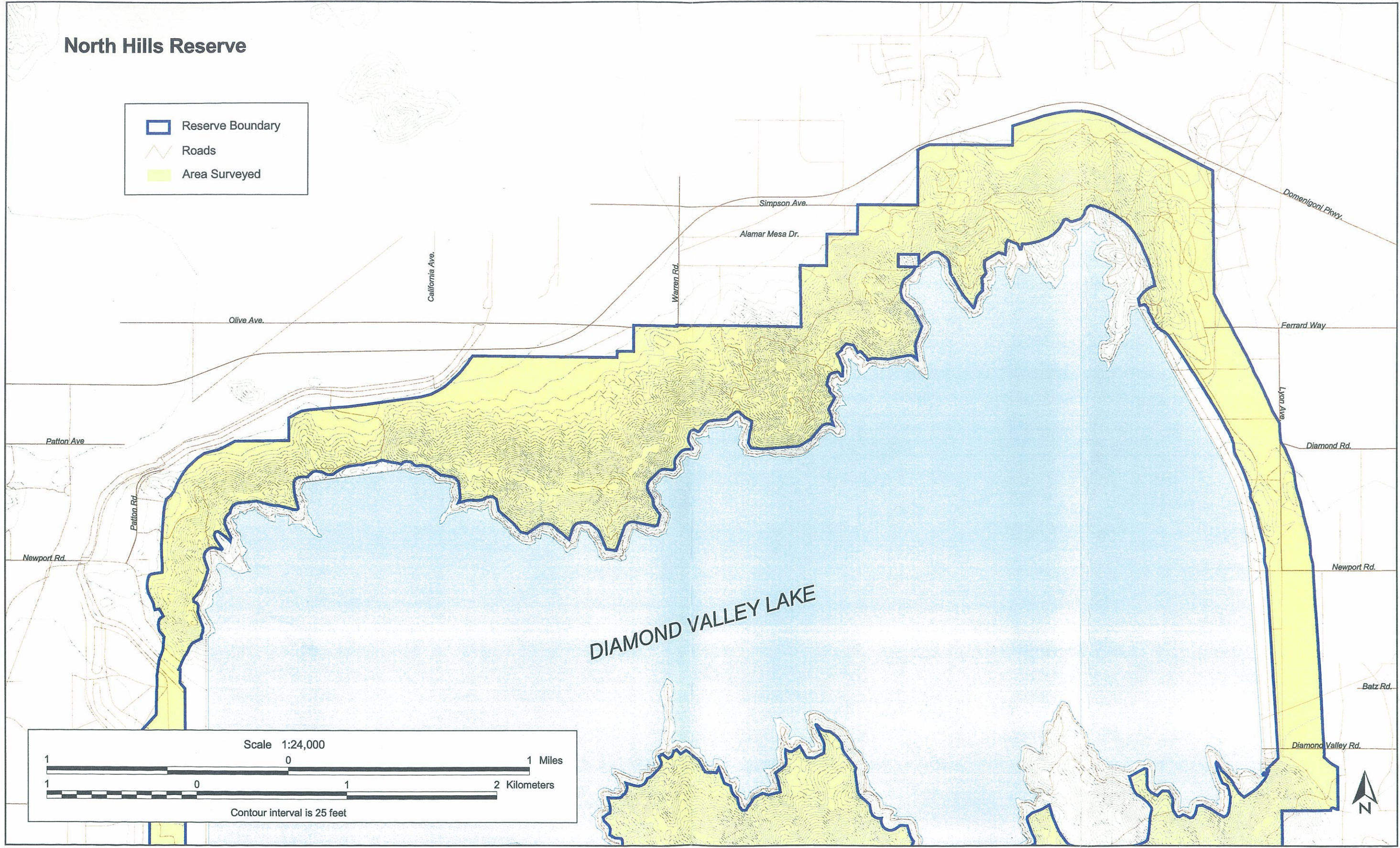
Map of the Reserve showing locations of inset maps and USGS 7.5' topographic quad boundaries.



# North Hills Reserve

Legend:

- Reserve Boundary
- Roads
- Area Surveyed



Scale 1:24,000

1 Miles

2 Kilometers

Contour interval is 25 feet






North Hills Reserve areas surveyed.



# South Hills Reserve

Legend:

-  Reserve Boundary
-  Roads
-  Area Surveyed

DIAMOND VALLEY LAKE

Scale 1:24,000

1 Miles

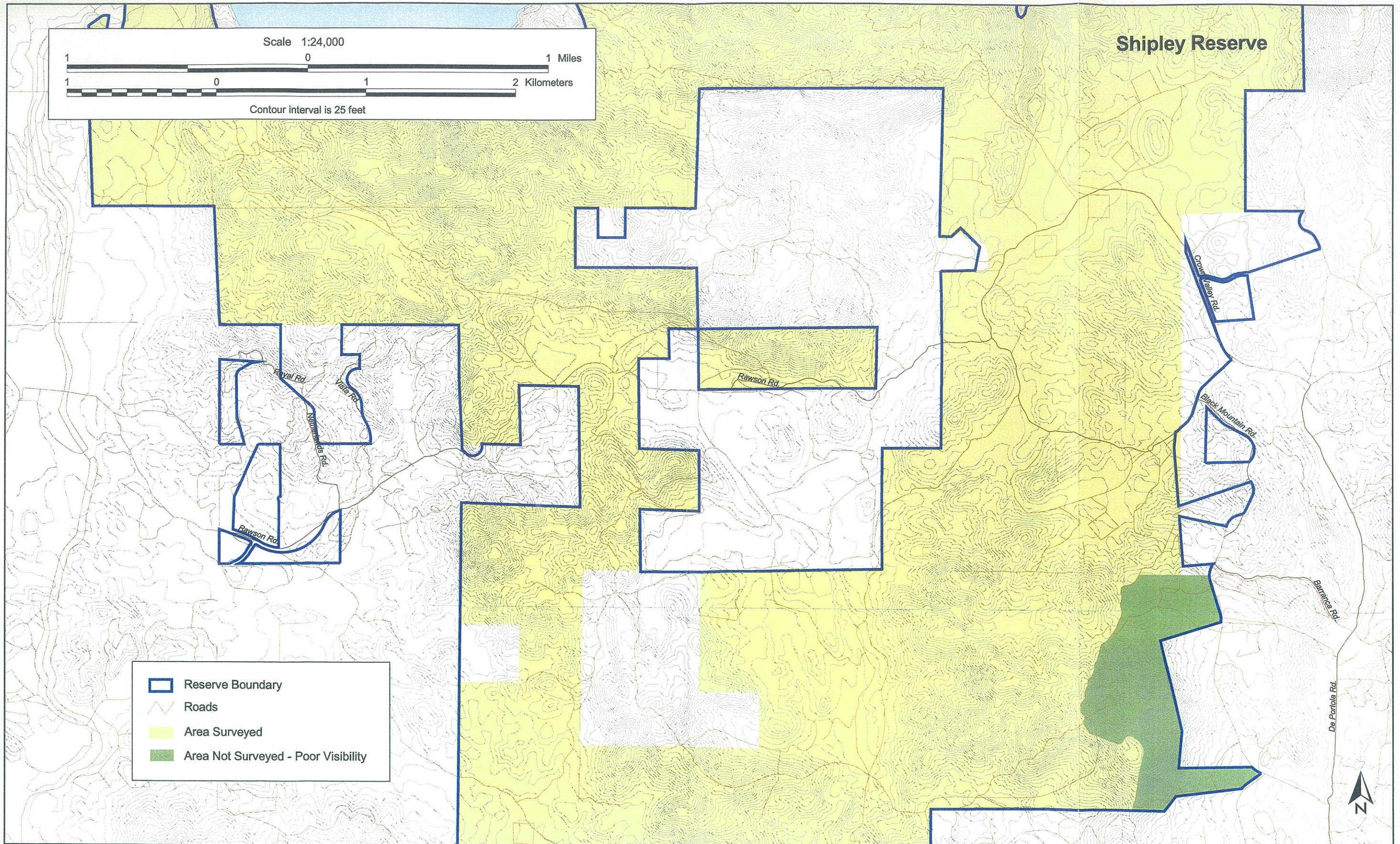
1 0 1 2 Kilometers

Contour interval is 25 feet



South Hills Reserve areas surveyed.








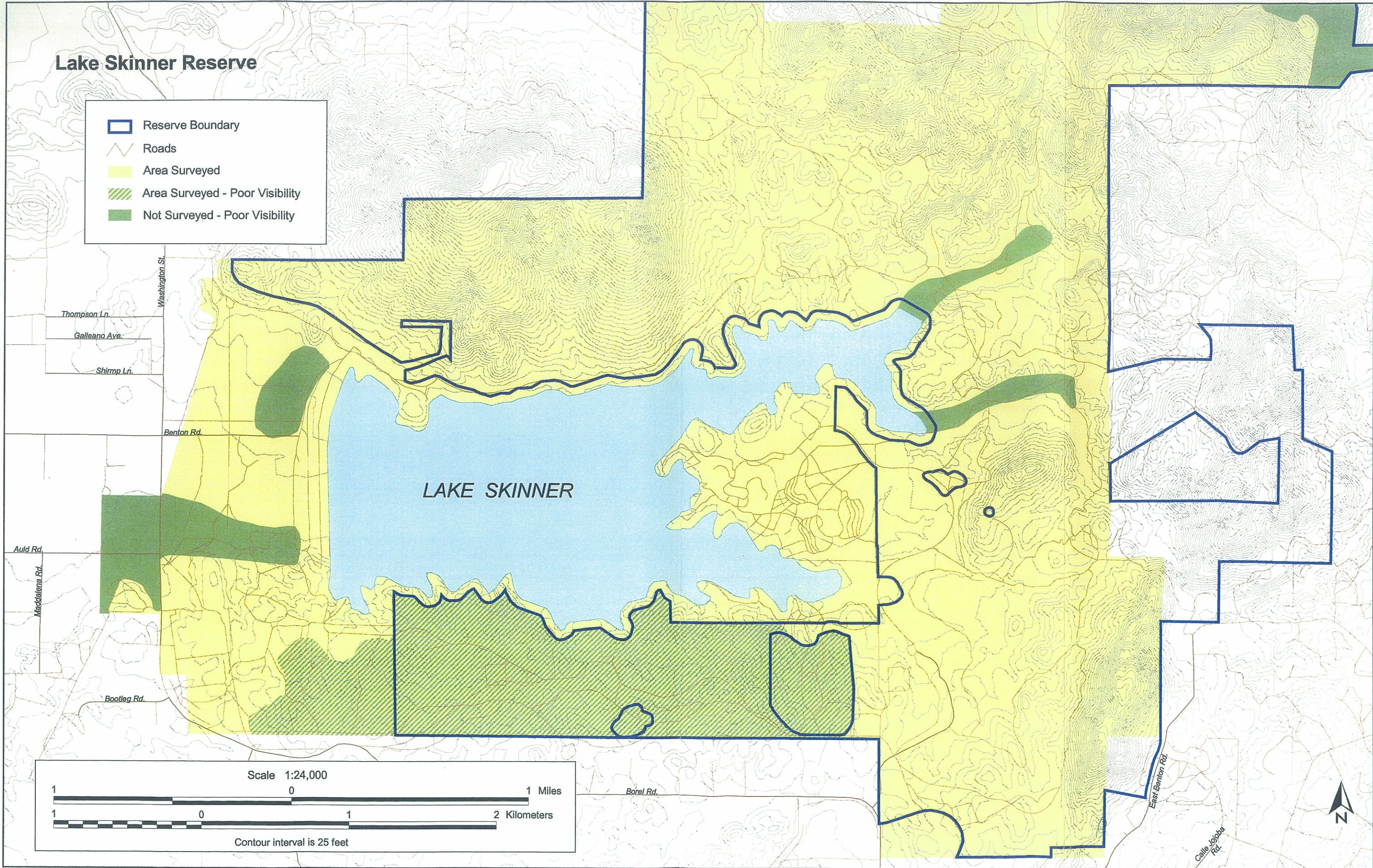


Shipley Reserve areas surveyed.



# Lake Skinner Reserve

-  Reserve Boundary
-  Roads
-  Area Surveyed
-  Area Surveyed - Poor Visibility
-  Not Surveyed - Poor Visibility



Lake Skinner Reserve areas surveyed.



## **Appendix 6: Oak Woodland Restoration on the Multi-Species Reserve**

Engelmann oaks are only found in southern California and the northern portions of Baja California (Pavlik et al. 1991). Most Engelmann oak woodlands occur between 700 and 1,300 meters (2,300 to 4,200 feet) in elevation and are usually found on southwest facing slopes and mesas dominated by grasslands or coastal sage scrub vegetation. Density of Engelmann oaks can range from 27 trees per hectare up to 147 trees per hectare. These oaks can be found within coast live oak (*Quercus agrifolia*) woodlands. However, due to their ability to germinate and grow better at low moisture conditions, Engelmann oaks also tend to occupy areas between mesic canyon bottoms and sage scrub/grassland uplands. Engelmann oaks are often found in soil that is deep loamy clay; however they can also grow in sandy or rocky soils if there is some source of summer moisture such as a perennial or intermittent stream (Pavlik et al. 1991). Drought and over-grazing, starting near the beginning of the 20<sup>th</sup> century, have altered the distribution of Engelmann oaks. A reduction in their abundance and decreases in potential habitat has also occurred due to land developments.

The Reserve has approximately 32 acres of oak woodlands mainly comprised of coast live oak (*Quercus agrifolia*). However, there are many Engelmann oaks (*Quercus engelmanni*), mainly located within Lopez Canyon. Engelmann oaks are a covered species under the Reserve MSHCP and the WRCMSHCP. In addition to the two aforementioned species, the Reserve also supports scrub oaks (*Quercus berberidifolia*).

A major threat to the oak woodlands of California is the lack of regeneration (Zach 2002). The problem seems to be the inability of seedlings to survive to become young trees, not in acorn production or acorn viability. There are several factors that contribute to this problem, they include 1) fire suppression; 2) cattle grazing; 3) invasion of non-native annual grasses that have largely replaced native perennial grasses; and 4) herbivory of oak shoots by cattle and native animals. The apparent lack of Engelmann oak regeneration has been observed on the Multi-Species Reserve (Zach Principe, pers. comm.).

Another, more recent, significant threat to oaks in California is the fungus-like pathogen *Phytophthora* which has been called "Sudden Oak Death" (SOD). To date, this pathogen has not reached oaks near the Multi-Species Reserve, but careful monitoring will be needed in order to address this serious threat if it should occur in any of the three *Quercus* species which occur on the Reserve. In addition, the Reserve Manager should be vigilant about information of this pathogen in the general area (surrounding the Reserve).

The Lopez canyon area had historically been used for cattle grazing and dry-farming (Gail Wanzuck-Barton, pers. comm.) Following the end of the grazing and farming and the formation of the Shipley Reserve, non-native grasses have become prevalent in the area. Native deer populations use the area and the combined pressures of the non-native grasses and herbivory by deer and gophers (*Thomomys bottae*) have probably conspired to significantly reduce Engelmann seedling survival.

Reducing the extent and density of the non-native grasses within the oak woodland areas of the Reserve should be a primary goal in the effort toward restoring and maintaining the oak woodlands on the Reserve. The primary effect of competing vegetation from non-native grasses and other

weeds on oak seedlings is a reduction in soil moisture available for uptake (McCreary 2001). In the Mediterranean climate of California, where there is often little precipitation from April to October, a lack of moisture in the soil can limit growth and affect survival. One of the most cost-effective means of managing the non-native grasslands is through the use of prescribed fire. Prescribed fire will reduce the non-native grasses in the area thus reducing competition for resources between the grasses and the seedlings. Prescribed fire should occur outside of typical avian nesting periods (August – February).

Higher fire frequencies in the era before widespread fire suppression (before the 1950's) may have created conditions that favored oak regeneration (Standiford and Tinnin 1996). Thus restoring natural fire frequencies may contribute to improved oak recruitment. Also, low-intensity prescribed burns may help reduce fuel levels and prevent large, high-intensity fires that destroy oak stands (Zach 2002). Too high a fire frequency may damage oak woodlands, therefore adaptive management following careful monitoring after prescribed fire is warranted.

Grazing is another option for managing non-native grasslands, but comes with its own inherent problems (as discussed in §4: Habitat Management). Whichever non-native grass removal method is used, it should also be noted that the Lopez Canyon area also supports Stephens' kangaroo rat (*Dipodomys stephensi*) and this species will also benefit from non-native grass removal methodologies.

In addition to benefiting Stephens' kangaroo rat and Engelmann oak (both covered species under the Reserve MSHCP), restoration of the oak woodlands of the Multi-Species Reserve will also benefit other equally-important sensitive species such as purple needle grass (*Nasella pulchra*), Cooper's hawk (*Accipiter cooperi*), and long-eared owl (*Asio otus*), as well as many other wildlife species.

### Management Activities

The Reserve Manager will map (GPS) all Engelmann oaks, mark the trees, collect size and condition data and monitor the oaks on a four-year schedule that will also coincide with the restoration activities described below.

### *Collection and Germination*

Multi-Species Reserve staff will collect Engelmann and live oak acorns in the fall when they are mature. Acorns will then be germinated in a refrigerator in sealable plastic bags filled with soil (soil from below the tree where they were collected in order to capture mycorrhizal fungi). Germinated acorns will then be planted into PVC pipes (10 cm diameter x 30-45 cm length) to allow for proper development of the taproot, and placed into the Reserve greenhouse and watered regularly until the taproot has reached the bottom of the container. While in the greenhouse, the plants should be watered on a weekly basis. MSR Reserve Staff will then plant the trees around mid-January (one year later) to minimize the need for watering and to allow the plant to become well-established before the onset of the hot, dry summer months.

### *Site Preparation and Planting*

Prior to out-planting an area of approximately 1.2 m in diameter will be weeded to minimize competition for resources. Roots will be protected by lining the 45 cm diameter, 45 cm deep hole with chicken wire around the sides (but not at the bottom) to protect the roots from burrowing animals such as gophers. The holes will be adjacent to existing Engelmann oaks and a small amount of soil from directly beneath the adjacent oak will be placed into the hole to inoculate the new plant with the appropriate mycorrhizae. In cases where the restoration is to occur in new areas, soil from existing oaks will be transported to the new location. The plants will have either wire-mesh protector or a 1.2 m Tubex plant protector around them to discourage herbivory. A 45% shade cloth will be placed over the wire protector to provide shade for the first 1 to 2 years, depending on the health of the seedling. Once the seedling is established, the shade will be removed. In addition, for supplemental irrigation needs, a 6 cm diam. By 0.25 – 0.5 m deep PVC pipe will be placed in the ground adjacent to the planted seedling to allow for below-ground irrigation. Supplemental water will be provided at approximately 2 -3 gallons once per month, depending on local weather conditions. Appropriate watering will follow recommendations by McCreary (2001) because inappropriate watering may harm the seedling or surrounding trees. For example, watering near the base of a native oak during the warm season can cause root and crown rot (Zach 2002).

### *Monitoring and Maintenance*

All out-planted seedlings will be protected, monitored, and maintained until the seedling is at least 70 cm (27 inch) tall with a 2 cm (0.8 inch) diameter trunk. Maintenance will consist of supplemental watering and weed removal. Once the seedling has reached the minimum height and basal diameter, the protective wire above ground can be removed.

During the annual monitoring of the oaks, the Reserve Manager will also evaluate the potential for the presence of *Phytophthora*. Upon observation of this fungus-like pathogen, the Reserve Manager will contact the California Oak Foundation to determine the best method of treatment.

### Restoration Timing and Site Selection

Height after the fourth year may be a reasonably strong predictor of future growth (Scott and Pratini 1992). Therefore, to increase the efficiency of Engelmann oak restoration on the Multi-Species Reserve, restoration activities will follow a four-year cycle (Table 1). In addition, initial restoration will occur within areas already supporting Engelmann oak until other appropriate areas can be identified and evaluated for compatibility with this management plan.

### Monitoring for Engelmann-live oak hybridization.

Compared to other native woody plants, oaks hybridize frequently. Hybridization is important in the evolution of oaks because it increases genetic variation within populations; the genes from one species combine with those of another, resulting in novel combinations to be selected by the environment (Pavlik et al. 1991). However, to ensure the collection of pure Engelmann oak acorns, acorns will only be collected from non-hybrid individuals.



Reduce “ladder-fuels” under oaks to minimize canopy fires.

In general, live-oak and Engelmann oak trees can withstand cool, quick-moving fires due to the dense bark and the protection it provides to the tree. However, hot, slow fires can severely damage or kill trees that have heavy brush under the canopy or that have ladder-fuels which allow the fire to enter the tree canopy. Oaks that survive severe fire events are those where fuel loading is at low levels (Green 1979). For this reason, ladder fuels will be removed from as many Engelmann oaks as possible and nearby live oaks. In addition, litter and other vegetation will be cleared away from the trunk to minimize fire damage. This will minimize fire traveling to the crown of the tree and thereby subjecting it to potentially devastating effects of fires moving through the area.

Table 1. Summary Schedule

<b>Year 1</b>	October	Acorns collected from many individuals
	November	Germination in refrigerator for approx. one month
	December	Placement into PVC in greenhouse (for ~12 months)
<b>Year 2</b>	Throughout year	Maintain greenhouse seedlings
<b>Year 3</b>	January	Site preparation
	January	Plant seedlings
		Water seedlings as needed
		Monitor seedlings monthly
<b>Year 4</b>		Water seedlings as needed
		Monitor seedlings monthly
<b>Year 5</b>		Water seedlings as needed
		Monitor seedlings monthly
	October	Final measurements and assessments

## Appendix 7: Invasive and Non-Native Species known to occur on the Reserve and recommended control methodologies

Invasive species are non-native organisms introduced to an ecosystem that are likely to cause harm to the economy, the environment, or humans. This list is by no means comprehensive. For plant species, it is primarily compiled from species lists provided to the Reserve by Dave Bramlet (1996) and Andy Sanders (2000). Numerous other invasive and non-native species certainly occur on the Reserve and this list will be updated, accordingly, and as needed.

Non-native species are detrimental to ecosystem function in many ways. One negative aspect is that they displace native species. Some species increase fire hazard (e.g., *Arundo* and *Tamarisk*). Mustard also increases fire hazard within sage scrub due to increased fuel-loading. In addition, non-native plants increase competition with native plant species for soil nutrients and moisture. In the case of Eucalyptus, understory establishment of other species is inhibited by the production of allelopathic chemicals and by the physical barrier formed by high volumes of forest debris consisting of bark strips, limbs, and branches. It's important to note that, while large trees such as Eucalyptus and Pepper are non-native, and the goal should be to remove them from the Reserve, they do provide an important function in the Reserve for nesting birds. Therefore, it will be important to provide a native replacement for large trees prior to removing the non-native tree (replacing form and function).

<i>Species</i>	<i>Family</i>	<i>Habitat</i>	<i>Control Method</i>
<b>PLANTS</b>			
<i>Amaranthus albus</i> (Tumbleweed)	Amaranthaceae (Amaranth)	Disturbed sites. Primarily along roadsides.	Avoid unnecessary ground disturbance. Removal and burning of individuals prior to setting seed.
<i>Schinus molle</i> (Peruvian pepper)	Anacardiaceae (Cashew)	Canyons and washes. Individual trees in historic ranch locations throughout Reserve, specifically Rawson Canyon.	Manual removal. Girdle.
<i>Apium graveolens</i> (Celery)	Apiaceae (Carrot)	Tucalota Creek.	Manual removal upon discovery.
<i>Foeniculum vulgare</i> (Sweet fennel)	Apiaceae (Carrot)	Disturbed, mesic areas.	Manual removal, including roots. Glyphosate foliar spraying in the spring.
<i>Conium maculatum</i> (poison hemlock)	Asteraceae (Sunflower)	Disturbed areas. Tucalota Creek.	Manual removal upon discovery.
<i>Centaurea melitensis</i> (Tocolote or Napa star thistle)	Asteraceae (Sunflower)	Disturbed areas. Along Shipley Road edges.	Mowing during flowering. Prescribed fire after native species have dispersed their seeds but before

<i>Species</i>	<i>Family</i>	<i>Habitat</i>	<i>Control Method</i>
			Centaurea produces viable seed (June-July).
<i>Chamomilla suaveolens</i> (Pineapple weed)	Asteraceae (Sunflower)	Reported by D. Bramlet, specific location unknown.	Manual removal upon discovery.
<i>Cirsium vulgare</i> (Bull thistle)	Asteraceae (Sunflower)	Grasslands.	Hand cut before flowering.
<i>Cnicus benedictus</i> (Blessed thistle)	Asteraceae (Sunflower)	Reported by D. Bramlet, specific location unknown.	Manual removal upon discovery.
<i>Cotula australis</i> (Australian thistle)	Asteraceae (Sunflower)	Moist, disturbed soils. Rawson Canyon.	Manual removal upon discovery.
<i>Cotula coronopifolia</i> (African brass buttons)	Asteraceae (Sunflower)	Moist, disturbed soils. Rawson Canyon.	Manual removal upon discovery.
<i>Filago gallica</i> (Narrow-leaved filago)	Asteraceae (Sunflower)	Open disturbed areas, roadsides. Tualata Hills.	Manual removal upon discovery.
<i>Hypochaeris glabra</i> (Smooth cat's ear)	Asteraceae (Sunflower)	Widespread weed. Rawson Canyon.	Manual removal upon discovery.
<i>Lactuca serriola</i> (Prickly lettuce)	Asteraceae (Sunflower)	Reported by D. Bramlet, specific location unknown.	Manual removal upon discovery.
<i>Picris echioides</i> (Prickly ox tongue)	Asteraceae (Sunflower)	Reported by D. Bramlet, specific location unknown.	Manual removal upon discovery.
<i>Senecio vulgaris</i> (Common groundsel)	Asteraceae (Sunflower)	Uncommon weed of roadsides. Tualata Hills.	Manual removal upon discovery.
<i>Sonchus asper</i> (Prickly sow thistle)	Asteraceae (Sunflower)	Uncommon weed in moist areas. Schoolhouse Creek.	Manual removal upon discovery.
<i>Sonchus oleraceus</i> (Common sow thistle)	Asteraceae (Sunflower)	Widespread but uncommon weed. Base of Bachelor Mtn, edge of Lake Skinner.	Manual removal upon discovery.
<i>Xanthium strumarium</i> (Cocklebur)	Asteraceae (Sunflower)	Reported by D. Bramlet, specific location unknown.	Manual removal upon discovery.
<i>Brassica nigra</i> (Black mustard)	Brassicaceae (Mustard)	Disturbed soils. Southern base of Bachelor Mtn.	Prescribed burns. Manual removal.
<i>Brassica tournefortii</i> (Asian mustard)	Brassicaceae (Mustard)	High water road of the North Hills. Disturbed soils.	Prescribed burns. Manual removal.
<i>Capsella bursa-pastoris</i> (Shepherd's purse)	Brassicaceae (Mustard)	Uncommon but widespread annual, moist slopes. Crown Valley.	Manual removal upon discovery.
<i>Hirschfeldia incana</i> [ <i>Brassica geniculata</i> ] (Summer mustard)	Brassicaceae (Mustard)	Disturbed areas, and open areas of CSS and Chaparral.	Manual removal upon discovery.
<i>Sisymbrium altissimum</i> (Tumble mustard)	Brassicaceae (Mustard)	Disturbed areas along roadsides. Tualata Hills.	Manual removal upon discovery.

<i>Species</i>	<i>Family</i>	<i>Habitat</i>	<i>Control Method</i>
<i>Sisymbrium irio</i> (London rocket)	Brassicaceae (Mustard)	Reported by D. Bramlet, specific location unknown.	Manual removal upon discovery.
<i>Sisymbrium orientale</i> (Hare's ear cabbage)	Brassicaceae (Mustard)	Disturbed areas along roadsides. Rawson Canyon.	Manual removal upon discovery.
<i>Cerastium glomeratum</i> (Sticky mouse-ear chickweed)	Caryophyllaceae (Pink)	Grassy slopes. Tributary to Rawson Canyon.	Manual removal upon discovery.
<i>Silene gallica</i> (Common catch fly)	Caryophyllaceae (Pink)	Grassy areas. Rawson Canyon.	Manual removal upon discovery.
<i>Spergula arvensis</i> (Corn spurrey)	Caryophyllaceae (Pink)	Reported by D. Bramlet, specific location unknown.	Manual removal upon discovery.
<i>Stellaria media</i> (Chickweed)	Caryophyllaceae (Pink)	Shaded slopes. Rawson Canyon.	Manual removal upon discovery.
<i>Atriplex rosea</i> (Redscale)	Chenopodiaceae (Goosefoot)	Reported by D. Bramlet, specific location unknown.	Manual removal upon discovery.
<i>Atriplex semibaccata</i> (Australian saltbush)	Chenopodiaceae (Goosefoot)	Heavy saline soils, grazed or disturbed areas.	Manual removal.
<i>Bassia hyssopifolia</i> (Five-hook bassia)	Chenopodiaceae (Goosefoot)	Reported by D. Bramlet, specific location unknown.	Manual removal, including roots.
<i>Chenopodium album</i> (Lamb's quarters)	Chenopodiaceae (Goosefoot)	Reported by D. Bramlet, specific location unknown.	Manual removal upon discovery.
<i>Chenopodium murale</i> (Nettle-leaved goosefoot)	Chenopodiaceae (Goosefoot)	Disturbed areas. Rawson Canyon.	Manual removal upon discovery.
<i>Salsola tragus</i> (Russian thistle)	Chenopodiaceae (Goosefoot)	Disturbed areas along roadsides. South base of Bachelor Mtn.	Manual removal upon discovery.
<i>Convolvulus arvensis</i> (Bindweed)	Convolvulaceae (Morning-glory)	Reported by D. Bramlet, specific location unknown.	Manual removal upon discovery.
<i>Euphorbia peplus</i> (Petty spurge)	Euphorbiaceae (Spurge)	Reported by D. Bramlet, specific location unknown.	Manual removal upon discovery.
<i>Ricinus communis</i> (Castor bean)	Euphorbiaceae (Spurge)	Riparian areas. Reported by D. Bramlet, specific location unknown.	Manual removal, including roots. Glyphosate foliar spray method.
<i>Lotus corniculatus</i> (Birdfoot's trefoil)	Fabaceae (Pea)	Reported by D. Bramlet, specific location unknown.	Manual removal upon discovery.
<i>Medicago polymorpha</i> (Bur clover)	Fabaceae (Pea)	Grassy and disturbed areas. Rawson Canyon and Park entrance road.	Manual removal upon discovery.
<i>Melilotus indica</i> (Yellow sweet clover)	Fabaceae (Pea)	Disturbed areas, moist arroyo margins. Bachelor Mt.	Manual removal upon discovery.
<i>Erodium botrys</i> (Long-	Geraniaceae (Geranium)	Throughout Reserve.	Manual removal upon

<i>Species</i>	<i>Family</i>	<i>Habitat</i>	<i>Control Method</i>
beaked filaree)			discovery.
<i>Erodium cicutarium</i> (Red-stemmed filaree)	Geraniaceae (Geranium)	Very common in grassy, open areas, and roadsides. Rawson Canyon.	Manual removal upon discovery.
<i>Erodium moschatum</i> (White-stemmed filaree)	Geraniaceae (Geranium)	Disturbed soils. Rawson Canyon.	Manual removal upon discovery.
<i>Lamium amplexicaule</i> (Henbit)	Lamiaceae (Mint)	Moist, open soils. Rawson Canyon.	Manual removal upon discovery.
<i>Marrubium vulgare</i> (Horehound)	Lamiaceae (Mint)	Disturbed soils. Rawson Canyon.	Manual removal upon discovery.
<i>Malva parviflora</i> (Cheeseweed)	Malvaceae (Mallow)	Disturbed soils. Rawson Canyon.	Manual removal upon discovery.
<i>Myoporum laetum</i> (Myoporum)	Myopoaceae (Myoporum)	Cultivated at campground. Potential introduction into Reserve. If left uncontrolled, can quickly take over large areas.	Manual removal, including roots. Glyphosate cut-stump method.
<i>Eucalyptus spp.</i> (Blue gum)	Myrtaceae (Myrtle)	All habitats.	Manual removal. Girdle with Glyphosate.
<i>Plantago lanceolata</i> (Rib grass)	Plantaginaceae (Plantain)	Reported by D. Bramlet, specific location unknown.	Manual removal upon discovery.
<i>Plantago major</i> (Common plantain)	Plantaginaceae (Plantain)	Reported by D. Bramlet, specific location unknown.	Manual removal upon discovery.
<i>Agrostis viridis</i> (Water bent)	Poaceae (Grass)	Reported by D. Bramlet, specific location unknown.	Manual removal upon discovery.
<i>Arundo donax</i> (Giant reed)	Poaceae (Grass)	Riparian areas and around reservoirs. Tucalota and Middle Creeks near Lake Skinner.	Manual removal, including rhizome. Also chemical control with glyphosate.
<i>Avena barbata</i> (Slender wild oat)	Poaceae (Grass)	Grasslands.	Spring prescribed fire. Fusilade herbicide.
<i>Avena fatua</i> (Wild oat)	Poaceae (Grass)	Grasslands.	Spring prescribed fire. Fusilade herbicide.
<i>Bromus diandrus</i> (Ripgut brome)	Poaceae (Grass)	North-facing slopes and in shaded areas. Throughout Reserve.	Spring prescribed fire. Fusilade herbicide.
<i>Bromus hordeaceus</i> (Soft chess)	Poaceae (Grass)	Bachelor Mtn. Park entrance road.	Spring prescribed fire. Fusilade herbicide.
<i>Bromus madritensis</i> (Red brome)	Poaceae (Grass)	Areas disturbed by wildfire, grazing, off-road vehicles or agriculture.	Spring prescribed fire. Fusilade herbicide.
<i>Bromus tectorum</i> (Cheatgrass)	Poaceae (Grass)	Annual grasslands.	Mowing within one week after flowering. Spring prescribed fires. Fusilade herbicide.
<i>Cortaderia jubata</i>	Poaceae (Grass)	Found along Lake	Manual removal of



<i>Species</i>	<i>Family</i>	<i>Habitat</i>	<i>Control Method</i>
(Pampas grass)		Skinner shore. High potential for infection into Reserve.	entire crown and top section of roots. Removal of cuttings is important. Also foliar spraying of Glyphosate.
<i>Echinochloa crus-galli</i> (Barnyard grass)	Poaceae (Grass)	Reported by D. Bramlet, specific location unknown.	Manual removal upon discovery.
<i>Gastridium ventricosum</i> (Nitgrass)	Poaceae (Grass)	Reported by D. Bramlet, specific location unknown.	Manual removal upon discovery.
<i>Hordeum murinum leporinum</i> (Hare barley)	Poaceae (Grass)	Disturbed soils. Rawson Canyon.	Manual removal upon discovery.
<i>Lamarkia aurea</i> (Golden top)	Poaceae (Grass)	Rock outcrops and roadsides. Rawson Canyon.	Manual removal upon discovery.
<i>Polypogon monspeliensis</i> (Rabbit's foot grass)	Poaceae (Grass)	Seasonally wet open areas, streams, lakeshores. Rawson Canyon.	Manual removal upon discovery.
<i>Schismus barbatus</i> (Mediterranean schismus)	Poaceae (Grass)	Grasslands and open areas. Rawson Canyon, Tualota Hills, Black Mtn.	Fire not recommended. Can be controlled with herbicides, but risk of non-target impacts highly likely.
<i>Vulpia bromoides</i> (False-brome fescue)	Poaceae (Grass)	Reported by D. Bramlet, specific location unknown.	Prescribed burns and grass-specific herbicide such as Fusilade.
<i>Vulpia myuros</i> (Foxtail fescue)	Poaceae (Grass)	Reported by D. Bramlet, specific location unknown.	Prescribed burns and grass-specific herbicide such as Fusilade.
<i>Rumex crispus</i> (Curly dock)	Polygonaceae (Buckwheat)	Reported by D. Bramlet, specific location unknown.	Manual removal upon discovery.
<i>Anagallis arvensis</i> (Scarlet pimpernel)	Primulaceae (Primrose)	Reported by D. Bramlet, specific location unknown.	Manual removal upon discovery.
<i>Galium aparine</i> (Common bedstraw)	Rubiaceae (Madder)	Reported by D. Bramlet, specific location unknown.	Manual removal upon discovery.
<i>Veronica anagallis-aquatica</i> (Water speedwell)	Scrophulariaceae (Figwort)	Reported by D. Bramlet, specific location unknown.	Manual removal upon discovery.
<i>Nicotiana glauca</i> (Tree tobacco)	Solanaceae (Nightshade)	Scarce, but throughout Reserve.	Manual removal upon discovery.
<i>Tamarix ramosissima</i> (Mediterranean tamarix)	Tamaricaceae (Tamarisk)	All of the main creeks in the Reserve.	Glyphosate foliar and cut-stump methods. Removal of cuttings is important. March – Oct.
<i>Tribulus terrestris</i> (Puncture vine)	Zygophyllaceae (Caltrop)	Reported by D. Bramlet, specific location unknown.	Manual removal upon discovery.
<b>INVERTEBRATES</b>			
Red swamp crayfish		Rawson Creek	Trapping and removal

<i>Species</i>	<i>Family</i>	<i>Habitat</i>	<i>Control Method</i>
( <i>Procambarus spp.</i> )			
<b>INSECTS</b>			
Fire ants ( <i>Solenopsis invicta</i> , <i>S. richteri</i> )			“Amdro” (metabolic inhibitor) and/or “Distance” (insect growth regulator)
Argentine ants ( <i>Iridomyrmex humilis</i> )		Edges of Reserve associated with development	Diazinon spray on colonies
<b>HERPETOFAUNA</b>			
Bullfrog ( <i>Rana catesbeiana</i> )		All Reserve streams and Lake Skinner	Trapping and removal
<b>BIRDS</b>			
Brown-headed cowbird ( <i>Malothrus ater</i> )		Riparian areas	Annual trapping March 15 – June 15.
European starling ( <i>Sturnus vulgaris</i> )		All habitats	Removal
House sparrow ( <i>Passer domesticus</i> )		All habitats	Removal
<b>MAMMALS</b>			
Beaver ( <i>Castor Canadensis</i> )		Riparian areas near Lake Skinner	Manual removal.

The Reserve Manager shall seek to reduce or eliminate any negative impacts non-native species may have on the resources of the Reserve through the following steps:

1. The Reserve Manager shall first assess the level of threat posed by the non-native species to the flora and fauna of the Reserve. This assessment will take into consideration;
  - a. The current and/or potential rate of habitat destruction or loss of individuals of native species;
  - b. The potential for the non-native species to increase in population size;
  - c. The risk to humans on the Reserve.
  
2. Based on this assessment, the Reserve Manager shall choose a course of action that is commensurate with the level of threat identified and is feasible within the current years operating budget. The Reserve Manager may elect to use chemical control (e.g., herbicides, pesticides, sterilants, poison), biological control (e.g., grazing, introduction of parasitic species or pathogens), hazing techniques, live capture, or lethal control to reduce or remove the threat. All chemicals proposed for use in the control of non-native species within either the Lake Skinner or Diamond Valley reservoir’s watersheds shall require written approval from MWD (to assure protection of water quality in the drinking water reservoirs) and the approval of the RMC prior to their use on the Reserve. Any member agency of the RMC may place conditions (e.g., geographic or time of year restrictions) on the use of individual chemicals on the Reserve. The use of biological controls will require unanimous approval from **all** RMC member agencies and may require further regulatory approvals from the resource agencies.

3. If, in the opinion of the Reserve Manager, the only method(s) available to adequately address the identified threat will cost in excess of the amount allocated in the approved annual budget, the Reserve Manager shall make a request to the RMC for a budget amendment.
4. The Reserve Manager may allow for salvage of the non-native species by an outside entity if it is in the best interest of the Reserve.

Specific actions that may be taken by the Reserve Manager to control non-native species include:

1. Plants: Either killed onsite or removed from the site using any combination of chemical or mechanical means, as deemed appropriate by the Reserve Manager.
2. Invertebrate animals: May be controlled through lethal means, collecting, or habitat modifications using chemical or mechanical means, as deemed appropriate by the Reserve Manager. The Reserve Manager shall coordinate any efforts with local and/or regional vector control programs, if necessary.
3. Domesticated vertebrate animals (e.g., dogs, house cats, livestock, etc.): The Reserve Manager shall make a reasonable effort to first attempt to contact owner (if known or suspected), then either haze the subject animal(s) until they have left the Reserve or capture the subject animals(s) using live traps or other means and transfer them to the local humane society or other permitted and government recognized animal shelter. The Reserve Manager may enlist assistance from the local authorities to capture or dispose of the subject animal(s). Lethal control, administered in a humane fashion, will only be considered if the risk posed by the animal(s) to native flora and/or fauna is significant (as determined by the Reserve Manager) and is imminent and otherwise unavoidable.
4. Non-domesticated vertebrate animals: The Reserve Manager may use live trapping, hazing, chemical control (e.g., sterilants, poison), biological control, or lethal control to reduce or remove the threat to Reserve resources. The Reserve Manager shall make a reasonable effort to transfer any captured animal to the local humane society or other permitted and government recognized care facility, as appropriate. The Reserve Manager may euthanize (with approval from the wildlife agencies), using humane methods, any animal captured pursuant to an RMC approved depredation program, or for whom no receiving facility was identified. The Reserve will not incur costs for transferring captured animals beyond the boundaries of Riverside County or for holding and/or caring for animals once they have been removed from the Reserve. The Reserve Manager may enlist assistance from the local authorities to capture or dispose of any animal and may arrange for salvage of the animal by an outside entity if it is in the best interest of the Reserve.

## **Appendix 8: Reserve Interpretive Program**

### **Introduction**

The RMC may authorize the funding for the creation of a Reserve interpretive position, depending on funding availability. A Reserve interpreter would conduct presentations and classes for the general public, schools, and other groups regarding the natural history and cultural resources of the Reserve.

The Reserve and RCRPOSD restored the historic Alamos schoolhouse at Lake Skinner Recreation Area for use as an interpretive building. The schoolhouse, built around 1900, was originally situated in French Valley, and at least four generations of several families attended classes there until the school was closed in 1968. The schoolhouse was moved in 1976 about four miles from its original site below the Lake Skinner dam on Auld Road to the Lake Skinner County Park. The County of Riverside purchased the building from the Hemet Unified School District to save it from eventual destruction and the Reserve contributed funding for the restoration of the building.

### **Interpretive Program Purpose**

The relevance of the interpretive program to the Reserve mission is two-fold: not only does it promote the Reserve to local governmental officials and the voting community that may help in kind whenever they vote on local bonds or planning issues, but it can also develop a sense of awareness and foster better stewardship for all natural resources in the community. This goal may be achieved through the use of a variety of special programs, events, displays and exhibits for the general public.

### **Potential Interpretive Program Contents**

Programs that the Reserve Interpreter may offer to the general public, groups, and schools include: special topic lecture programs to be held monthly at the Reserve Interpretive Center; special topic guided hikes that showcase seasonal events (e.g., wildflower season and winter birds); and school programs that include programs such as guided nature hikes, ecology of water, and local ethno-botany.

The Reserve Interpreter may also conduct outreach programs off-site through a "Traveling Naturalist Program". The program may include portable exhibits, hands-on demonstrations, and multi-media presentations that may be brought to other museums, school assembly programs, group meetings, and other venues.

Outdoor special events may also be conducted at the Interpretive Center. These programs include astronomy programs, nocturnal animal programs (bats and owls), and general natural history of the Reserve.

## **Interpretive Center**

Exhibits and displays have been developed for the Interpretive Center (see Table 1: Inventory). Together, they describe the natural resources that are all part of the Reserve, and why they are important for us today. The displays accomplish this goal by providing a visitor a self-guided overview that includes:

- 1) The human story of the land, how hunter-gatherers and how historic farmers interacted with the land and depended on the health of its resources;
- 2) A more detailed description of the natural resources of the Reserve, including the unique ecological communities and habitats of the Reserve, and some of the flora and fauna found on the Reserve;
- 3) A description of what the Reserve is today, by whom it was created, and the reason it was created; and
- 4) How visitors can help in the goal of conservation by becoming involved in stewardship and conservation in their own community.

Because many of the visitors to the center may be elementary school-aged children, the center may also provide an exploratory hands-on discovery corner specifically designed for children. The discovery corner allows children to learn about Reserve flora and fauna, habitats and conservation through self-guided activities that include:

- 1) A native animal puppet theater that has a habitat backdrop as its stage;
- 2) An animal track and bone box where children can learn about animal tracks and some of the characteristics of their teeth and other bones;
- 3) A children's reading activity corner with environmental education theme books and games;
- 4) Discovery boxes and drawers filled with nature items and other activities; and
- 5) A microscope station for exploration of nature items.

## **Outdoor Interpretive Displays and Facilities**

Future development plans for the Interpretive Center may include an outdoor native plant garden. This will provide the interpretive program with an outdoor classroom, which will allow participants the chance to see characteristic plants of the Reserve up close. Demonstrations and classes held in the garden may also include native plant gardening and propagation, which will promote and assist visitors in planning their own native gardenscapes at home. Garden themes include native habitats and the characteristic plants found in each, as well as native plant gardening appropriate for domestic and school classroom gardens. The gardens will also provide visitors the opportunity for self-guided exploration and interpretive functions when the center is closed.



## **Interpretive Program Community Outreach**

### **Volunteer Programs**

Special volunteer programs may include local scout groups, private home school groups, and individual volunteers interested in conducting service projects and badge programs at the Reserve. In the past, these volunteers have built and donated items to the Reserve including items ranging from birdhouses to more complicated projects such as information kiosks, and even an outdoor campfire amphitheater. In addition, scouts and other special interest groups have contributed hundreds of volunteer hours to the Reserve working on projects such as native plant collections and propagation projects for the Interpretive Center garden and greenhouse, trash pickup, artwork and even museum display assistance.

### **Coordination with other Centers and Museums**

An effort to develop additional interpretive program channels and opportunities with the community includes the formation of cooperative programs with local area museums and other educational groups. This has included the coordination of displays and presentations with the Metropolitan water education program at Diamond Valley Lake. In the past, the interpreter designed and developed a video kiosk that can be programmed to display seasonal events and slide programs about the Reserve for the Diamond Valley Lake visitor center. The display also includes a seasonal photo display with additional information about the reserve. In order to assist Metropolitan with their volunteer training efforts, the interpreter also provided presentations about the Reserve during the Diamond Valley Lake docent training sessions. This is important because the docents are in charge of contacting the visiting general public at the Lake Overview, the North Hills Trail and the Diamond Valley Lake Trail, and at the visitor center.

The Reserve and Metropolitan water education program staff may also share the task of providing information booths at community events, and may also share resource information and other data with each other in order to assist with program development and enhancement.

The Reserve interpreter may also coordinate programs with other local area museums including the Riverside County KidsZone Museum in Hemet, the Temecula Historical Museum, and the Hemet Museum Association. Outreach programming may also be shared with some regional museums including, but not limited to: the San Bernardino Museum of Natural History; the Anza-Borrego Natural History Association; and the Hi-Desert Museum in Yucca Valley. Coordination with all of these museums and groups in the past has included conducting off-site presentations, booths during special events, obtaining display and equipment donations, and sharing program reference information.

In addition, the Reserve has contributed to the development of a joint Nature Conservancy and Metropolitan video regarding the use of Natural Process Restoration techniques in the development and management of large-scale reserves.

## Goals, Objectives and Strategies of a Reserve Interpretive Program

In the Reserve MSHCP, Goal 4 states “To the extent feasible without compromising the above primary management goals, to provide opportunities for teaching and interpretive activities, historical and cultural research and interpretation, and nature study and appreciation.”

- Objective 1. To the extent that funds are available, the Reserve will establish and maintain an active interpretive program, based at its interpretive center at Lake Skinner Recreation Area. This program will include development of appropriate interpretive trails linking the center with the Reserve and other natural areas. The primary goals of the Reserve’s interpretive program shall be to (1) encourage people to explore and appreciate the Reserve in particular and wild lands in general, and (2) instill an understanding and appreciation of fundamental ecological principles such as the nature and value of biodiversity, the nature and importance of ecological scale management, and the inter-relatedness of biotic communities, and (3) impart an appreciation for the application of science to understanding the natural world.
  - Strategy 1: Reserve interpretive trails: The Reserve will cooperate with Metropolitan in the establishment of interpretive trails by providing input into trail location, design, and programs. Reserve personnel shall be authorized by Metropolitan to utilize these interpretive trails for the Reserve’s interpretive programs.
  - Strategy 2: Interpretive facilities and their uses: The Reserve will maintain the recently restored schoolhouse at Lake Skinner Recreation Area as its primary interpretive center. The following uses may be conducted without prior RMC approval:
    - Interpretive tours, lectures, and other interpretive programs under the supervision of the Reserve interpretive staff and/or volunteers;
    - Management meetings, scientific symposia, and other meetings which involve Reserve personnel, researchers, or others involved in Reserve management;
    - Social gatherings intended to promote cooperative relationships among Reserve member agencies and/or the Reserve and local community groups or agencies.
  - Strategy 3: The facilities may also be used for special public events with the prior approval of the RMC.
  - Strategy 4: The Reserve interpretive center and its grounds are generally not available for private-party events, but may be used for such purposes if the event is not inconsistent with the Reserve’s goals and objectives and (1) upon payment of a rental and maintenance fee adequate to fully offset all building depreciation, maintenance, clean-up, supervision,

administrative and other costs associated with the event, (2) with prior approval by the RMC.

- Strategy 5: Interpretive tours of the Reserve: RMC member agencies may conduct such guided tours of the Reserve as necessary in the furtherance of their roles and responsibilities as RMC members and agency business, provided that such tours are led by a representative of the RMC member agency responsible for the tour and the agency accepts responsibility for control of the event, repair of any damage to Reserve facilities, infrastructure, or habitats, and clean-up following the event. Further, the Reserve Manager may authorize special interpretive tours of the Reserve for the public, including tours to areas not served by the Reserve trail system, to the extent that such tours are consistent with the Reserve's goals and objectives and serve a legitimate interpretive purpose.
- Objective 2. The Reserve will cooperate with complementary interpretive programs, such as those at the Santa Rosa Plateau and Diamond Valley Lake.
- Objective 3: A primary focus of Reserve interpretation programs shall be on school-age children. Programs for the general public will be a secondary focus.
- Objective 4: The Reserve will allow appropriate guided educational and interpretive tours of the Reserve. As appropriate, the RMC may authorize special-event tours which may involve use of areas not generally open to the public.
  - Strategy 1. Authorized programs: Consistent with the above policies and recognizing that opportunities for public contact, teaching, and interpretation may occur in a number of ways, the Reserve generally authorizes its designated interpretive personnel to conduct:
    - In-school programs and in-field school programs;
    - Programs at public events such as fairs and expositions;
    - Programs at the Lake Skinner Regional Park and, in cooperation with Metropolitan, at recreation areas associated with Diamond Valley Lake;
    - Programs for environmental and civic organizations and other general public groups, including, but not limited to homeowner's associations and public clubs.

**Table 1. Interpretive Program Inventory**

<b>Item</b>	<b>Description, Accessories and Status</b>	<b>Location</b>
<b>Office Related Equipment</b>		
HP LCD Projector	In black/silver hard case with CF Card Reader plus 2 remote controllers and associated cables.	MSR Office
HP 5400C Scanner	W/ film reader, software and cables	MSR Office
Maxtor 80GB External Hard Drive	W/ cables and black transformer plug	MSR Office
XP Office Computer	With A705 monitor	Schoolhouse
Hp deskjet 1220c printer		MSR Office
Hp laserjet 6p printer		Schoolhouse
Cannon pixma ip4000 printer		MSR Office
Xerox laminator		MSR Office
AT&T answering machine		Schoolhouse
Southwestern Bell cordless phone		Schoolhouse
GE Phone		Schoolhouse
Slide Viewing box		Schoolhouse
2 Motorola Transceivers	W/ chargers (Tom picked up 6/19/06)	MSR Office
9 folding tables	3x7 feet, white plastic with black legs	Schoolhouse
1 folding table	3x7 feet, white plastic with black legs	MSR Office
42 Chairs	Grey plastic with silver legs	Schoolhouse
Sony Video Camera and Sunpack tripod	Digital Hi-8 format	MSR Office
2 Toolsets	Combo-set in gray case and black/grey toolbox	Schoolhouse
<b>Displays</b>		
1 Chalkboard		Schoolhouse
39 Animal Puppets	Assorted Native Animal Puppets	Schoolhouse
4 Wood Boxes	With multicolored wood drawers	Schoolhouse
Sand Tracking Table	With footprint sets and brushes	Schoolhouse
2 benches	White with animal stickers	Schoolhouse
3 framed historic photo sets + 1 diploma set		Schoolhouse
1 Post-fire coastal sage scrub habitat display case	Large, holding taxidermy: coyote, quail, spotted towhee, horned lizard, ants, bobcat/rabbit/coyote scat	Schoolhouse
1 oak woodland habitat display case	Large, holding taxidermy: grey fox, great horned owl, acorn woodpecker, bats.	Schoolhouse
1 grassland habitat display case	Large, holding taxidermy: badger, rattlesnake	Schoolhouse
1 riparian woodland habitat display case	Large, holding taxidermy: coachwhip snake, red tail hawk, kestrel	Schoolhouse
3 student rail desks	Old wooden student desks attached to 3 pairs of rails	Schoolhouse
48 Star Flag w/stand	Old cloth 48-Star American flag w/handmade stand	Schoolhouse
Teachers desk	Old Wooden Teacher's desk with two wooden chairs	Schoolhouse
Chalkboard	Old Wooden Teachers Chalkboard	Schoolhouse
<b>Item</b>	<b>Description, Accessories and Status</b>	<b>Location</b>
Assorted teachers Items	Old student chalkboard, penmanship practice book, assorted era books, 2 teacher's bells, globe.	Schoolhouse
1 Video kiosk (antique oak style)	With computer and display screen	Schoolhouse
12 inch color monitor	With slide controller	Schoolhouse

1 Video Kiosk (grey stone formica)	Grey with 12-inch color monitor and slide controller	DVL Visitor Center
Tascam Studio	Double slide projector show controller	Schoolhouse
(2) Kodak 35mm Slide Projectors	With (1) remote control unit (note: unit stored at schoolhouse needs new fan belt)	Schoolhouse & MSR office
Bauch&Lomb Spotting Scope	Discovery series	Schoolhouse
10 kids microscopes	Assorted black and gray bodies.	Schoolhouse
23 Kids binoculars	21 Black w/cases, plus 2 plastic yellow kidlet pairs	Schoolhouse
(2) kids microscope viewers with wall adapters	Purple with black wall AC adapters	Schoolhouse
Assorted nature books		Schoolhouse
Assorted skins		Schoolhouse
Assorted skulls		Schoolhouse
Assorted rubber animal footprints		Schoolhouse
Animal Taxidermy	(see final taxidermy list)	Schoolhouse
2 donated Pentium II computers	W/ Samsung syncmaster monitor, Septor monitor compact Presario monitor.	Schoolhouse
Terrarium display	Round glass with wooden top and base	Schoolhouse
4 habitat display cases	Large 4x4x7 feet each	Schoolhouse
2 display cases	Both rectangular, 1 glass with wood base, 1 w/ glass base	Schoolhouse
2 Juncus Baskets	Donated Native American Juncus Basket	Schoolhouse
4 framed basketry prints	Printed display posters about basket making	Schoolhouse
1 yucca fiber cargo net	Native American replica made from Yucca Fiber	Schoolhouse
1 pair yucca fiber sandals	Native American replica made from yucca fiber	Schoolhouse

Item	Description, Accessories and Status	Location
Vivaria Display Case	With 6 aquaria and cover panel made to match them	Schoolhouse
Daewoo TV	With Digital photo viewer and b/w tv camera monitor	Schoolhouse
Shop vac		Schoolhouse
Toshiba VCR, Sony Television on cart	28-inch TV, VHS VCR on a black media cart	Schoolhouse
<b>Schoolhouse Kitchen Items</b>		
Goldstar Microwave oven		Schoolhouse
Sanyo mini-fridge		Schoolhouse
Water cooler stand		Schoolhouse
Rubbermaid cabinet		Schoolhouse



*Appendix 9. Road Maintenance. Multi-Species Reserve Management Plan: September 3, 2008*

<b><i>Road Name/Description/General location <sup>1</sup></i></b>	<b><i>Associated Landowner(s)</i></b>	<b><i>Road or Road Segment to be maintained by:</i></b>	<b><i>Maintained Road Width</i></b>	<b><i>Notes/Special Instructions</i></b>
North Hills of Diamond Valley Lake	MWD	MWD	14'	
Rawson Road between DVL and Crown Valley Road (Gate 140 to 144), including the cutoff to the Shipley Barn.	MWD	MWD	14'	
Crown Ridge Road	MWD	MSR	11'	
Gate 146 Road	MWD	MSR	10'	This road is currently unnecessary and is not being maintained; currently scheduled for elimination.
Crown Valley Road between Bit Road and MWD gate (gate located on western edge of mitigation parcel 5)	ORHOA	ORHOA	14'	Maintained by ORHOA
Bit Drive	ORHOA	ORHOA	14'	Maintained by ORHOA
Black Mtn. Peak Rd.	RCHCA	MSR	11'	This road is currently unnecessary and is not being maintained; it is scheduled for elimination.
Crown Valley Road between MWD gate and gate 148	MWD	An unmaintained County Road.	14'	
Crown Valley Road between gate 148 and gate 150	MWD, RCHCA, Mit. Bank Property #4	An unmaintained County Road	14'	
Rawson Road (west of Gate 150)	MWD, Private, RCHCA, Mit. Bank Parcels #27, #31	An unmaintained County Road.		Historically, owners of Rawson Ranch have maintained the road within their property boundaries.
Buckskin Road within Reserve boundaries	MWD	ORHOA	12'	
Ridge Road within Reserve boundaries	RCHCA, BLM, Private	MSR	12'	This road has an access easement for the private parcels at the end of the road.
Lopez Canyon Loop Road	MWD	MWD	12'	

<sup>1</sup> Please refer to the Wildfire Response Plan maps located in Appendix 11 for road names and location.

*Appendix 9. Road Maintenance. Multi-Species Reserve Management Plan: September 3, 2008*

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<b><i>Road Name/Description/General location <sup>1</sup></i></b>	<b><i>Associated Landowner(s)</i></b>	<b><i>Road or Road Segment to be maintained by:</i></b>	<b><i>Maintained Road Width</i></b>	<b><i>Notes/Special Instructions</i></b>
Shipley Road (Gate 150 to Gate 158)	MWD, County	MWD	14'	
Bachelor Mtn. Road	MWD	MWD	12'	
North Shore Skinner Road (Gate 158 to Gate 112)	MWD, BLM	MWD	14'	
MSR Entrance Road (Gate 158 to Gate 100)	MWD	MWD	14'	
Tucalota Creek Road	MWD	MSR	12'	This road should be lightly weeded using hand-held weed-trimmers.
Stage Road	MWD	MSR	12'	This road should be lightly weeded using hand-held weed-trimmers.
Water Tank Road (From Gate 104 north to water tank)	MWD	MSR	12'	
South Shore Skinner Road (Gates 106 and 108 to Gate 110)	MWD	MWD	14'	
Horse Camp Cutoff	MWD	MSR	12'	
Lake Skinner Park Entrance Road	MWD	Lake Skinner Park		Paved road maintained by Lake Skinner Regional Park
Maintenance road to Lake Skinner Park maintenance yard	MWD	Lake Skinner Park	14'	
Tucalota Hills Road (aka John Moore Trail)	MWD	ORHOA		

<sup>1</sup> Please refer to the Wildfire Response Plan maps located in Appendix 11 for road names and location.

In a natural resource management setting, monitoring is a crucial component of an informed process for making decisions, and monitoring design should be driven by the decision context and uncertainties (Lyons et al. 2008). However, with limited staff and funding, this management plan will strive for efficient monitoring protocols for the species covered by the Reserve MSHCP and select State and/or Federal listed species. The overall goal of the monitoring protocols will be for decision-making strategies that aim to meet the management goals. In addition, the monitoring protocols may change as new information, or the overall efficacy of the methodologies are evaluated in an adaptive management context. For many species, incidental observations and reporting may be all that is required (Table 1). All monitoring on the Reserve will be subject to available funding and staff.

### **Munz's Onion enhancement and monitoring**

**Goal:** Track changes in population size on the Reserve by annually estimating limits of occupation and abundance within known occupied areas. In addition, enhance habitat suitability by reducing non-native vegetation or thatch that may be negatively affecting the population growth.

**Narrative:** There are two main populations of this species on the Reserve: 1) on the north shore of Lake Skinner (three small adjacent populations); and 2) in the North Hills (north of DVL). The north shore Lake Skinner population was studied for approximately five years (1992-1996) by Ellstrand and Clegg (1996). Although they never delineated the extent of the population, population numbers were estimated. It should also be noted that a separate study was conducted on the south slope of Bachelor Mountain and two other populations were apparently surveyed. However, the reports, data, and maps of this additional work are not available (1991 ERCE sensitive map report). It is unclear from the Ellstrand and Clegg study reports what technique was used to estimate population sizes. It may be that they conducted a complete count of the populations because the populations were relatively small (1995 was the year of highest recorded population size at 3,322 individuals.)

**Objective 1:** Estimate the area occupied by Munz's onion at the two known populations.

**Strategy 1)** Annually map the perimeter of each occupied area based on direct observations of the plants. This will be conducted each year, concomitant with the abundance estimation (see Objective 2 below). Record the perimeter using GPS or other location recording technology with similar precision. Mapping error due to plant detection rates or mapping technology will not be estimated.

**Objective 2:** Estimate the number of plants within each of the two known populations.

**Strategy 1)** Annually count the number of plants observed using variable-width transects (distance sampling). Transects will run from edge to edge of the mapped perimeter of occupied habitat, will be oriented North-South (to

partially control for the effects of lighting differences on detection probability) and spaced regularly throughout the occupied habitat such that within each population the length of all transects combined will be at least 500 meters. Surveys along the transects will continue either until a sufficient number of plants are recorded (e.g., 500) to estimate plant density or the 500 meter transect is complete, whichever comes first. Surveys will be conducted during the period when plants appear to be in full bloom (approximately April of each year). Detection probability will be calculated separately for flowering and non-flowering plants within each population. Plant density will be calculated separately for each population following the methods of Buckland et al. (2001). Total population within each population will be calculated by extrapolating the density estimate to the entire area mapped as occupied in each respective population.

- Strategy 2) Conduct direct counts of abundance in addition to variable-width transects during years of relatively low abundance and when direct counts are deemed logistically and fiscally feasible.

Objective 3: Enhance habitat suitability in occupied areas.

- Strategy 1) In the first year of monitoring for Munz's onion, the perimeter of the populations will be delineated (see Objective 1 above). The area occupied by each population will be divided into two approximately equal halves. One half will be managed annually to enhance the habitat suitability (treatment), the other half will not be managed (control). For the first five years of this plan, the thatch and biomass from non-native vegetation will be removed from the "treatment" half of the occupied area delineated in year one using either mowing or burning (the same method must be used every year). Vegetation removal will occur annually (approximately February) prior to the emergence of the Munz's onion.
- Strategy 2) Detection probability and plant density will be calculated separately for the treatment and control areas to determine the efficacy of the treatment. If the treatment results in a 20 percent or greater increase in estimated plant density (averaged across the last three years of the program) the treatment will be applied to the entire occupied areas in all subsequent years and detection and density estimates will no longer be made separately for treatment and control areas.

### **Engelmann Oak restoration, enhancement, and monitoring**

Goal: Maintain the current footprint of occupancy of Engelmann oaks on the Reserve and promote diversity in the age class structure of the population through plantings and protection of seedling/saplings from herbivory. In addition, attempt to expand populations of Engelmann oaks in other areas of the Reserve to minimize the effects of catastrophic events (such as fire).

Narrative: There is one large population of Engelmann oak on the Reserve, located generally in and around Lopez Canyon and Lopez Loop Road. A second, smaller population is located southwest of Lopez Canyon near a small geologic fault.

Objective 1: Count (census) the number of Engelmann oak trees on the Reserve.

Strategy 1) Every five years, mark all “new” (unmarked) seedlings and saplings using a permanent metal tag. Enclose approximately 50 percent of all “new” trees that are within age classes subject to herbivory (up to 70 cm tall and 1 cm basal stem diameter). Record all locations using GPS or another location recording technology with similar precision.

Strategy 2) Estimate tag loss using the GPS locations of previously marked seedlings and saplings. Tag loss should be estimated separately for naturally recruited trees protected from herbivory, naturally recruited trees not protected from herbivory, trees planted under the restoration program that are protected from herbivory, and trees planted under the restoration program that are not protected from herbivory. Note: Tag loss may only be estimated for plants three years old and older due to the potential that the five-year sample interval could allow for one plant to die and another to be recruited at the same location.

Objective 2: Measure (census) difference in survivorship between naturally recruited and planted Engelmann oaks. This will provide feedback on the efficacy of, and continued need for, the planting program and herbivory protection measures.

Strategy 1) Every five years, census all previously marked Engelmann oak trees that were known to be alive as of the last survey. Survivorship will be reported as the simple percentage of trees that survive from one survey period to the next, with a correction for tag loss. Survivorship will be estimated separately for naturally recruited trees protected from herbivory, naturally recruited trees not protected from herbivory, trees planted under the restoration program that are protected from herbivory, and trees planted under the restoration program that are not protected from herbivory.



Objective 3: Reduce potential for tree loss due to pathogens, insect invasions, or other avoidable sources of mortality.

Strategy 1) Every five years, all Engelmann oak trees and coast live oak trees (*Quercus agrifolia*) will be inspected and evaluated for the potential presence of *Phytophthora*, the fungus-like pathogen that causes “Sudden Oak Death”. If *Phytophthora* is found, the Reserve Manager will contact the California Oak Foundation to determine the best treatment method. In addition, trees will also be evaluated for the presence of the goldspotted oak borer (*Agrilus coxalis*), a relatively new species of invasive insect damaging oak trees in southern California. The presence of any suspected goldspotted oak borers will be immediately reported to USDA Forest Service, Pacific Southwest Region.

### **Quino Checkerspot Butterfly habitat enhancement and monitoring**

**Goal:** To increase and maintain habitat suitability for Quino checkerspot butterfly at known occupied locations, and expand the footprint of suitable habitat to twice the size of the area historically occupied.

**Narrative:** Known locations: There is a significant population of this species located along the south shore road of Lake Skinner (referred to as a USFWS “reference site”<sup>1</sup>). This population is currently being monitored by the USFWS and the Western Riverside County Regional Conservation Authority, as well as by the Reserve Manager. Other, smaller, populations have been previously found in the southeast corner of the Reserve, along the Lake Skinner Equestrian Trail just south of the Tualota Bridge Crossing, on top of Bachelor Mountain, along Tualota Creek Road and along the ridge west of the intersection of Tualota Creek Road and the MSR Entrance Road. Additionally, a recent observation of a new location for this species was made near the southwestern corner of Diamond Valley Lake.

Past enhancement efforts: An area of approximately ½ acre adjacent to the USFWS reference site was mowed and treated with Fusilade® in January 2005. As of January 2008, the site is exhibiting signs of increased *Plantago* occupancy.

Description of suitable habitat: Grasslands, remnant forbland, juniper woodland, and open scrub and chaparral communities that support the primary larval host plants (*Plantago erecta*, *Antirrhinum coulterianum*, *Castilleja exserta*) and a variety of adult nectar sources. The Reserve is identified as a recovery unit in the Final Recovery Plan for the Quino Checkerspot Butterfly (USFWS 2003). The Plan identifies the invasion of nonnative plant species as the primary threat to the Quino checkerspot butterfly in the Reserve.

**Objective 1:** Delineate the area of historically occupied habitat and set the target value for suitable habitat expansion.

Strategy 1) Conduct a one-time delineation of area on the Reserve estimated to have been occupied by the Quino checkerspot butterfly since the Reserve was established. The delineation will consider all available survey data, vegetation mapping, and professional opinion.

Strategy 2) Establish the target value for expansion of suitable habitat as twice (2 times) the area delineated as historically occupied.

**Objective 2:** Reduce the vegetative competition within half of the historically occupied areas to test methods that promote the abundance of larval host plants for Quino checkerspot butterfly.

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<sup>1</sup> <http://www.fws.gov/carlsbad/Rules/QuinoDocuments>

- Strategy 1) Designate half of the historically occupied area as the “experimental area” where methods will be tried to reduce vegetation competition. The remaining half will not be treated.
- Strategy 2) Annually, up to 50% of the experimental area (25% of the total historically occupied area) will be treated to reduce non-native grasses and/or forbs that are suspected of reducing habitat quality for the Quino checkerspot butterfly. Methods of vegetation reduction may include mowing, burning, and chemical treatments, but should be consistent from year to year. Treatments will require annual approval from the wildlife agencies prior to implementation. Treatments will only take place outside of larval and adult butterfly activity periods (August – December).
- Strategy 3) Annually, the abundance of host larval plants for the Quino checkerspot butterfly will be estimated separately within the treatment areas and in the non-treatment areas for each larval host plant species. Vegetation quadrates (Elzinga et al. 2001) will be used to sample the abundance of the host plants and estimate cover of weed species within the treatment and non-treatment areas. The results will be used to assess whether or not a significant ( $p_{\alpha=0.1}$ ) increase in abundance of the larval host plant species has resulted from the vegetation treatment(s). If no significant increase is detected within three years, another treatment method will be tried. If a significant increase is detected, the Reserve Manager will seek permission from the wildlife agencies to expand the treatment to the entire area delineated as historically occupied.
- Objective 3: Expand the footprint of suitable habitat for Quino checkerspot butterfly on the Reserve to the total area established under Objective 1 above.
- Strategy 1) Delineate an area (contiguous or in multiple pieces) equal in size and directly adjacent to the area designated as historically occupied by the Quino checkerspot butterfly. This area will be designated as the “expansion area”.
- Strategy 2) Annually, treat up to 100% of the expansion area to reduce non-native grasses and/or forbs that are suspected of precluding establishment of larval host plants. Methods of vegetation reduction may include mowing, burning, and chemical treatments, but should be consistent from year to year. Treatments will not require annual approval from the wildlife agencies unless Quino checkerspot butterfly is observed in the area and could be impacted by the treatment.
- Strategy 3) Annually, the abundance of host larval plants for the Quino checkerspot butterfly will be estimated within the expansion area for each larval host plant species. Vegetation quadrats (Elzinga et al. 2001) will be used to sample the abundance of the host plants and estimate cover of weed

species within the treatment and non-treatment areas. The results will be used to assess whether or not a significant ( $p_{\alpha=0.1}$ ) increase in abundance of the larval host plant species has resulted from the vegetation treatment(s). If no significant increase is detected within three years, another treatment method will be tried.

Objective 4: Evaluate historically occupied areas for current occupancy and possible population size assessment.

Strategy 1) Conduct surveys at all historically occupied areas once per week for 5 consecutive weeks once the flight season has begun. Surveys will only be completed between the hours of 0930 and 1430, when temperatures in the shade at ground level are  $>15.5^{\circ}\text{C}$  on a clear, sunny day, or  $>21^{\circ}\text{C}$  on an overcast or cloudy day, and wind speeds are  $<16$  km per hour measured 1.2 – 1.8 m above the ground. Because this species is not covered under the Reserve MSHCP, the surveyor must hold a valid USFWS permit to conduct surveys for this species.

### **Burrowing Owl habitat enhancement and monitoring**

Goal: Identify, protect, and enhance the habitat directly adjacent to all burrow complexes supporting breeding burrowing owls on the Reserve.

Narrative: This species typically occupies grassland areas in southern California. They nest in mammal burrows (usually squirrel) and the nest is occasionally enlarged by the owl kicking dirt backward out of the burrow opening. The nest is often lined with cow chips, horse dung, food debris, dry grass, weeds, pellets, and feathers. The burrow may be used year around for breeding and for cover.

Most of the historic locations of burrowing owl occupancy on the Reserve have been primarily anecdotal. Some of the documented occurrences include:

Three burrowing owls were observed during Lake Skinner Equestrian trail surveys in 1994. The general location of the observations was approximately one-quarter mile west of the Lake Skinner Trail Equestrian Camp area (Wagner et al. 1995). A burrowing owl was observed once in this general area again in 2006.

Three burrowing owls were observed adjacent to the Reserve in an area under the operation of Lake Skinner Regional Park in 1996. The owls were located in an area proposed for event parking near the Park general store and have not been observed since that time.

In 2006, the Western Riverside County Multi-Species Habitat Conservation Plan Monitoring group observed a burrowing owl within the Reserve on the north side of the North Hills of Diamond Valley Lake. This owl was observed once at UTM Easting 0495505, Northing 3728461 (record in MSR files).

In May, 2007, a pair of burrowing owls occupied a small pipe culvert which traveled under the road in the Reserve which leads to the Park Maintenance yard near the entrance to Lake Skinner Park. This pair hatched three young burrowing owls which were subsequently killed by a malicious individual. The adult owls returned to the pipe. An artificial burrow nest box was placed upslope of the pipe opening being used by the owls in hopes that the pair would vacate the pipe and move to the box. In November 2007, observations of the pair using the nest box were made. As of December, 2008, only one of the pair remains; using both the pipe and the artificial burrow.

An incidental observation of a burrowing owl was made by a CDFG employee in the Crown Valley area of the Reserve in 1999 or 2000. The approximate location was UTM 500380 mE, and 3723720 mN (E. Konno pers. comm.)

On March 17, 2007, 12 burrowing owl nest boxes were placed within the Reserve along the north shore of Lake Skinner. There were three sites identified and approximately 2 acres of non-native grass mowed at each site. The burrowing

owl boxes were constructed as part of an Eagle Scout project of the Boy Scouts of America. There are four nest boxes located in each of the three sites.

Focused surveys conducted throughout the Reserve in 2003 (Ginny Short) and in 2006 (WRCMSHCP Monitoring Group) found no burrowing owls in the Reserve.

Objective 1: Annually conduct surveys for burrowing owls in all areas likely to support breeding burrowing owls.

Strategy 1) A minimum of three surveys will be conducted at all locations where: a) burrowing owls have previously been recorded breeding; b) artificial burrows are installed; or c) burrowing owls have been observed incidental to other activities during the previous 12 month period. Timing of surveys will include at least one survey during each of the three following nest stages: breeding/laying/incubation (approximately March 12 – April 20); incubation/feeding nestlings (approximately April 23 – May 25); and fledging (approximately May 28 – June 29). Each survey will be conducted during the period of one hour before to two hours after sunrise or two hours before to one hour after sunset using binoculars to locate any burrowing owls from a distance. Each survey will also include a walking survey over 100% of the areas identified above to identify any burrow entrances that exhibit signs of nesting burrowing owls (see Hennings 1963 and Winchell 1994). The location of active burrow entrances will be recorded using GPS or another location recording technology with similar precision. In addition, representative photographs of all burrow locations will be taken and added to the burrowing owl database of information.

Objective 2: Protect burrow complexes that support breeding burrowing owls.

Strategy 1) Determine which burrow entrances are part of the complex being used by each nesting burrowing owl by repeatedly walking up to and flushing the breeding adult from the nest burrow (where eggs are being incubated) to nearby auxiliary burrows (Winchell 1994).

Strategy 2) Install perch posts (signage optional) within one meter of all burrow entrances in each complex that are separated by five meters or more. Reduce the height of all weeds or other vegetation considered problematic to burrowing owls (e.g., for visual identification of incoming predators) within at least 25 meters of the burrow using only hand equipment. Vegetation height should NOT be reduced to zero (e.g., bare ground) because some vegetation is necessary to support insects and other species that serve as prey for the burrowing owls.



Strategy 3) Remove all previously installed perch posts located in areas where active burrow complexes no longer exist (e.g., only burrow entrances that are active in that survey year should be marked with a perch post).

Objective 3: Every five years conduct a systematic survey for burrowing owls to document any new burrowing owl breeding locations on the Reserve. Survey methodology will generally follow those being used for more regional monitoring in Riverside County. Surveys will be confined to areas where the vegetation community could potentially support burrowing owls (e.g., grasslands, areas denuded of vegetation by fire, etc.), but exclude areas where burrowing owls are already known to occur.

Strategy 1) Establish survey transects and point count locations using a 400 meter grid overlaid on the most recent vegetation map for the Reserve. The location of all grid vertices that fall within the vegetation communities that could potentially support burrowing owls will be identified as point count survey locations. The point count survey locations will be numbered and the grid lines between sequential points will serve as the access and transect survey routes.

Strategy 2) Transect survey routes will be walked at least three times and will include at least one survey during each of the three following nest stages: breeding/laying/incubation (approximately March 12 – April 20); incubation/feeding nestlings (approximately April 23 – May 25); and fledging (approximately May 28 – June 29). Burrowing owls will be searched for visually and auditorily along the entire length of each survey route. Upon reaching each point count survey location, six minutes will be spent observing for burrowing owls while broadcasting recorded burrowing owl calls following the methods of Conway and Simon (2003).

Strategy 3) The location of all burrowing owls detected on the transect and point count surveys will be examined for signs of nesting by burrowing owls. If a burrow entrance is found with signs of occupancy by burrowing owls, the location will be added to the list of known locations for surveys in subsequent years, and the site will immediately be protected per Objective 2 above. If no sign of occupancy is visible at the location where the burrowing owl was observed, at least one additional repeat visit will be made to that location after two weeks to survey for burrowing owls and search for nest burrow entrances.

### **Least Bell's Vireo and Southwestern Willow Flycatcher monitoring**

Goal: To determine the distribution and abundance of listed riparian bird species within the Reserve.

Narrative: Appropriate habitat for these two species is typically in areas dominated by dense, willow riparian habitats with lush understory vegetation.

Least Bell's vireo: In southern California, the first eggs are laid in April. They typically nest low to the ground (0.5 m – 1.5 m, but also up to 8 m). The nest is constructed of grasses, plant stems, or skeletonized leaves and is lined with fine grass, tied together with spider silk and is often “decorated” on the outside with spider egg cases. Nests are suspended from lateral, terminal, and other small forks in pendulant or horizontal branches. Also of note is that Bell's vireo nests are usually located along the periphery of the substrate plant. Both sexes share the incubation of 3 - 5 eggs for approximately 14 days. Young fledge in 11 – 14 days and both sexes continue to feed and brood the fledglings. They may attempt multiple broods in each breeding season.

An excellent behavior for searchers to key in on while looking for least Bell's vireo nests is the highly ritualized behavior that occurs when the sexes switch incubation duty. When the female is on the nest the male will sing as he approaches her and the female responds with calls while staying still on the nest. The male then lands in the nest tree and continues to sing several more times which prompts the female to call and fly from the nest. After a quick inspection of the eggs at the edge of the nest, the male then sits on the nest.

Southwestern willow flycatcher: Nest building begins in mid- to late May. The nest is constructed by the female while the male perches nearby. The nest is low to the ground in the crotch of a small tree or shrub. The nest is constructed of weed stems, grass, and bark strips and is lined with fine grasses, hair, plant down, and/or feathers. The female alone will incubate 3 – 5 eggs for 12 – 14 days and the young fledge in approximately 14 days after that.<sup>2</sup>

The willow flycatcher is one of ten *Empidonax* flycatchers common in North America, four of which may migrate through southern California (Sogge et al. 1997). Like all *Empidonax*, willow flycatchers are nondescript in appearance, making them difficult to see in dense breeding habitat. It is generally believed that willow flycatchers breeding in southern California are of the *extimus* subspecies. However, any of the other subspecies may vocalize while passing through southern California, so it is important to determine if a vocalizing individual is, in fact, breeding in the area (Loren Hays, personal communication).

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<sup>2</sup> <http://www.usgs.nau.edu>

In 1995, Griffith Wildlife Biology (Griffith Wildlife Biology 1995) conducted surveys in six riparian areas within or adjacent to the Reserve: 1) Middle Creek; 2) Tualota Creek; 3) Schoolhouse Creek; 4) South Shore Lake Skinner MWD Rock Quarry; and 5) two additional areas along the south shore of Lake Skinner. Two least Bell's vireo males were observed within the MWD operations area of Schoolhouse Creek. One of the males was confirmed to be paired with a female and nesting. The general area of the observations is in the riparian area approximately 1,000 feet to the west of the Alamos Schoolhouse building and approximately 500 feet from the Reserve boundary.

In 1997, Griffith Wildlife Biology (Griffith 1998) surveyed the same areas that they surveyed in 1995: 1) Middle Creek; 2) Tualota Creek; 3) Schoolhouse Creek; 4) South Shore Lake Skinner MWD Rock Quarry; and 5) two additional areas along the south shore of Lake Skinner. Only one vireo pair was observed. The pair nested and fledged young in Schoolhouse Creek.

In 1999, Griffith Wildlife Biology (Griffith Wildlife Biology 1999) surveyed six riparian areas within or adjacent to the Reserve: 1) Middle Creek; 2) Tualota Creek; 3) Schoolhouse Creek; 4) South Shore Lake Skinner MWD Rock Quarry; and 5) two additional areas along the south shore of Lake Skinner. Four vireos were observed in Middle Creek and one vireo was observed in Tualota Creek. Nesting of two vireo pair were confirmed in Middle Creek (Griffith Wildlife Biology 1999).

On May 26, 2000, Griffith Wildlife Biology (Griffith 2000) surveyed riparian areas in Middle Creek, Tualota Creek, and Schoolhouse Creek. Two vireo were observed in Schoolhouse Creek, four in Tualota Creek, and three in Middle Creek, with nesting observed in Middle Creek (Griffith Wildlife Biology 2000). This document states "After holding steady at one to two pairs from 1995-1998, the number of Reserve vireo locations has increased from five to six males observed in 1999 (at Middle and Tualota Creeks) to the nine males observed in 2000 (at Middle, Tualota, and Schoolhouse Creeks)".

In the spring of 2003, the U. S. Army Corps of Engineers Environmental Laboratory conducted avian surveys along an unnamed creek located at the southeast base of Bachelor Mountain (Wakeley et al. 2004). The general location of the creek can be described as UTM 496050 mE and 3717912 mN. Among the 37 bird species detected during these surveys, two willow flycatchers were observed; however, it is unknown if these observations were of the listed *extimus* subspecies.

In 2006 and 2007 the WRCMSHCP Monitoring Group surveyed riparian areas in the Reserve. There were approximately four detections of least Bell's vireo in Rawson Creek, one detection in Middle Creek, and four detections in Tualota Creek in 2006. Additionally, there were detections of least Bell's vireo and

southwestern willow flycatcher within Middle Creek and at least two detections of willow flycatcher within Tualota Creek in 2007.

Potential areas that may support appropriate habitat within Reserve boundaries include:

Area 1) Tualota Creek upstream of Lake Skinner (approximately [3.2 km [2 miles]]);

Area 2) Middle Creek upstream of Lake Skinner (approximately 1.3 km [0.8 miles]). It's important to note that a significant portion of Middle Creek burned during the October 27, 2003, "Mountain Fire";

Area 3) Rawson Creek between the confluence with Middle Creek and Lopez Canyon Creek (approximately 3.6 km [2.26 miles]);

Area 4) Unnamed creek from the north shore of Lake Skinner north to beyond Bachelor Mountain Road (approximately 1.6 km [1 mile]); and

Area 5) Lopez Canyon Creek (approximately 1.1 km [0.7 miles]).

Objective: Survey appropriate habitat within stream corridors within the Reserve boundaries every two years.

Strategy 1) During the first three years of implementation of this plan, appropriate habitat within the five areas identified above will be mapped.

Strategy 2) Once appropriate habitat has been mapped, surveys for least Bell's vireo and southwestern willow flycatcher will be conducted according to the following protocol.

The USFWS has identified the appropriate survey periods for least Bell's vireo and southwestern willow flycatcher as April 10 – July 31, and May 15 – July 17, respectively. However, in order to optimize the probability of detecting both species, we will reduce effort at the end of the season in favor of additional survey effort in the middle of the season. Therefore, breaking the survey period for least Bell's vireo and southwestern willow flycatcher into five units (see below), the surveyor will conduct a slow walking transect through all appropriate habitat, noting all least Bell's vireo and willow flycatcher locations (using GPS unit), and possibly their reproductive status (if this can be accomplished quickly with no disturbance to the nest). The general survey methodology will follow Sogge et al. (1997) and incorporating the observance of least Bell's vireo.

1) Apr. 10 – May 14: Target species - LBV

2) May 15 – May 31: Target species – LBV and SWFL

- 3) June 1 – June 10: Target species – LBV and SWFL
- 4) June 11 – June 21: Target species – LBV and SWFL
- 5) June 22 – July 17: Target species – LBV and SWFL

According to USFWS guidelines, tapes are not necessary or recommended for surveying for least Bell's vireo. However, tapes are necessary and recommended for surveying for southwestern willow flycatcher; therefore, tapes to elicit the calls of southwestern willow flycatcher will be used during these surveys (concurrent with least Bell's vireo surveys). The use of tapes will follow guidelines in Sogge et al. 1997. Because these two species are not on the Reserve covered species list, the surveyor(s) will be required to have applicable State and Federal permits for southwestern willow flycatcher surveys (no permit is currently required for least Bell's vireo surveys).

The surveys will be conducted between dawn and 11:00 a.m. and there will be at least 10 days in between each survey effort. Surveys should not be conducted during periods of excessive or abnormal cold, heat, wind, rain, or other inclement weather that individually or collectively may reduce the likelihood of detection.

Depending upon the amount of mapped appropriate habitat, it will take approximately 3.5 days to conduct each of the five surveys (assuming that a person can survey 3 km between dawn and 11:00). This will result in a time commitment of approximately 18 days of surveys dedicated to LBV and SWFL surveys in any given year.

**California gnatcatcher, southern California rufous-crowned sparrow, and Bell's sage sparrow monitoring**

Goal: Evaluate, at a coarse scale, the status and distribution of select coastal sage scrub avifauna and their associated habitats within the Reserve and improve habitat quality through habitat enhancement in appropriate areas.

Narrative: California gnatcatcher, southern California rufous-crowned sparrow, and Bell's sage sparrow are typically found in sage scrub habitat and open chaparral habitat adjacent to sage scrub, although the three species have separate important habitat variables. For example, rufous-crowned sparrows inhabit areas that are dominated by rocks, sage sparrows will use sage scrub and chaparral equally, and California gnatcatcher prefers mature sage scrub dominated by *Artemisia californica* and *Eriogonum fasciculatum* species. There is currently approximately 8,500 acres of coastal sage scrub within the Reserve. All three species are cup nesters, typically building nests low in a bush. The nests are coarse dried grasses and rootlets, sometimes with small twigs, weed stems, or strips of bark. Nesting usually begins in March, but may begin as early as February.

In the past there have been many studies of California gnatcatchers on the Reserve. These studies have primarily focused on life history (nest success, dispersal, parasitism, depredation, etc.) and not on distribution throughout the Reserve. The studies that have been conducted have identified gnatcatcher populations in the North Hills of Diamond Valley Lake, the hills south of Diamond Valley Lake, and the sage scrub habitats to the east and south of Lake Skinner. Other incidental observations have occurred in appropriate habitat throughout the Reserve.

Objective 1): Survey sage scrub habitat and evaluate for habitat quality and presence/absence of California gnatcatcher, rufous-crowned sparrow, and sage sparrow.

Strategy 1) Within the first three years of this management plan, sage scrub within the Reserve boundaries will be mapped and categorized as high, medium, or low quality for each of the three target bird species.

Strategy 2) Once the sage scrub has been mapped, random points will be established equally within each representative sage scrub category. Randomization will be first established through the use of a grid with points 600m apart to optimize the probability of the point falling within an occupied territory (Clark Winchell, pers. comm.), and then by geographic stratification to ensure that points are well represented throughout the Reserve.

Point counts will generally follow the methods outlined in Ralph et al. 1993. Point counts will be conducted between February 15 and August



30. During the point count, the observer will conduct the survey for 10 minutes. The presence and approximate location relative to the point of any of the three focus species of birds will be recorded. The observer will also record the detection method (song, call, visual) and, if known, the sex and age of the bird. Sites will be surveyed between sunrise and six hours after sunrise, but surveys will be terminated if the temperature exceeds 30 degrees Celsius (86 degrees Fahrenheit). The survey season will be divided into three blocks (i.e., February 15 – April 14, April 15 – June 14, and June 15 – August 30), and each point will be visited within each block. In addition, each point will be surveyed a total of three times (at least one week apart) during the survey period. Data forms will be developed and analysis will follow Ralph et al. 1995.

While the observer is at the point and the bird survey is complete, the observer will conduct a quick vegetation survey. The vegetation survey will consist of the observer visually quantifying the surrounding vegetation and other land cover categories (e.g., rocks) in terms of the dominant species present, their overall condition, and general density. This information will be compared to the mapped category for that area to assess mapping accuracy. Data on the number of target species detections within each category of sage scrub will be evaluated to determine if the encounter rates correspond with the habitat category. If not, then the definitions of the categories may need to be refined.

The bird survey data will be an index of occupancy within each habitat category. No statistical models will be used. The information collected will be used as a rough estimate to evaluate target species occupancy within each habitat category to evaluate the potential need for habitat enhancement. Conversely, “high” habitat quality will provide information as to the desired outcome of any proposed habitat enhancement.

The Reserve-wide habitat mapping, point counts, and vegetation surveys should be conducted once every five years. An individual should be able to conduct a minimum of six surveys per day. Given a three-day per week survey schedule, approximately 28 weeks of survey season, and three visits to each point, approximately 56 points will be established within each habitat category in any given survey year.

Objective 2) Conduct habitat enhancement in areas of low sage scrub habitat quality.

Strategy 1) Using the presence/absence data of the three target bird species along with the overall condition categories of the sage scrub, the Reserve Manager will evaluate areas that may be in need of habitat enhancement (i.e., “low” quality habitat). If an area is targeted for treatment (pursuant to methods described in §3.2 of this plan), a complete breeding season census of the area will be conducted within the proposed treatment area prior to the

initiation of a treatment methodology. This census will ensure that the area does not support the target bird species, or that they are in such low numbers as to warrant habitat enhancement methods. In such a case, measures to avoid direct impacts to the resident bird(s) will be taken.

Post-treatment monitoring will be conducted through an additional complete census of the treatment area for five consecutive years.

**Stephens' kangaroo rat monitoring**

**Goal:** Conform with the regional monitoring program established by the RCHCA, to the extent funds are available to support such a program, and conduct annual monitoring of Las Mañanitas property as prescribed in previous agreements.

**Narrative:** Stephens' kangaroo rats are distributed throughout the Reserve in areas of relatively flat topography and grasslands with most populations distributed within the identified RCHCA conservation easements throughout the Reserve. Stephens' kangaroo rat habitat is described as open grasslands or sparse shrublands with cover less than 50 percent during the summer.

Past research of Stephen's kangaroo rats on the Reserve primarily focused on habitat enhancement and management rather than distribution (O'Farrell 1992-1996, Kelt et al. 2005). Density studies were conducted prior to the establishment of the Reserve (O'Farrell and Uptain 1989, ERC 1990) and then again in 2001 (Wagner 2001). Stephens' kangaroo rat densities are naturally variable and are dependent upon many factors, but most importantly inversely proportional to the density of non-native grasses.

**Objective 1:** Conform to the overall monitoring strategy designated by the RCHCA

Strategy 1) Coordinate directly with RCHCA to obtain the current methodology being employed for Stephens' kangaroo rat monitoring throughout the Plan Area for the Stephens' Kangaroo Rat Habitat Conservation Plan and determine if sufficient funds are available (in the endowment established by the RCHCA for Stephens' kangaroo rat management and monitoring on the Reserve) to conduct monitoring on the Reserve per the current methodology.

Strategy 2) If sufficient funds are available, conduct (or contract) implementation of the Stephens' kangaroo rat monitoring program per the specifications provided by the RCHCA. If sufficient funds are unavailable, coordinate with the RCHCA to determine whether funds should be reserved for the following year or if monitoring should be conducted to a reduced level of effort as supported by the available funding.

**Objective 2:** Annually conduct a survey on 205 acres of Stephens' kangaroo rat Conservation Easement land within Las Mañanitas Ranch and: a) visually estimate the percent area occupied by Stephens' kangaroo rat and the relative density of active kangaroo rat burrows; b) visually estimate the vegetative quality of the habitat for Stephens' kangaroo rat, and c) note if the terms and conditions of the Conservation Easement, the CMA/MOU, and the amendment to the Reserve MSHCP are being properly

implemented. The results shall be provided in writing to each RMC member agency within 30 days of survey completion.

### **Southeastern Pond Turtle**

Goal: Document the distribution and abundance of southwestern pond turtle within the Reserve.

Narrative: The southwestern pond turtle inhabits 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; however, pools are the preferred habitat within streams. Abundant logs, rocks, submerged vegetation, mud, undercut banks, and ledges are necessary habitat components for cover as well as a water depth greater than two meters. Additionally, emergent basking sites, emergent vegetation and the availability of suitable terrestrial shelter and nesting sites seem to characterize optimal habitat. Adjacent upland areas typically provide over wintering and estivation sites.

Objective: Survey appropriate habitat within the Reserve to estimate turtle population.

Strategy 1: During the first year of significant rainfall, appropriate habitat for turtles will be evaluated and mapped along all stream corridors within the Reserve. Appropriate habitat is generally defined as areas of slow moving or ponding water greater than 0.5 m deep, available vegetative cover, and basking sites (logs, rocks, submergent vegetation, etc.) During this habitat evaluation period, visual surveys for turtles will be conducted.

Strategy 2: Once appropriate habitat areas are identified, and following sufficient rainfall, turtle traps will be established and opened for four consecutive nights. Funnel traps will be used and the period of turtle nesting will be avoided (April through August). During this time, traps will be checked in the morning and in the evening. Traps will be baited with a can of sardines or tuna. The UTM location of each trap will be recorded as well as stream and weather conditions. All aquatic species found in a trap will be recorded and native species released (e.g., exotic species such as bullfrogs and crayfish will not be released). For all turtles captured, the following data will be recorded: sex, carapace length and width, and weight. In addition, pond turtles will be identified by notching the right femoral plastron scute and a photograph of the plastron taken.

Due to the low capture rate of pond turtles that is expected, no statistical analyses are expected to be completed.

## **Bat Surveys and Mine Closures**

**Goal:** To provide for public safety while allowing bat species to inhabit mines and caves within the Reserve.

**Narrative:** There are a number of mines and caves located throughout the Reserve. Currently, four have been identified, but more may be found in the future. Some mines and mine shafts were related to silica mining, and others may have simply been exploratory. Some of these mines currently support sensitive species of bats (e.g. Townsend's western big eared bat [*Corynorhinus townsendii townsendii*] observed in Crown Valley mine shaft by Pat Brown [1991]).

**Objective:** Within five years of the implementation of this plan, all mine shafts within the Reserve should be evaluated for use by wildlife, threats to wildlife or public safety, and their location documented. In addition, bat gates (or other method to restrict access) should be installed on all shafts inhabited by bats or other wildlife that may be accessed by the public and create a threat to public safety.

**Strategy 1:** Prior to gate installation, exit surveys (observations of bats leaving a mine to feed in the evening) should be conducted at all mines and caves pursuant to Tuttle and Taylor 1994. Surveys should be conducted between mid-June and early August to verify use of the mine during the summer months. Surveys should be conducted for at least two hours after dark, beginning at sunset, on nights of no rain, low wind speeds, and temperatures above at least 70 degrees Fahrenheit. Observers should be set up at least 30 minutes before sunset and should keep noise to a minimum. Observers should be seated at least 15 feet from the entrance and positioned so that emerging bats are silhouetted against the evening sky. If possible, the use of a "bat detector" should be employed to determine the species of bats exiting the mine.

The best time to check for winter use is usually when bats begin arriving to inspect a site for hibernation. This is typically around October or November in southern California. Observers should be in place at the entrance between one-half hour after sunset and midnight.

**Strategy 2:** If it is determined that the mine is being used by any of the free-tail bat species, no gate should be installed as gates are never acceptable to these species. An alternative means of preventing public access shall be implemented. In addition, a reliable source (such as Bat Conservation International) should be queried as to the acceptability of gates by whatever species is determined to be using the mine, based on current information. If it is determined that a gate is appropriate, simple, angle-iron gates following the design in Tuttle and Taylor 1994 should be installed over all mine openings. Proper design is extremely important; bat colonies have often abandoned a site due to inappropriate gate design. If possible, the minimum distance between vertical gate supports should be 24 inches and the horizontal members should be spaced six inches apart. A



small, lockable, opening should be incorporated into the gate to allow human access, if needed. Construction of the gate should be accomplished when the bats are not using the mine.

Table 1. Monitoring summary for those species covered by the Reserve MSHCP and/or species which are protected by either Federal or State laws.

<b>Common and Scientific Name</b>	<b>Habitat</b>	<b>Survey Period</b>	<b>Survey Methodology Summary</b>
<b>Plants</b>			
Smooth tarplant ( <i>Centromadia [Hemizonia] pungens</i> , ssp. <i>laevis</i> )*	G (grasslands with alkaline affinities)	April - November	Incidental observations and CNDDDB form.
Payson's jewelflower ( <i>Caulanthus simulans</i> )*	Rocky areas of CHP, CSS	April - June	Incidental observations and CNDDDB form.
Parry's spineflower ( <i>Chorizanthe parryi</i> var. <i>parryi</i> )*	CSS, CHP	April - June	Incidental observations and CNDDDB form.
San Jacinto Valley crownscale ( <i>Atriplex coronata</i> var. <i>notatior</i> )*	Alkali flats		Not known to occur in the Reserve. No monitoring is required.
Munz's onion ( <i>Allium munzii</i> )*	G, CSS	April	Permanently established line transects
Engelmann oak ( <i>Quercus engelmannii</i> )*	OF	All year	Individuals GPS'd and data on status of individuals collected in addition to restoration activities on a five-year rotation.
Palmer's grapplinghook ( <i>Harpagonella palmeri</i> )*	Open clay slopes and burn areas: CSS, CHP, G	March - April	Incidental observations and CNDDDB form.
<b>Invertebrates</b>			
Quino checkerspot butterfly ( <i>Euphydryas editha quino</i> )	G, CSS	March 1 - June 30	Habitat enhancement outside of flight season and surveys at historically occupied sites once per week for 5 weeks.
<b>Reptiles</b>			
Orange-throated whiptail ( <i>Cnemidophorus hyperythrus beldingi</i> )*	CSS, CHP, G	March - September when temperatures are above 33 degrees C (91 degrees F)	Incidental observations and CNDDDB form for breeding individuals.
San Diego horned lizard ( <i>Phrynosoma coronatum blainvillei</i> )*	CSS, CHP, G, OW, RF	March - September when temperatures are above 33 degrees C (91 degrees F)	Incidental observations and CNDDDB form for breeding individuals.
Northern red-diamond rattlesnake ( <i>Crotalus ruber ruber</i> )*	CHP, CSS, Rocky areas	April - September when temperatures are above 33 degrees C (91 degrees F)	Incidental observations and CNDDDB form for breeding individuals.
Western whiptail ( <i>Cnemidophorus tigris multiscutatus</i> )*	G, CSS, RF, CHP	April - September	Incidental observations and CNDDDB form for breeding individuals.

<b>Common and Scientific Name</b>	<b>Habitat</b>	<b>Survey Period</b>	<b>Survey Methodology Summary</b>
Southwestern pond turtle ( <i>Clemmys mamorata pallida</i> )*	Ponds, reservoirs, slow-moving streams	Opportunistically during periods of high rainfall.	Visual surveys of basking areas and trapping for four consecutive nights.
<b>Birds</b>			
California gnatcatcher ( <i>Polioptila californica californica</i> )*	CSS	Feb. – August	Random point counts and vegetation surveys.
Bell's sage sparrow ( <i>Amphispiza belli belli</i> )*	CHP, CSS	Feb. – August	Random point counts and vegetation surveys
Southern California rufous-crowned sparrow ( <i>Aimophila ruficeps canascens</i> )*	CSS, G	Feb. – August	Random point counts and vegetation surveys
Great blue heron ( <i>Ardea herodias</i> )*	RF, ponds, lakes, reservoirs	All year	Incidental observations and CNDDDB form for breeding individuals.
White-tailed kite ( <i>Elanus leucurus</i> )*	RF, G, OW	All year	Incidental observations and CNDDDB form for breeding individuals.
Bald eagle ( <i>Haliaeetus leucocephalus</i> )*	Lakes and Reservoirs	Winter (September – March)	Incidental observations and CNDDDB form for breeding individuals.
Cooper's hawk ( <i>Accipiter cooperi</i> )*	RF, OF	All year	Incidental observations and CNDDDB form for breeding individuals.
Ferruginous hawk ( <i>Buteo regalis</i> )*	G, open CSS	Winter (September – March)	Incidental observations and CNDDDB form for breeding individuals.
Golden eagle ( <i>Aquila chrysaetos</i> )*	CSS, G, open OF and CHP	All year	Incidental observations and CNDDDB form for breeding individuals.
Loggerhead shrike ( <i>Lanius ludovicianus</i> )*	G, CSS, G, RF, OF	All year	Incidental observations and CNDDDB form for breeding individuals.
Burrowing owl ( <i>Athene cunicularia hypugea</i> )*	G	March - August	Three transects spaced equally through survey period per year.
California horned lark ( <i>Eremophila alpestris actia</i> )*	G, CSS	All year	Incidental observations and CNDDDB form for breeding individuals.
Least Bell's vireo ( <i>Vireo bellii pusillus</i> )	RF	April - July	Transects.
Southwestern willow flycatcher ( <i>Empidonax traillii extimus</i> )	RF	May - July	Transects.
<b>Mammals</b>			
Mountain lion ( <i>Felis concolor</i> )*	CSS, CHP, RF, OW		Incidental observations and CNDDDB form for all observations.

<b><i>Common and Scientific Name</i></b>	<b><i>Habitat</i></b>	<b><i>Survey Period</i></b>	<b><i>Survey Methodology Summary</i></b>
American badger ( <i>Taxidea taxus</i> )*	G	All year	Automatic camera stations at suspected badger dens
Stephens' kangaroo rat ( <i>Dipodomys stephensi</i> )*	G, CSS	All year	Comply with RCHCA monitoring methodology
Los Angeles pocket mouse ( <i>Perognathus longimembrus brevinasus</i> )*	CSS, G	All year, but observations most likely during warmer periods	Concurrent with, and incidental to, SKR trapping
San Diego desert woodrat ( <i>Neotoma lepida intermedia</i> )*	CSS, RF, CHP	All year	Incidental observations and CNDDDB form for breeding individuals.
San Diego black-tailed jackrabbit ( <i>Lepus californica bennettii</i> )*	G, CSS	All year	Incidental observations and CNDDDB form for breeding individuals.
Northwestern San Diego pocket mouse ( <i>Chaetodipus fallax fallax</i> )*	CSS, G, CHP	All year	Incidental observations and CNDDDB form for breeding individuals.
Bat Species	Mines and caves	Summer and fall	Exit surveys and hibernation surveys

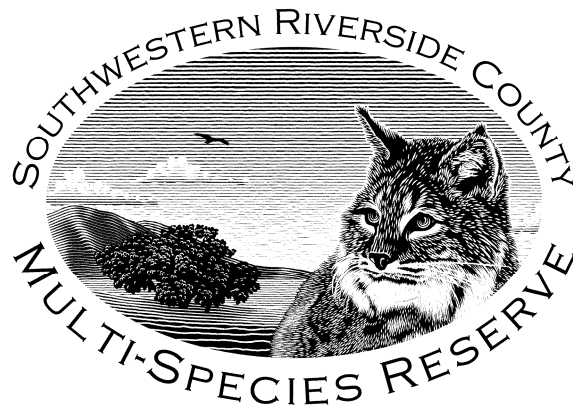
\*Species covered by Reserve MSHCP.

#### Habitat Codes

CHP	Chamise and mixed chaparral
CSS	Coastal sage scrub
DIS	Disturbed
G	Annual grassland
OF	Coast live and Engelmann oak forest
OW	Open water/shoreline
RF	Riparian forest

# WILDFIRE RESPONSE PLAN

## For the SOUTHWESTERN RIVERSIDE COUNTY MULTI-SPECIES RESERVE



*June 2008*

Prepared for:

California Department of Forestry  
and Fire Protection

Prepared by:

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## **I. Introduction**

This Wildfire Response Plan was prepared for the Southwestern Riverside County Multi-Species Reserve (Reserve), with information developed by the Reserve Management Committee (RMC) and the California Department of Forestry and Fire Protection (CDF/CalFire). The intent of this document is to provide CDF with information and recommendations for emergency fire response within and immediately adjacent to Reserve boundaries.

## **II. Objectives:**

The objectives of the information presented in this document are:

1. To identify environmentally sensitive areas within the Reserve which may be inadvertently damaged by aggressive fire-fighting methods;
2. To reduce the potential damage to sensitive habitats and wildlife caused by fire-fighting methods within the Reserve;
3. To identify areas where structures and/or people may be in danger in the case of wildfire within the Reserve;
4. To identify access for fire-fighting;
5. To minimize the cost, difficulty, and uncertainty of fire-fighting efforts within the Reserve;
6. To identify management units within which a wildfire may be contained; and
7. To limit ground crew activities in difficult terrain to reduce potential injury to firefighters.

## **III. Location and Description of the Reserve:**

The Southwestern Riverside County Multi-Species Reserve was established to comply with various regulatory requirements. The primary management objective of the Reserve is to cooperatively manage the Reserve lands as a single ecological unit by protecting, preserving, restoring, enhancing and monitoring the natural resources to maximize native biological diversity within the ecological context of the Reserve and its funding realities. The Reserve encompasses approximately 14,000 acres. In addition, there are a number of private in-holdings within the Reserve.

In general, the Reserve is located from the North Hills, north of Diamond Valley Lake, south to just past the southern shore of Lake Skinner. Roughly, the Reserve is comprised of the following legal description:

Township 5 South, Range 2 West: Sections 35, 36.

Township 5 South, Range 1 West: Sections 29, 30, 31, 32.

Township 6 South, Range 2 West: Sections 10, 11, 12, 13, 14, 23, 24, 25, 26, 34, 35, 36.



Township 6 South, Range 1 West: Sections 4, 5, 6, 7, 8, 9, 16, 17, 18, 19, 20, 21, 28, 29, 30, 31, 32, 33.

Township 7 South, Range 2 West: Sections 1, 2, 11, 12

Township 7 South, Range 1 West: Sections 4, 5, 6, 7, 8, 18

In addition to sensitive cultural resources, there are a number of species protected by state and federal laws within the Reserve. These species and their associated habitats include:

- Coastal California gnatcatcher (*Polioptila californica californica*), sage scrub
- Least Bell's vireo (*Vireo bellii pusillus*) and southwestern willow flycatcher (*Empidonax traillii extimus*), riparian habitats
- Stephens' kangaroo rat (*Dipodomys stephensi*), grasslands
- Quino checkerspot butterfly (*Euphydryas editha quino*), grasslands and sage scrub
- Munz's Onion (*Allium munzii*), grasslands

The presence of these, and other, sensitive species and cultural resources are the basis for attempting to identify areas where fire-fighting methods may need to be carefully implemented.

#### **IV. Reserve Access Information and Emergency Contacts**

Our goal is to reduce potential damage to Reserve habitats and to work cooperatively with CDF to provide information, resources, and assistance, whenever possible, in the event of a wildfire within or near the Reserve. To attempt to achieve this goal, we have designed maps that identify Fire Management Units within the Reserve and the associated preferred fire-fighting methods and information (Table 1). In addition, we have included a list of emergency contacts that may assist CDF in the event of a wildfire on or near the Reserve (Appendix 1). The RMC authorizes the Reserve Manager (or, in the absence of the Reserve Manager, the Reserve Patrol) to act as Resource Advisor in coordination with the Incident Commander in the event of a wildfire within the Reserve.

There are three main roads which enter the main body of the Reserve:

- 1) Within the Lake Skinner Riverside County Park Recreation Area, near the Multi-Species Reserve office. This is a locked gate and is identified as gate number 100 on the map.
- 2) Crown Valley Road heading west off of De Portola Road. This road eventually becomes Rawson Road and heads west to Washington Street. However, there is a locked gate on a road heading south into the Reserve at the point where Crown Valley Road becomes Rawson Road (gate number 150.)
- 3) Rawson Road heading east from Washington Street.

For the North Hills, access may be obtained through gates at Warren Road (gate 132), the east dam via Searl Parkway and the west dam of Diamond Valley Lake via Construction Road.

There are approximately 34 gates within the Reserve, 23 of which have identifying numbers associated with them. The general locations of the numbered gates are detailed in Appendix 2.

## V. Recommended Fire-Fighting Methods

Methods preferred within the Reserve are “Light hand on the land tactics”. Due to the potential for significant impacts to Reserve species, habitats, and cultural resources, the use of heavy equipment **should be avoided** unless the California Department of Forestry and Fire Prevention determines that this method is necessary to prevent loss of life or damage to structures.

Additional fire suppression guidelines for the Reserve include:

1. Utilize minimum impact suppression techniques in all areas of the Reserve, except where necessary to save structures or protect human life. Every effort should be made to minimize stream course disturbance, sedimentation, and actions that will result in damage to the environment.
2. The use of heavy equipment should be avoided within the Reserve unless absolutely necessary. Bulldozers should only be used to protect structures and riparian areas (if absolutely necessary) during a wildfire. It is preferred that protection of riparian areas during prescribed burns be accomplished with the use of hand crews.
3. Chemical Use:
  - a. Do not use chemicals when there is a potential for direct stream contamination, or in areas of environmental sensitivity (consult with Reserve Manager regarding specific areas of sensitivity.)
  - b. Minimize the application of retardant near streams. Retardant drops should be at least 300 feet from all water sources. Do not drop retardant directly in streams or adjacent riparian areas. **The use of foams should be completely avoided within the Reserve.**
  - c. Keep refueling, fuel storage, and fuel trucks at least 100 feet away from streams and riparian areas.
4. Suppression tactics (backburns or burnouts) should be used to minimize fire severity in riparian areas.
5. A Resource Advisor (Reserve Manager or Reserve Patrol) will be readily available to the Incident Commander. This advisor will review Operational Plans to assess the potential effects of the planned actions.

## VI. Fire Management Units (see Table 1 and Maps)

This Wildfire Response Plan recognizes that CDF and cooperating agencies have discretion to take any action they determine is necessary to protect public health and safety during wildfire events. These fire-fighting recommendations, therefore, apply only to conditions when CDF and cooperating agencies determine they can implement these recommended guidelines to the extent feasible without jeopardizing human life or property. It should be noted that the Fire Management Unit boundaries do not necessarily reflect Reserve boundaries. In addition, we are only making recommendations for

fire-fighting on the Reserve and are not making recommendations for activities related to private land surrounding the Reserve, or private in-holdings.

Units were delineated within each region based on the following criteria:

- Defensibility of the unit;
- Perimeters along roads or trails, along ridgelines, or on flat ground in a valley;
- Perimeters that are conducive to creating 30 – 60 foot fuel/fire breaks; and
- Where access, in most cases, is not a “dead-end”.

Units were also delineated based on general sensitivity guidelines based on: 1) biological sensitivity (the level of adverse impacts on the habitat by fire); 2) cultural resource sensitivity (the significance of the cultural site); and 3) health and safety sensitivity (the potential for structure or human impacts from fire) (Appendix 3).

Table 1 and associated maps identify Fire Management Units by number and unit details. The goal for each unit is to contain the fire within the unit, whenever possible.

Table 1. Southwestern Riverside County Multi-Species Reserve Fire Units

<b>Unit Number and Description</b>	<b>Notes</b>
1. Overlook	Visitor's Center and other facilities on top of hill. Helicopter landing potential at parking lot. Avoid impacts to reservoir facilities and equipment.
2. Saddle Dam	Some equipment on north facing slope. Be aware of MWD operational facilities.
3. North Hills	No structures in unit. Some trails in unit.
4. Magnesite Mine	No structures in unit. Some trails in unit.
5. Water Tower	Unit has development of approximately 30 homes at north-west base of hills.
6. Mustang Ridge	No structures in unit. Some trails in unit.
7. Northeast Marina	(Year 2002 – Marina under construction) Lives and property potentially at risk.
8. Dam Abutment	There may not be people or structures in unit, but containment important to protection of Unit 7.
9. East Corridor	Some reservoir monitoring equipment is in the unit.
10. West Corridor	Some equipment is in the unit. Major structures at west base of dam.
11. West Dam (southern abutment)	Winchester House at base of hills is a significant cultural resource to be protected.
12. West Rawson	Several structures in unit.
13. Borrow Area Crest	
14. Central Hills	Very limited access routes. No structures in unit.
15. Crown Ridge Hills	Some structures in unit.
16 A. Field Offices	Some structures in unit.
16 B. Crown Valley	Some structures along eastern boundary.
17. Rawson Ranch	Several homes in this predominantly private in-holding area. One home near the southeast area of the management unit has a small pond which may be useful as an engine water source.
18. Crown Valley Road	No structures or trails in unit.
19. Black Mountain	A north-south trail is near crest.

Table 1. Southwestern Riverside County Multi-Species Reserve Fire Units

20. Rancho Las Mañanitas	Large private estate. They have their own water supply (pond), it is approximately 5 acres in size, 14 million gallons, and 10 feet deep (uniform depth). The landowners have expressed that they would allow the use of their pond in the event of a wildfire (to fill trucks possibly appropriate for helicopters), but request that care be taken to limit damage to surrounding landscaping and the pond bottom. Emergency contact is Robert Grable (representative) 714-431-1177.
21. Rocky Mountain	Several houses in isolated canyons near north end of unit – the “Moderate Impact” applies to these areas only.
22. Rawson Canyon	No structures or trails. Very poor access except for the perimeter roads.
23. Bachelor Mountain North.	Use least-damaging methods possible in all areas except near houses and structures along north base of hills.
24. Bachelor Mountain South	MWD canal runs along west and southwest boundary. No trails or other access.
25. Lake Skinner, northeast shore	Multi-species Reserve office and trailer located in southeast portion of Unit 25.
26. Between Creeks	No facilities except for water tower.
27. Tualota Hills	Reserve interpretive center in western portion of Unit. This structure is separated from wildlands by fuelbreak. The interpretive center has asphalt shingles as roof material.
28 A. County Recreation Area	Use all available fire fighting methods. Expect people/campers in this Unit.
28 B. Entry Loop Road	
29. South Shore	No facilities. Expect hikers, fisherman, and horses in this Unit.
30. Southern Boundary	Structures along southern boundary of Unit.

Appendix 1.

## **Emergency Contacts:**

### **Multi-Species Reserve Personnel:**

Christine Moen (Reserve Manager)	Office: 951-926-7416 Home: 909-238-9658 Cell: 951-906-9776
Tom Ash (Reserve Ranger)	Office: 951-926-7416 Home: 951-927-1676 Cell: 951-906-9777

### **California Department of Forestry and Fire Protection:**

Chief Dan Johnson	Office: 951-659-3337 Cell: 951-901-5014
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### **Metropolitan Water District Personnel:**

Wendy Picht (MWD Reserve Representative)	Cell: 951-204-0730
MWD Emergency Operations Center	800-555-5911
Lake Skinner Filtration Plant	951-926-5810
Bill Wagner (MWD Biological Consultant)	Office: 951-659-5858 Cell: 951-850-5677



## Appendix 2: Locations of numbered gates within the Reserve.

	UTM Northing	UTM Easting	Latitude Deg-Min-Sec	Longitude Deg-Min-Sec
<b>100</b>	3716521.12	497628.36	33-35-18	117-1-32
<b>102</b>	3716070.36	497500.88	33-35-3	117-1-36
<b>104</b>	3715869.47	497902.19	33-34-57	117-1-21
<b>106</b>	3715563.83	497104.66	33-34-47	117-1-52
<b>108</b>	3714821.88	497117.69	33-34-23	117-1-51
<b>110</b>	3715461.24	493856.48	33-34-43	117-3-58
<b>112</b>	3717197.60	494098.60	33-35-40	117-3-48
<b>114</b>	3718898.98	495490.43	33-36-35	117-2-55
<b>116</b>	3720843.44	493960.70	33-37-38	117-3-54
<b>124</b>	3722137.40	496475.02	33-38-20	117-2-16
<b>132</b>	3728911.67	497005.46	33-42-00	117-1-56
<b>134</b>	3728869.44	497295.51	33-41-59	117-1-45
<b>136</b>	3730025.98	498579.42	33-42-36	117-00-55
<b>140</b>	3724604.21	499198.76	33-39-40	117-00-31
<b>142</b>	3723800.96	499259.16	33-39-14	117-00-28
<b>144</b>	3723395.69	499564.91	33-39-1	117-00-16
<b>146</b>	3723486.35	499892.28	33-39-4	117-00-4
<b>148</b>	3723183.58	499309.91	33-38-54	117-00-26
<b>150</b>	3722428.73	499020.96	33-38-30	117-00-38
<b>152</b>	3722882.44	501292.82	33-38-44	116-59-9
<b>154</b>	3720717.42	500493.94	33-37-34	116-59-40
<b>156</b>	3719303.31	498192.64	33-36-48	117-1-10
<b>158</b>	3717965.23	497568.00	33-36-5	117-1-34

Appendix 3.

## **Environmental Sensitivity**

Within each unit, the RMC has adopted general sensitivity guidelines, based on the resource sensitivities of the unit. In each unit, fire-fighting activities are based on an evaluation of three categories of sensitivity: 1) biological, 2) cultural resource, and 3) health and safety.

- **Biological Sensitivity**

High: Habitat value greatly reduced by fire; type conversion likely following fire.

Moderate: Habitat value affected by fire; type conversion likely only if fire is frequent.

Low: Habitat may require fire or other fuels reduction (fire-adapted community); type conversion unlikely.

- **Cultural Resource Sensitivity**

High: Major cultural site, many sites, high potential for sites, or known significant sites.

Moderate: Some known sites, and moderate potential for additional significant sites.

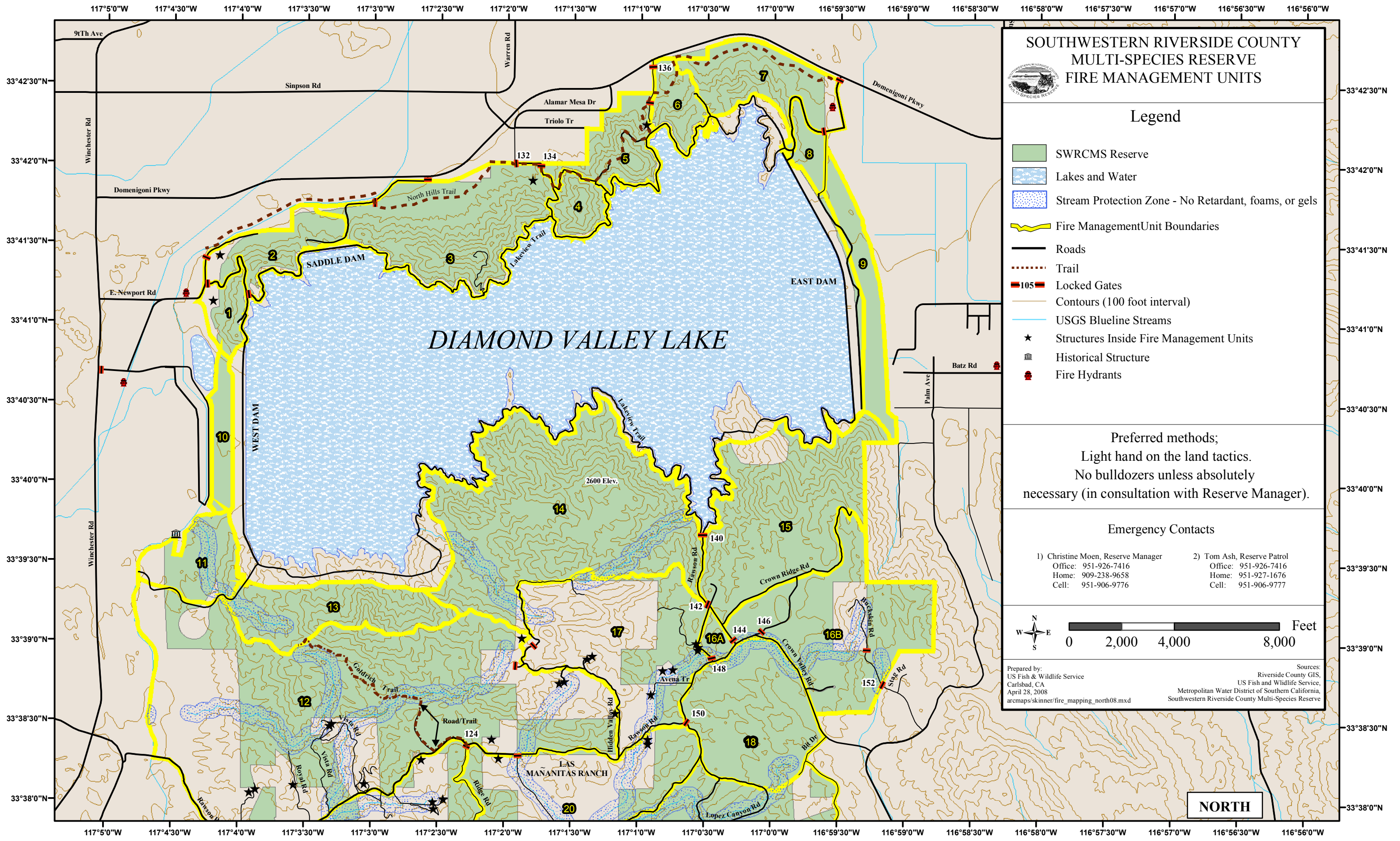
Low: Low number of, or no known sites. Low potential for unknown sites.

- **Health and Safety Sensitivity**

High: High potential for damage to numerous structures, health, and safety; structures in path of potential fire routes.

Moderate: Moderate to low potential for structures to be damaged by fire.

Low: No structures within unit, and few or none in adjacent units.

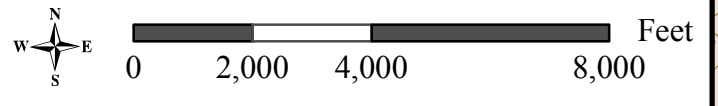


**SOUTHWESTERN RIVERSIDE COUNTY  
MULTI-SPECIES RESERVE  
FIRE MANAGEMENT UNITS**

- Legend**
- SWRCMS Reserve
  - Lakes and Water
  - Stream Protection Zone - No Retardant, foams, or gels
  - Fire Management Unit Boundaries
  - Roads
  - Trail
  - Locked Gates
  - Contours (100 foot interval)
  - USGS BlueLine Streams
  - ★ Structures Inside Fire Management Units
  - Ⓜ Historical Structure
  - Ⓜ Fire Hydrants

Preferred methods;  
Light hand on the land tactics.  
No bulldozers unless absolutely  
necessary (in consultation with Reserve Manager).

- Emergency Contacts**
- |  |  |
|--|--|
| <p>1) Christine Moen, Reserve Manager<br/>Office: 951-926-7416<br/>Home: 909-238-9658<br/>Cell: 951-906-9776</p> | <p>2) Tom Ash, Reserve Patrol<br/>Office: 951-926-7416<br/>Home: 951-927-1676<br/>Cell: 951-906-9777</p> |
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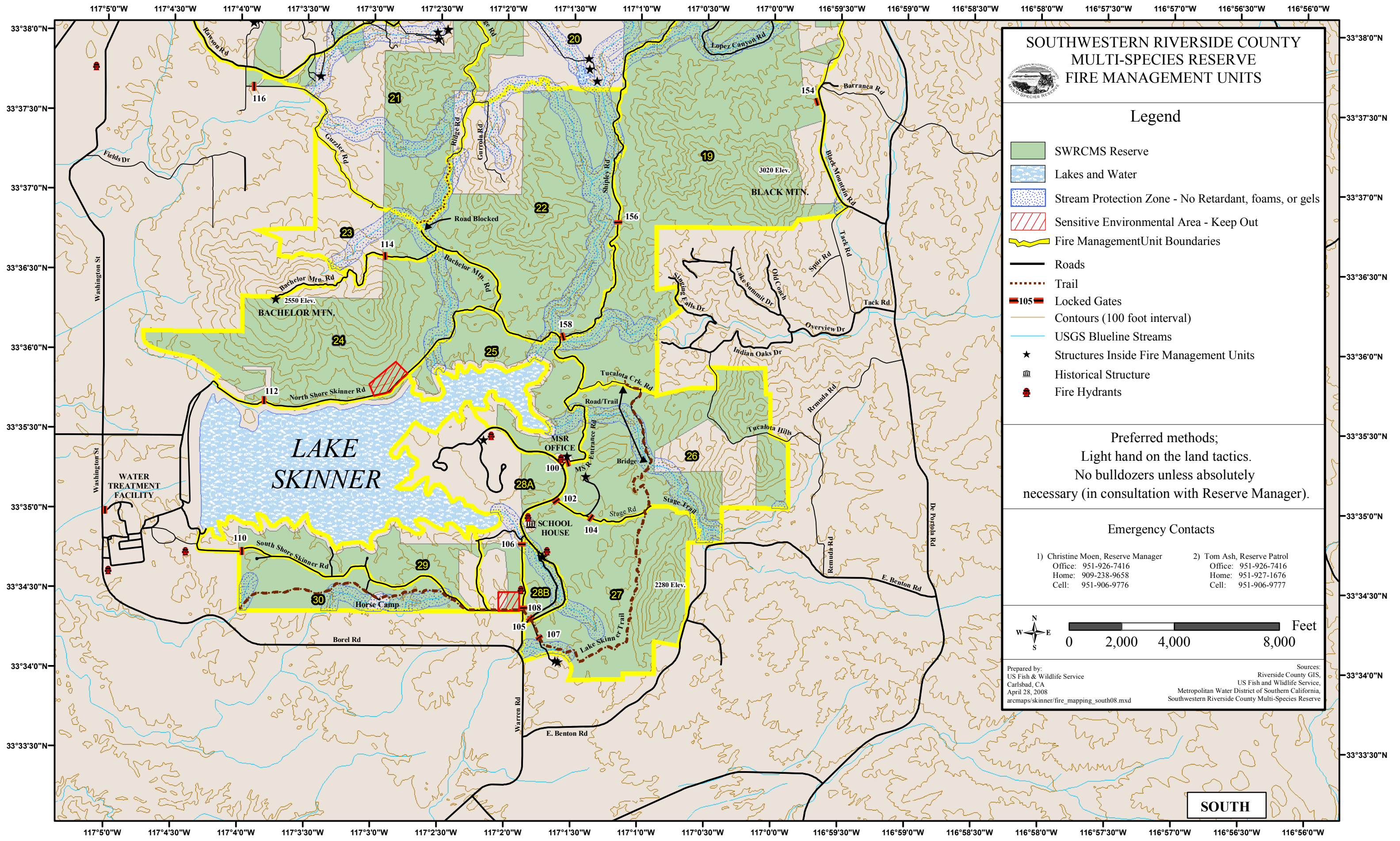


Prepared by:  
US Fish & Wildlife Service  
Carlsbad, CA  
April 28, 2008  
arcmaps/skinner/fire\_mapping\_north08.mxd

Sources:  
Riverside County GIS,  
US Fish and Wildlife Service,  
Metropolitan Water District of Southern California,  
Southwestern Riverside County Multi-Species Reserve

**NORTH**





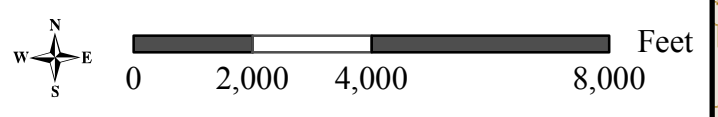
## SOUTHWESTERN RIVERSIDE COUNTY MULTI-SPECIES RESERVE FIRE MANAGEMENT UNITS

- ### Legend
- SWRCMS Reserve
  - Lakes and Water
  - Stream Protection Zone - No Retardant, foams, or gels
  - Sensitive Environmental Area - Keep Out
  - Fire Management Unit Boundaries
  - Roads
  - Trail
  - Locked Gates
  - Contours (100 foot interval)
  - USGS Blue Line Streams
  - Structures Inside Fire Management Units
  - Historical Structure
  - Fire Hydrants

Preferred methods;  
Light hand on the land tactics.  
No bulldozers unless absolutely  
necessary (in consultation with Reserve Manager).

### Emergency Contacts

1) Christine Moen, Reserve Manager Office: 951-926-7416 Home: 909-238-9658 Cell: 951-906-9776	2) Tom Ash, Reserve Patrol Office: 951-926-7416 Home: 951-927-1676 Cell: 951-906-9777
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Prepared by:  
US Fish & Wildlife Service  
Carlsbad, CA  
April 28, 2008  
arcmaps/skinner/fire\_mapping\_south08.mxd

Sources:  
Riverside County GIS,  
Carlsbad, CA  
US Fish and Wildlife Service,  
Metropolitan Water District of Southern California,  
Southwestern Riverside County Multi-Species Reserve

SOUTH

# Multi-Species Reserve Public Use Policy

## September 3, 2008

As approved at the June 6, 2007 Multi-Species Reserve Management Committee meeting, this Public Use Policy supersedes all previous Reserve public use policies (including Resolution 41). Decisions regarding public use of the Reserve by individuals or small groups should be made by the Reserve Manager using Table 1 as a guideline. Any proposed public use approved by the Reserve Manager will not have any impacts to species listed as covered by the Reserve MSHCP, Federal or State Endangered Species Acts, or natural or cultural resources. In addition, the Reserve Manager may deny a proposed public use based on Reserve staff time and availability. Public uses proposed by large groups or which may have impacts to listed or covered species, or to cultural or natural resources will be brought to the Committee for consideration.

Any person who is denied their request for public use of the Reserve by the Reserve Manager will be informed of their right to present their case to the Reserve Management Committee during the Public Comment session of any regularly scheduled RMC meeting.

Table 1.

<b>Activity</b>	<b>Yes to all Mngt Areas</b>	<b>No to all Mngt Areas</b>	<b>RMC will consider proposals on a case-by-case basis</b>
fishing		X	No
archaeological collecting		X	No
wildlife or plant collecting		X	Yes (Example: seed collecting for restoration outside of Reserve)
Motorized vehicles	X On established roads within the Reserve		Yes
swimming		X	No
trails	Only as part of a comprehensive trail strategy. With avoidance of sensitive habitat		Yes
firearms		X except regulated hunting	Yes

<b>Activity</b>	<b>Yes to all Mngt Areas</b>	<b>No to all Mngt Areas</b>	<b>RMC will consider proposals on a case-by-case basis</b>
public entry	X (ENTRY should only be at controlled locations and not along uncontrolled Reserve boundaries. All entry must be in association with management activities, approved research, approved interpretive programs, a managed entry program such as a trails program, or pursuant to the rights of each RMC member agency) [*Note: see Public access.]		Yes
introduction of species		X	No
feeding wildlife		X	No
Pesticides/Herbicides	X (ONLY in association with Reserve management or RMC approved research studies)		No
grazing		X (ONLY for management purposes - grazing leases not identified as necessary for management or for the sole purpose of revenue generation are NOT acceptable)	No
Falconry (See hunting)			
Aircraft (includes hang gliders, Para gliders, helicopters, etc.)		X	No
pets		TBD and only leashed if approved on trails	TBD
fires		X	No
camping		X	No
equestrian	ONLY on designated trails		Yes
hot-air balloon landing/launching		X	No
smoking		X	No
hiking	X (restricted to trails - see trails: Hiking associated with hunting, research and other activities considered under separate headings)		Yes



<b>Activity</b>	<b>Yes to all Mngt Areas</b>	<b>No to all Mngt Areas</b>	<b>RMC will consider proposals on a case-by-case basis</b>
foot races	ONLY with RMC approval on a case by case basis		Yes
BMX races		X	No
interpretive programs	X		Yes
habitat restoration	ONLY with RMC approval on a case by case basis		Yes
concerts		X	No
night hikes	ONLY on designated trails or as part of an approved program		Yes
archeological interpretation	ONLY with RMC approval on a case by case basis		Yes
Geocache			No
Hunting	X Recreational hunting will be considered only as part of a comprehensive program proposed and directed by CDFG.		Yes
Rock climbing			No
Public access	X (ONLY in association with Reserve management, RMC approved research studies, RMC approved interpretive actions, RMC member agency activities, or RMC approved trails/public access program. The trails could traverse any management unit)		Yes