The City of
SAN DIEGO

Natural Resource Management Plan for Mission Trails Regional Park San Diego, California

City of San Diego
Park & Recreation Department
202 C Street, MS5D
San Diego, CA 92101

Natural Resource Management Plan for Mission Trails Regional Park, San Diego, California

Prepared for

City of San Diego
Parks & Recreation Department
202 C Street, MS5D
San Diego, CA 92101

Prepared by

RECON Environmental, Inc.
1927 Fifth Avenue
San Diego, CA 92101-2358
P 619.308.9333 F 619.308.9334
RECON Number 5286
February 8, 2019

TABLE OF CONTENTS

Acronyms **vi**
1.0 Introduction **1-1**
2.0 Existing Conditions **2-1**
2.1 Environmental Setting **2-1**
2.1.1 Topography 2-1
2.1.2 Geology and Paleontology 2-1
2.1.3 Soils 2-5
2.1.4 Hydrology 2-8
2.2 Existing Biological Resources **2-10**
2.2.1 Vegetation Communities 2-10
2.2.2 Plant Species 2-27
2.2.3 Wildlife Species 2-27
2.2.4 Wildlife Corridors 2-27
3.0 Regulatory Framework **3-1**
3.1 Multiple Species Conservation Program **3-1**
3.2 Multi-Habitat Planning Area Guidelines for MTRP **3-1**
4.0 Biological Resource Management **4-1**
4.1 Sensitive Biological Resources **4-1**
4.1.1 Sensitive Species within MTRP 4-1
4.2 Threats to Biological Resources at MTRP **4-1**
4.2.1 Preserve-level Threats 4-6
4.2.2 Region-wide Threats 4-9
4.3 Adaptive Management **4-12**
4.3.1 Management Action Tool Kit 4-12
4.3.2 Management Prioritization 4-13
4.4 Priority Species Management at MTRP **4-15**
4.4.1 San Diego Thornmint (*Acanthomintha ilicifolia*) 4-15
4.4.2 San Diego Ambrosia (*Ambrosia pumila*) 4-26
4.4.3 Variegated Dudleya (*Dudleya variegata*) 4-38
4.4.4 Willowy Monardella (*Monardella viminea*) 4-53
4.4.5 Coastal Cactus Wren (*Campylorhynchus brunneicapillus couesi*) 4-69
4.5 Priority Management Guilds at MTRP **4-77**
4.5.1 Cliffs and Rocky Outcrops 4-77
4.5.2 East Elliott Clay Ridgelines 4-85
4.5.3 Tierrasanta Clay Ridge 4-95
4.5.4 Riparian Woodlands 4-102
4.5.5 Coastal Sage Scrub – *Artemisia*/*Eriogonum* 4-109
5.0 Budget and Schedule **5-1**
6.0 References **6-1**

FIGURES

2-1: Regional Location of Mission Trails Regional Park 2-2
2-2: Mission Trails Regional Park Areas 2-3
2-3: Topography within Mission Trails Regional Park 2-4
2-4: Soil Types Present within Mission Trails Regional Park 2-6
2-5: Soil Types Associated with Sensitive Species Occurrences Present within Mission Trails Regional Park 2-7
2-6: Hydrologic Units Present within Mission Trails Regional Park 2-9
2-7a: Vegetation Communities at MTRP (Holland Code) 2-13
2-7b: Vegetation Communities at MTRP (Holland Code) 2-14
2-7c: Vegetation Communities at MTRP (Holland Code) 2-15
2-7d: Vegetation Communities at MTRP (Holland Code) 2-16
2-7e: Vegetation Communities at MTRP (Holland Code) 2-17
2-8a: Vegetation Communities at MTRP (SANDAG) 2-22
2-8b: Vegetation Communities at MTRP (SANDAG) 2-23
2-8c: Vegetation Communities at MTRP (SANDAG) 2-24
2-8d: Vegetation Communities at MTRP (SANDAG) 2-25
2-8e: Vegetation Communities at MTRP (SANDAG) 2-26
2-9: Regional Wildlife Corridors at Mission Trails Regional Park 2-29
2-10: Preserve Level Connectivity within Mission Trails Regional Park 2-32
2-11: Wildlife Crossings at Mission Trails Regional Park 2-33
3-1: Project in Relation to MSCP Preserve Area 3-2
4-1: Approximate Location of Utility and Service Lines within Mission Trails Regional Park 4-11
4-2: San Diego Thornmint (*Acanthomintha ilicifolia*) Detected Occurrences: Mission Trails Regional Park 4-18
4-3: Comparison of Purple False Brome (BRDI) and Other Non-Native Species Cover at Area D Over Time 4-20
4-4: Conceptual Model for San Diego Thornmint (*Acanthomintha ilicifolia*) at MTRP 4-22
4-5: San Diego Thornmint (*Acanthomintha ilicifolia*) Management Actions: Mission Trails Regional Park 4-24
4-6: San Diego Ambrosia (*Ambrosia pumila*) Detected Occurrences: Mission Trails Regional Park 4-29
4-7: San Diego Ambrosia Population Area at MTRP Occurrence C 4-31
4-8: Conceptual Model for San Diego Ambrosia (*Ambrosia pumila*) at MTRP 4-33
4-9a: San Diego Ambrosia (*Ambrosia pumila*) Management Actions: Mission Trails Regional Park 4-34
4-9b: San Diego Ambrosia (*Ambrosia pumila*) Management Actions: Mission Trails Regional Park 4-35
4-9c: San Diego Ambrosia (*Ambrosia pumila*) Management Actions: Mission Trails Regional Park 4-36
4-10a: Variegated Dudleya (*Dudleya variegata*) Detected Occurrences: Mission Trails Regional Park 4-40
4-10b: Variegated Dudleya (*Dudleya variegata*) Detected Occurrences: Mission Trails Regional Park 4-41
4-10c: Variegated Dudleya (*Dudleya variegata*) Detected Occurrences: East Elliott 4-42

FIGURES (cont.)

4-11: Three Selected Populations of Variegated Dudleya within the Fortuna Mountain Area 4-44
4-12: Three Selected Populations of Variegated Dudleya within the East Elliott Area 4-45
4-13a: Variegated Dudleya (*Dudleya variegata*) Management Actions: Mission Trails Regional Park 4-47
4-13b: Variegated Dudleya (*Dudleya variegata*) Management Actions: Mission Trails Regional Park 4-48
4-13c: Variegated Dudleya (*Dudleya variegata*) Management Actions: East Elliott 4-49
4-14: Conceptual Model for Variegated Dudleya (*Dudleya variegata*) at MTRP 4-51
4-15: Population Size (clumps vs. plants) of Willowy Monardella at Occurrence A within the West Sycamore Area 4-56
4-16: Clump to Individual Ratio of Willowy Monardella at Occurrence A at West Sycamore Area 4-57
4-17a: Willowy Monardella (*Monardella viminea*) Detected Occurrences: West Sycamore 4-58
4-17b: Willowy Monardella (*Monardella viminea*) Detected Occurrences: East Elliott 4-59
4-18: Conceptual Model for Willowy Monardella (*Monardella viminea*) at MTRP 4-62
4-19a: Willowy Monardella (*Monardella viminea*) Management Actions: West Sycamore 4-64
4-19b: Willowy Monardella (*Monardella viminea*) Management Actions: East Elliott 4-65
4-20: San Diego Cactus Wren (*Campylorhynchus brunneicapillus couesi*) Detected Occurrences: West Sycamore 4-71
4-21: San Diego Cactus Wren (*Campylorhynchus brunneicapillus couesi*) and Cacti: Regional Habitat Connectivity 4-72
4-22: Conceptual Model for Coastal Cactus Wren (*Campylorhynchus brunneicapillus cousei*) at MTRP 4-74
4-23: San Diego Cactus Wren (*Campylorhynchus brunneicapillus couesi*) Management Actions: West Sycamore 4-75
4-24: Cliffs and Rocky Outcroppings within Mission Trails Regional Park 4-81
4-25: Conceptual Model for Cliffs and Rocky Outcrops Management Guild 4-83
4-26: Cliff and Rocky Outcroppings Guilds Management Action: Mission Trails Regional Park 4-84
4-27: East Elliott Clay Ridgeline Guild within Mission Trails Regional Park 4-88
4-28: Conceptual Model for East Elliott Clay Ridgeline Management Guild 4-90
4-29: East Elliott Clay Ridgeline Guild Management Actions 4-92
4-30: Tierrasanta Clay Guild Presence within Mission Trails Regional Park 4-97
4-31: Conceptual Model for Tierrasanta Clay Ridge Management Guild 4-99
4-32: Tierrasanta Clay Guild Management Actions: Mission Trails Regional Park 4-100
4-33: Riparian Woodland Presence within Mission Trails Regional Park 4-103
4-34: Conceptual Model for Riparian Woodlands Management Guild 4-107

FIGURES (cont.)

4-35a: Coastal Sage Scrub (*Artemisia/Eriogonum*) Guild within Mission Trails Regional Park 4-110
4-35b: Coastal Sage Scrub (*Artemisia/Eriogonum*) Guild within Mission Trails Regional Park 4-111
4-35c: Coastal Sage Scrub (*Artemisia/Eriogonum*) Guild within East Elliott 4-112
4-35d: Coastal Sage Scrub (*Artemisia/Eriogonum*) Guild within East Elliott 4-113
4-35e: Coastal Sage Scrub (*Artemisia/Eriogonum*) Guild within West Sycamore 4-114
4-35f: Coastal Sage Scrub (*Artemisia/Eriogonum*) Guild within West Sycamore 4-115
4-36a: California Gnatcatcher Habitat Evaluation Model Spring 2003 (pre-fire) 4-117
4-36b: California Gnatcatcher Habitat Evaluation Model Spring 2003 (pre-fire) 4-118
4-37a: California Gnatcatcher Habitat Evaluation Model 2010 (post fire) 4-119
4-37b: California Gnatcatcher Habitat Evaluation Model 2010 (post fire) 4-120
4-38a: Change in California Gnatcatcher Habitat Evaluation Model 2003-2010 4-121
4-38b: Change in California Gnatcatcher Habitat Evaluation Model 2003-2010 4-122
4-39: Coastal Sage Scrub (*Artemisia/Eriogonum*) Guild Management Actions 4-126
4-40: Conceptual Model for Coastal Sage Scrub (*Artemisia/ Eriogonum*) Management Guild 4-128

PHOTOGRAPHS

4-1: San Diego thornmint within a clay lens at MTRP 4-16
4-2: Degraded San Diego thornmint habitat on friable clay lens within the Fortuna Mountain sub-area within MTRP. Note invasion of purple false brome (light green grass between shrubs) 4-16
4-3: San Diego ambrosia at MTRP 4-27
4-4: San Diego ambrosia habitat within the Mission Gorge area, facing north 4-28
4-5 Variegated dudleya within the Fortuna Mountain area of MTRP 4-39
4-6: Willowy monardella within the West Sycamore area at MTRP 4-55
4-7: Willowy monardella habitat within the East Elliott area of MTRP 4-55
4-8: Coastal cactus wren habitat within the West Sycamore subarea of MTRP 4-70
4-9: Visitor Center Loop quarry cliff face, MTRP, facing northwest 4-78
4-10: West Kwaay Paay rocky outcropping, MTRP, facing northeast 4-79
4-11: Detail of soil crusts within East Elliott Clay Ridgeline Guild at MTRP 4-87
4-12: Vegetation present within the Tierrasanta Clay Ridge Management Guild boundary 4-96
4-13: Habitats present within the Riparian Woodland Guild at MTRP 4-104
4-14: *Artemisia californica*-dominated scrub at MTRP 4-116
4-15: Artichoke thistle infestation within the West Sycamore Subarea 4-127

TABLES

2-1: Geologic Formations with High Paleontological Sensitivity within MTRP 2-5
2-2: Baseline Data Collection at MTRP 2-11
2-3: Holland Vegetation Communities and Land Cover Types within MTRP 2-12
2-4: SANDAG Vegetation Groups within MTRP 2-12
2-5: SANDAG Vegetation Community Alliance and Associations Observed at MTRP 2-18
2-6: Preserve Level Adjacency to Open Space at MTRP 2-28
2-7: Wildlife Undercrossings at SR-52 2-31
4-1: Sensitive Plant Species Observed within MTRP 4-2
4-2: Sensitive Wildlife Species Observed within MTRP 4-3
4-3: MSCP Covered Species, Required Area Specific Management Directives (ASMDs), and Associated Sections within The MTRP NRMP 4-4
4-4: Priority Sensitive Species at MTRP 4-14
4-5: Priority Management Guilds at MTRP 4-14
4-6: Size of Population D Over Time 4-17
4-7: Size of Populations A and B Over Time 4-19
4-8: Variegated Dudleya Location Parcel Ownership within MTRP 4-43
4-9: Variegated Dudleya Surveys on Selected Sites within MTRP (2001-2012) 4-43
4-10: Channel Entrenchment Classifications 4-66
4-11: CWMA Cacti Height Classes 4-77
4-12: Sensitive Species Observed within the Cliffs and Rocky Outcropping Management Guild at MTRP 4-79
4-13: Sensitive Species within the East Elliott Clay Ridgeline Management Guild 4-87
4-14: East Elliott Clay Ridgeline Survey: Sensitive Species Targets 4-93
4-15: Sensitive Species Observed within Tierrasanta Clay Ridge Management Guild at MTRP 4-96
4-16: Sensitive Species Observed within Riparian Woodlands at MTRP 4-105
4-17: Sensitive Species Observed within the Coastal Sage Scrub – *Artemisia/Eriogonum* Guild at MTRP 4-116
4-18: Acreage of High and Very High California Gnatcatcher at MTRP 4-123
4-19: Major Wildfires within Coastal Sage Scrub - *Artemisia/Eriogonum* Guild Boundaries at MTRP 4-124
5-1: Budget and Schedule 5-1

APPENDICES

A-A: Plant Species Observed within MTRP
A-B: Wildlife Species Observed/Detected within MTRP during 2009/10 Surveys
A-C: Sensitive Species at MTRP not Selected for Individual Management
A-D: Fire Management Plan

Acronyms

ASMD	Area-specific Management Directives
Cal-IPC	California Invasive Plant Council
Caltrans	California Department of Transportation
CDFW	California Department of Fish and Wildlife
City	City of San Diego
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society's
CWA	Clean Water Act
CWMA	Cactus Wren Management Area
EO	Elemental Occurrence
GIS	Geographic Information System
GPS	Global Positioning System
JRMP	Jurisdictional Water Runoff Management Plan
MBTA	Migratory Bird Treaty Act
MCAS	Marine Corps Air Station
MHPA	Multi-Habitat Planning Area
MDP	Master Development Plan
MPU	Master Plan Update
MSCP	Multiple Species Conservation Program
MSP	Management Strategic Plan
MSS	Maritime Succulent Scrub
MTRP	Mission Trails Regional Park
NAS	National Academy of Sciences
NRMP	Natural Resource Management Plan
RWQCB	Regional Water Quality Control Board
SANDAG	San Diego Association of Governments
SDCWA	San Diego County Water Authority
SDG&E	San Diego Gas & Electric
SDMMP	San Diego Management and Monitoring Program
SDNHM	San Diego Natural History Museum
SDSU	San Diego State University
SR-52	State Route 52
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WMA	Weed Management Area
WNS	White-Nose Syndrome
WTI	Western Tracking Institute

1.0 Introduction

This Natural Resource Management Plan (NRMP) fulfills the City of San Diego's (City) Multiple Species Conservation Program (MSCP) requirement to develop Area-Specific Management Directives (ASMDs) for the protection of natural resources at Mission Trails Regional Park (MTRP) (see MSCP Implementing Agreement Section 10.6.B, City Subarea Plan Section 1.5.6, and Final MSCP Plan Section 6.3). MTRP is a core biological area and regional wildlife corridor within the MSCP's Multi-Habitat Planning Area (MHPA) and is managed to achieve the goals of the MSCP. The specific objectives of the NRMP are to:

- Update sensitive species and habitat mapping.
- Develop management guilds (management units based on habitat groupings with similar life-history requirements and/or threats) for groups of species and/or habitats.
- Identify and prioritize threats to sensitive species and habitats.
- Document current understanding of natural systems and species life history requirements using conceptual models.
- Develop conservation and enhancement goals for individual populations/habitats and/or management guilds based on MSCP conditions of coverage (MSCP Plan Table 3-5).
- Develop specific management actions (e.g., ASMDs) within an adaptive management framework to address the identified threats and ensure long-term, viable populations of these species within MTRP.
- Develop protocols (e.g., data collection methods, success criteria) to evaluate adaptive management techniques and projects proposed in this plan.

2.0 Existing Conditions

2.1 Environmental Setting

The MTRP planning envelope occupies a total of 9,780 acres and is located eight miles northeast of the City's downtown (Figure 2-1). MTRP supports a wide range of native vegetation, habitats, and wildlife species within a diverse physical setting, and is a core biological resource area within the MHPA. MTRP has multiple notable features, including Cowles and Fortuna mountains, the San Diego River, Sycamore Landfill, Lake Murray, Mission Gorge, and the Old Mission Dam. For planning and discussion purposes, MTRP has been divided into six areas based on significant features of each. The designated areas are shown on Figure 2-2 and are:

- Lake Murray
- Cowles Mountain
- Mission Gorge
- Fortuna Mountain
- East Elliott
- West Sycamore

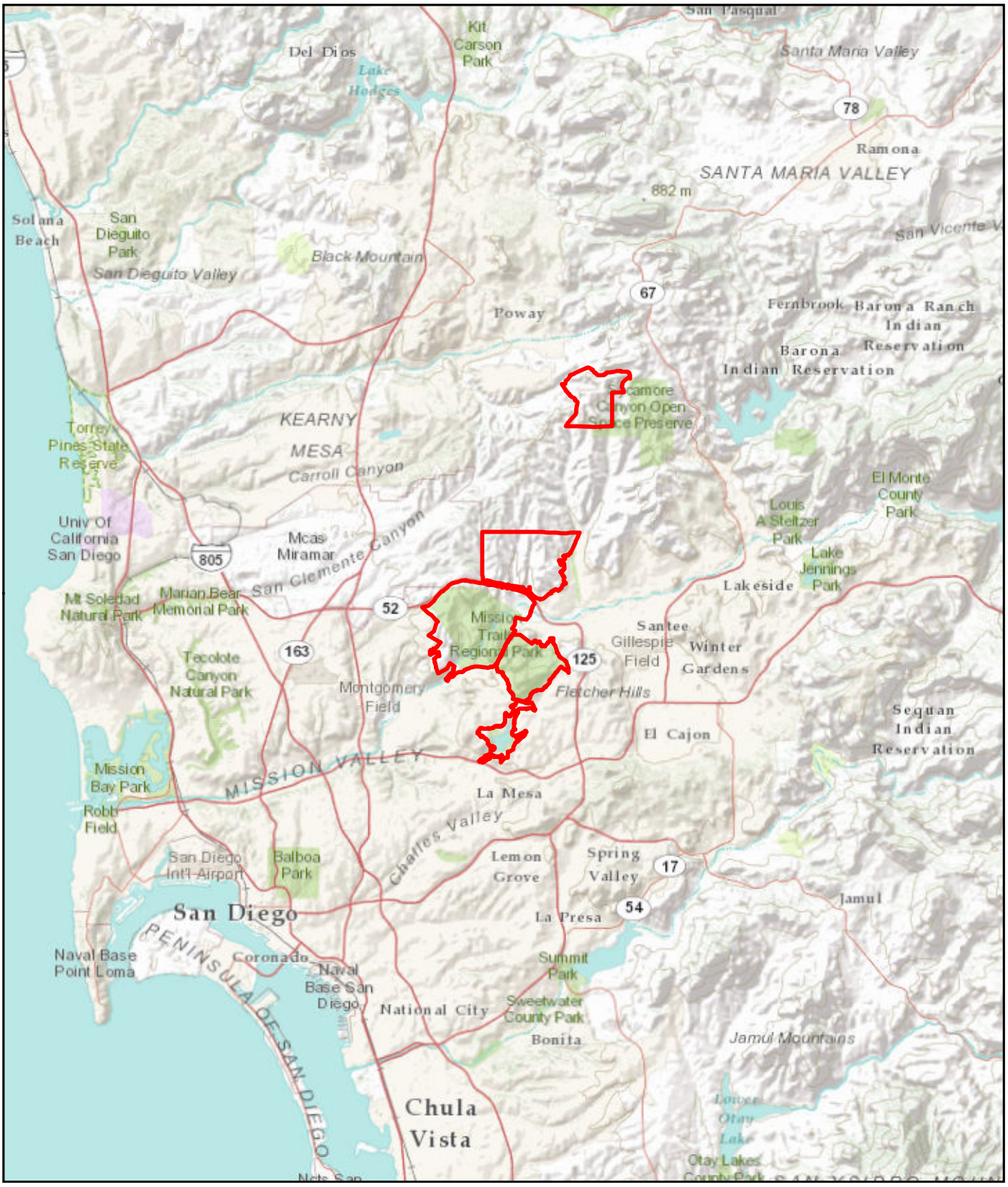
MTRP is a regionally important recreation area for many outdoor sports, including: hiking, mountain biking, horseback riding, and rock climbing. The trails provide access for recreational and maintenance activities. Trails are generally 2–4 feet in width, except where co-located with access roads. The existing trail system at MTRP is currently being reevaluated and revised in the Master Plan update associated with this NRMP.

2.1.1 Topography

MTRP contains a variety of topographic features, including canyons, valleys, mountains, hills, and low-lying areas. The topography is generally very rugged, with elevations ranging dramatically throughout the different areas. Cowles Mountain is the highest point in MTRP at 1,591 feet (Figure 2-3).

2.1.2 Geology and Paleontology

Geologically, the region of San Diego County in which MTRP is located consists of a layer cake sequence of Cenozoic sedimentary rock units which preserve portions of the last 47 million years of Earth history. These Cenozoic sedimentary rocks overlie a deeply eroded terrain formed in significantly older crystalline basement rocks (e.g., metasediments, metavolcanics, gabbros, granites, and tonalities) of the massive Peninsular Ranges Batholith.



0 Miles 4

Project Boundary

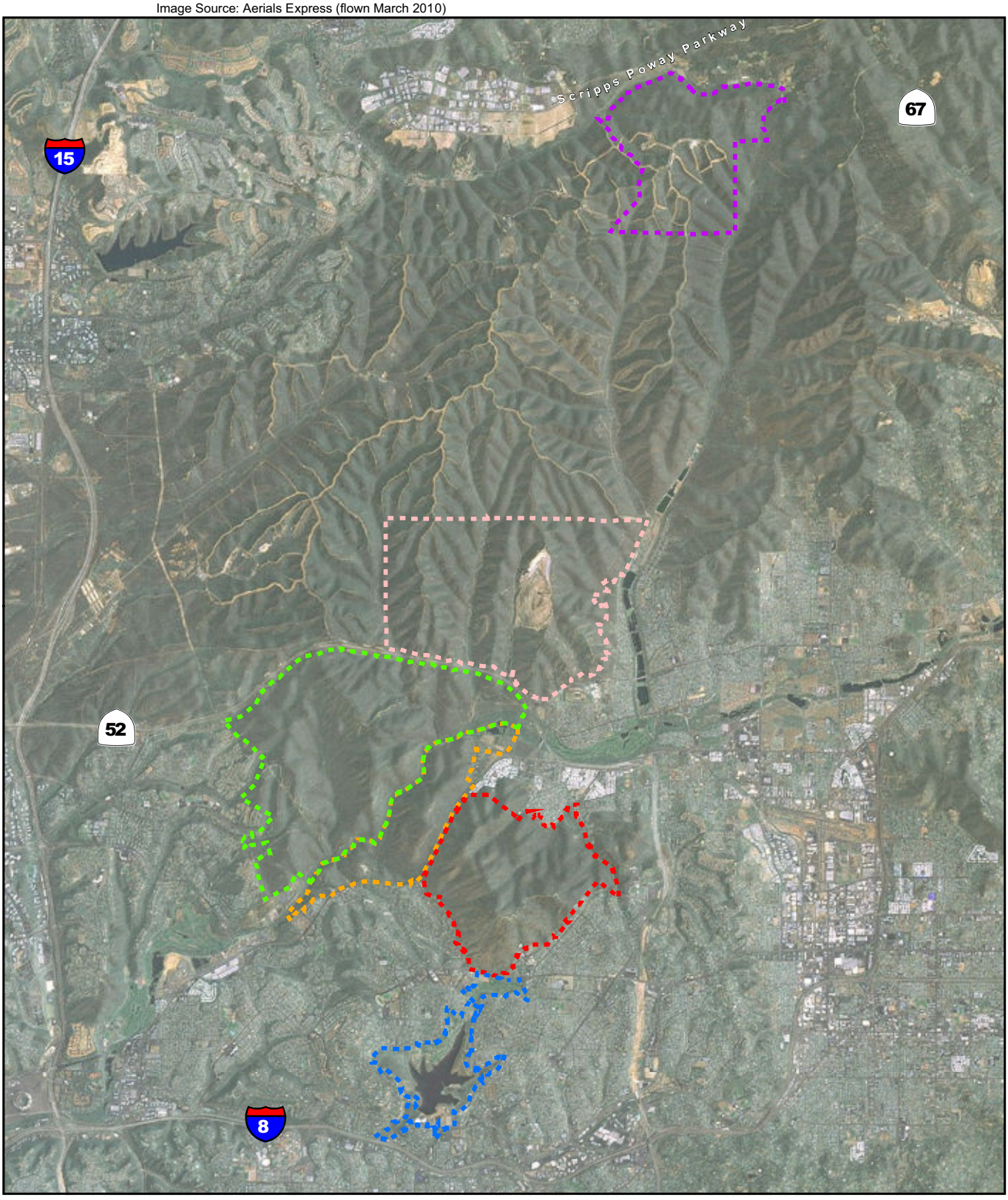
FIGURE 2-1

Regional Location of Mission Trails Regional Park

RECON

M:\JOBS3\5286\common_gis\fig2-01.mxd 10/31/2012

Image Source: Aerials Express (flown March 2010)



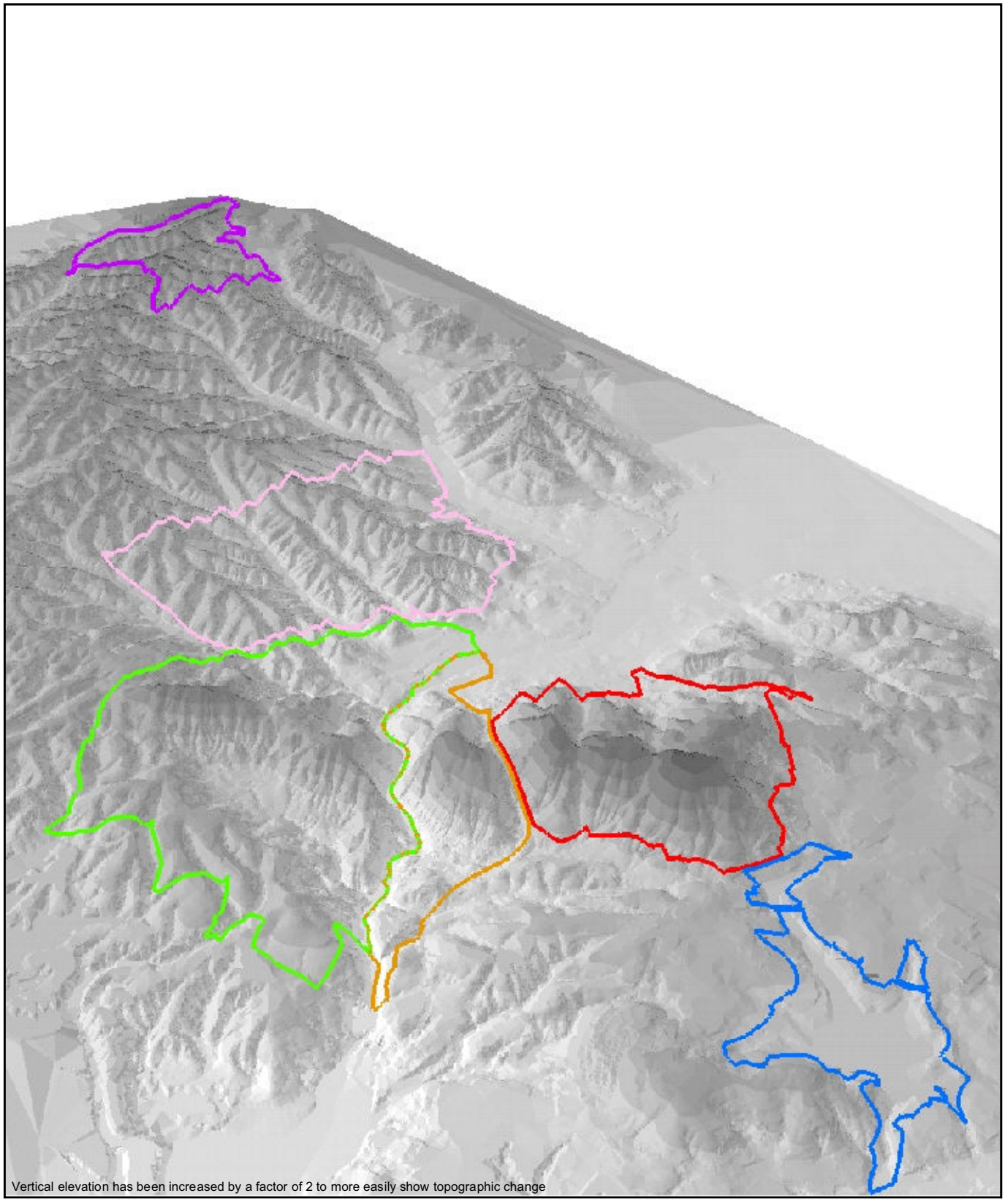
0 Miles 2

Cowles Mountain Area
East Elliott Area
Fortuna Mountain Area
Lake Murray Area
Mission Gorge Area
West Sycamore Area

RECON

M:\JOBS3\5286\common_gis\fig2-02.mxd 12/11/2012

FIGURE 2-2
Mission Trails Regional Park Areas



RECON

M:\JOBS3\5286\common_gis\fig2-03.mxd 10/2/2013

FIGURE 2-3

Topography within Mission Trails Regional Park

In 2011, the San Diego Natural History Museum conducted a paleontological resource assessment of MTRP (see Appendix G of the MTRP Master Plan Update Program Environmental Impact Report). The report identified five formations present at MTRP with a high sensitivity for the presence of paleontological resources (see Table 2-1) such as vertebrate fossil remains.

TABLE 2-1
GEOLOGIC FORMATIONS
WITH HIGH PALEONTOLOGICAL SENSITIVITY
WITHIN MTRP

Geologic Formation
Pomerado Conglomerate
Stadium Conglomerate
Friars Formation
Mission Valley Formation
Torrey Sandstone

Fossils are most likely to be found in the Friars Formation, Stadium Conglomerate, Mission Valley Formation, and Pomerado Conglomerate. A full discussion of paleontological resources at MTRP can be found in Appendix G of the MTRP Master Plan Update Program Environmental Impact Report.

2.1.3 Soils

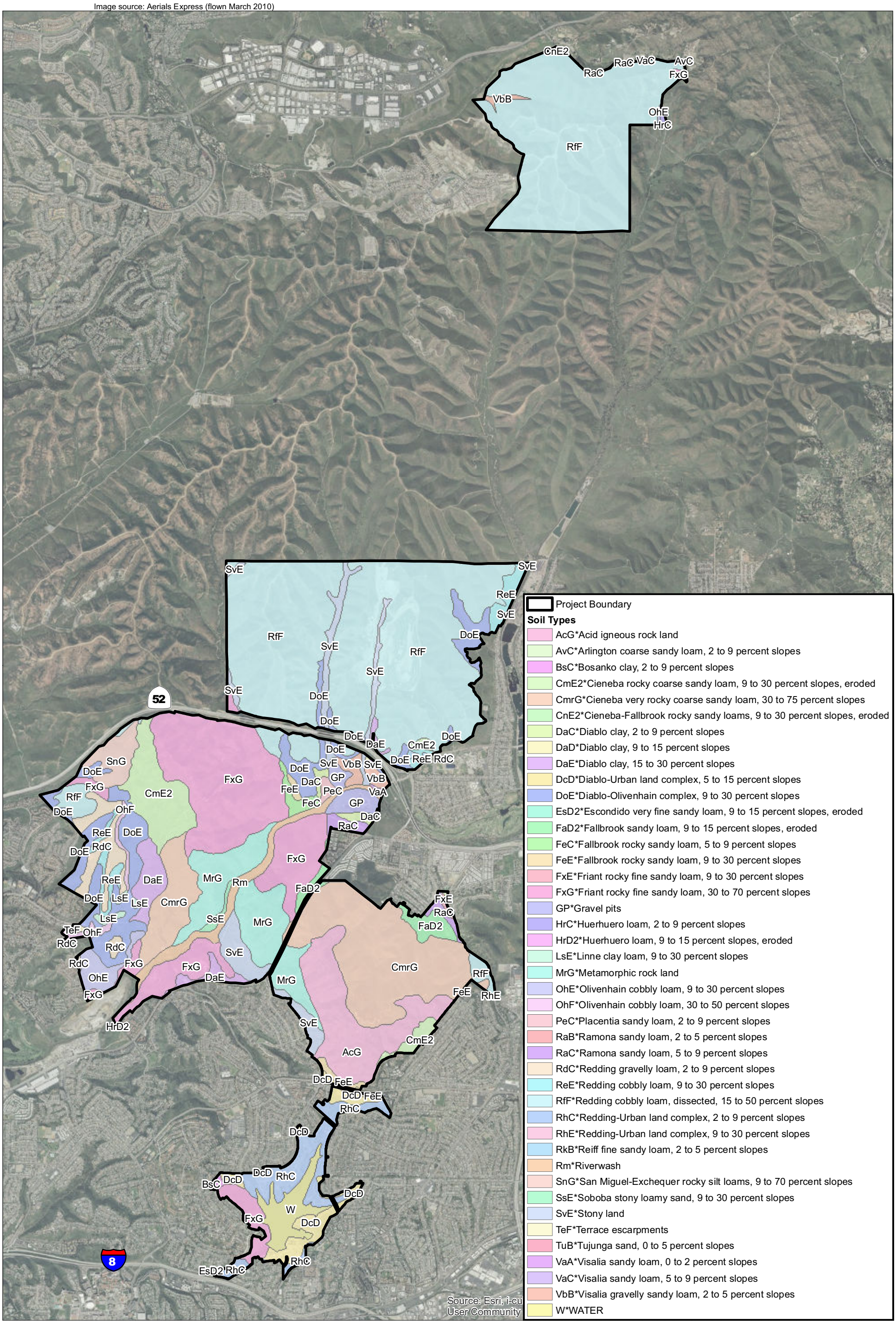
The U.S. Department of Agriculture (USDA; 1973) has mapped a total of 43 soil types within MTRP (Figure 2-4). Several of these soil types are known to be a primary component of sensitive species habitat, have been associated with sensitive species occurrences, and can be used as a tool to guide survey and restoration efforts.

2.1.3.1 Mafic soils

Mafic soils are derived from igneous rocks and have high levels of minerals such as magnesium and iron (USDA 1973). The unique mineral-rich composition of mafic soils (and other ultra-mafic soils such as the California State rock serpentine) can act as a mild plant toxin and promote the development of unique endemic vegetation assemblages. Mafic and ultramafic soils are a necessary habitat component of a variety of rare plants in southern California.

San Miguel – Exchequer rocky silt loams (SnG). This mafic soil has been mapped in the northwest corner of the Fortuna Mountain area (Figure 2-5).

Image source: Aerials Express (flown March 2010)

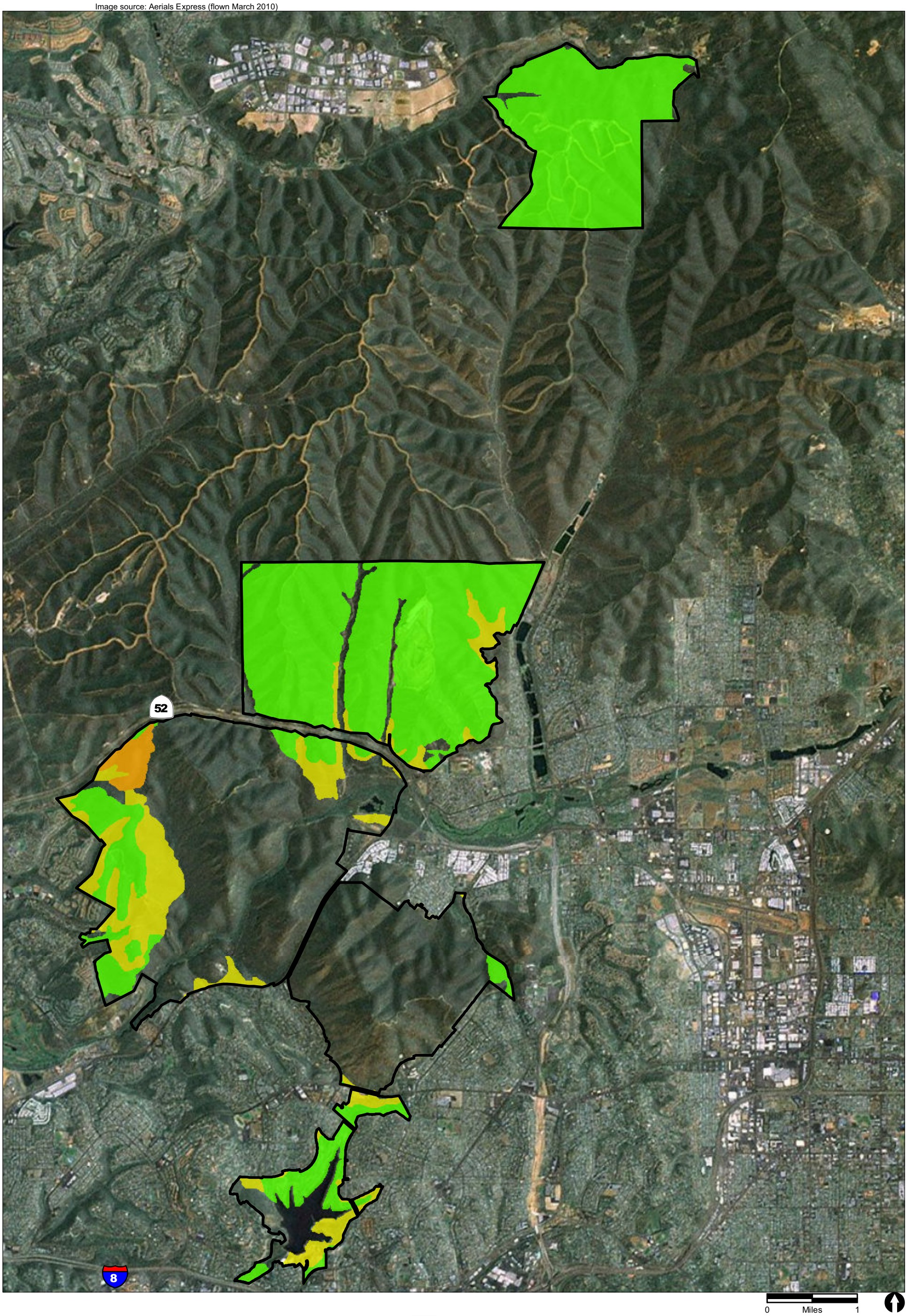


RECON

M:\JOBS3\5286\common_gis\fig2-04.mxd 10/31/2012

FIGURE 2-4
Soil Types Present within Mission Trails Regional Park

Image source: Aerials Express (flown March 2010)



Project Boundary

Soil Types

- Clay Soils
- Hardpan Soils
- Mafic Soils

RECON

M:\JOBS3\5286\common_gis\fig2-05.mxd 10/31/2012

FIGURE 2-5

Soil Types Associated with Sensitive Species Occurrences Present within Mission Trails Regional Park

2.1.3.2 Clay soils

Clay soils, in general, have low water permeability rates, tend to favor herbaceous vegetation, and are associated with sensitive plant species.

Diablo clay (DaC, DaD, DaE). Diablo clay soil is an upland clay soil formed from soft sandstone and shale. Diablo clay soils are the primary soil type of an endangered tar plant (*Deinandra conjugens*) in southern San Diego County. At MTRP, San Diego thornmint (*Acanthomintha ilicifolia*), an endangered herb, is known to occupy diablo clay soils. Diablo clay soils are very dark grey and have been mapped within the western portion of the Fortuna Mountain area.

Linne clay loam (LsE). Linne clay loams are moderately deep clay soils derived from soft calcareous sandstones and shale. At MTRP, a cluster of linne clay loam has been mapped within the western portion of the Fortuna Mountain area.

2.1.3.3 Hardpan soils

Hardpan soils are associated with sensitive vernal pools due to a sub-soil perching on an impervious, concrete-like, hardpan layer. At MTRP, these include hardpan clay soils such as Redding cobbly loam and Olivenhain cobbly loams.

Redding cobbly loams (RdC, ReE, RtF). This soil type is generally observed to have a rusty red color and round cobbles scattered throughout the soil surface and sub-surface. Redding cobbly loam has been mapped within the western portion of the Fortuna Mountain area and is the principal soil in the East Elliott and West Sycamore areas (see Figure 2-5).

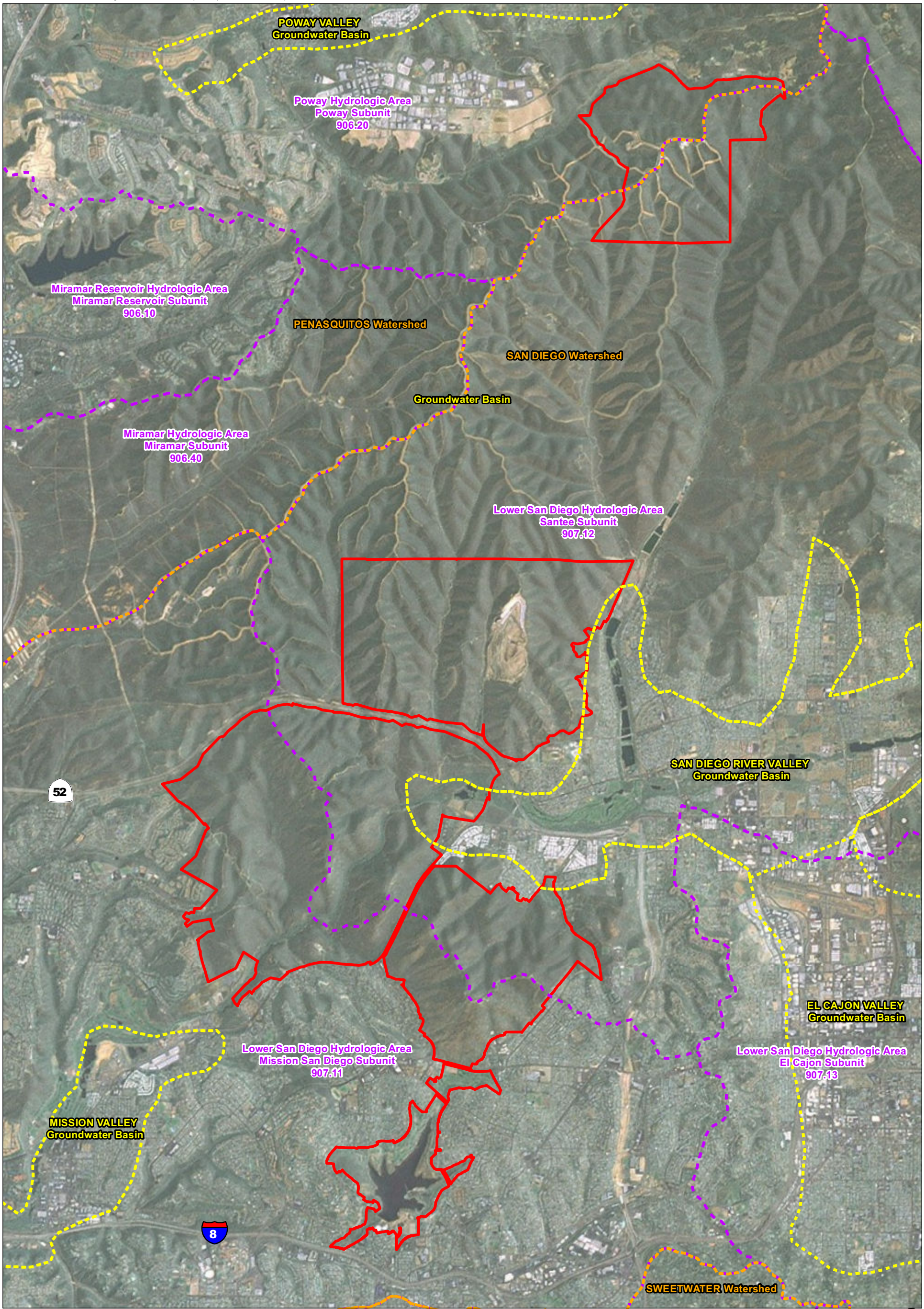
Olivenhain cobbly loams (OhE, OhV). This soil type has been mapped throughout the western portion of the Fortuna Mountain area (see Figure 2-5).

2.1.4 Hydrology

MTRP is located within two watersheds: the San Diego River and Los Peñasquitos Creek. The majority of MTRP is within the San Diego River Watershed (Figure 2-6), which has its headwaters in the Cuyamaca Mountains near Julian, CA and its terminus in San Diego near Mission Bay. The watershed, as a whole, contains 11 significant tributaries, five water storage reservoirs, and several important groundwater aquifers. There are four dams, including El Capitan, San Vicente, Lake Jennings, and Cuyamaca, which affect flows into MTRP.

Historically, the San Diego River flowed intermittently west of El Capitan and was characterized by periods of drought and extreme flooding events (Smythe 1908). Currently, with the addition of several dams and additional water inputs from urban run-off and treated wastewater, the San Diego River flows year-round and is less prone to flooding. The San Diego River Watershed has a precipitation range of 10.5 to 35 inches (Weston Solutions Inc. 2007).

Image Source: Aerials Express (flown March 2010)



RECON

M:\JOBS3\5286\common_gis\fig2-06.mxd 10/31/2012

FIGURE 2-6

Hydrologic Units Present within Mission Trails Regional Park

A portion of the Los Peñasquitos Creek Watershed is contained within the northwest corner of the West Sycamore area of MTRP (see Figure 2-6). The Peñasquitos creek watershed is relatively small and drains a mainly urbanized area of coastal San Diego. The watershed begins at its headwaters in Poway, CA just north of MTRP, and flows through a series of military, open space, and urbanized canyons to empty into the Pacific Ocean at the Los Peñasquitos Lagoon. As with the San Diego River, Peñasquitos Creek originally flowed intermittently and is now considered to have perennial flows due to increased runoff from urbanization (Kelly 1998).

2.2 Existing Biological Resources

The biological resources in MTRP have been studied through biological inventories, vegetation mapping, MSCP monitoring, archive research, and general scientific research. The results of the biological studies and surveys have been compiled (Table 2-2).

2.2.1 Vegetation Communities

Vegetation community composition directly and indirectly influences habitat quality for the majority of species within MTRP.

Vegetation communities at MTRP were mapped using two compatible classification systems: Holland (1986) as modified by Oberbauer (2005), and the *Vegetation Classification Manual for Western San Diego County* (San Diego Association of Governments [SANDAG] 2011). Though both systems provide methods to classify vegetation, Holland communities are described at a landscape scale and are currently used by the MSCP to plan conservation and mitigation throughout the area, while the SANDAG system provides a high-resolution view into the specific vegetative components of communities and changes within communities over time. Due to the precision of data available from the SANDAG mapping system, it was selected to inform management actions for this document.

TABLE 2-2
BASELINE DATA COLLECTION AT MTRP

Surveyor(s)	Survey Type	Date	CM	EE	FM	MG	LM	WS
City of San Diego	MSCP monitoring	Annually	X	X	X	X	X	X
CNPS	Willowy monardella surveys	Annually		X				
RECON Environmental	Vegetation Map (SANDAG)/Invasive sp.	2011		X				X
Clark Biological	Avian Surveys of Cliffs	2010	X		X	X		
RECON Environmental	Riparian vegetation and wildlife	2010				X		
RECON Environmental	Chaparral vegetation wildlife	2010	X		X			
RECON Environmental (sub. SDNHM)	Roosting and foraging bats	2010	X		X	X		
WTI	Mammal monitoring and Habitat Assessment	2010	X	X	X	X		
Clark Biological Services	Avian surveys of Cliffs	2010	X		X	X		
RECON Environmental	Vegetation Map (SANDAG/Invasive sp.	2009	X		X	X	X	
SDNHM	Birds and Mammal Survey (BioBlitz)	2009						
SDNHM	Herpetological survey (BioBlitz)	2009	X		X	X		
Helix Environmental	Vegetation communities (Holland)/rare plants	2001						X
Scott McMillan	Rare plant surveys	2001	X	X	X	X		

Areas: **CM** = Cowles Mountain, **EE** = East Elliott, **FM** = Fortuna Mountain, **MG** = Mission Gorge, **LM** = Lake Murray, **WS** = West Sycamore
CNPS = California Native Plant Society
SDNHM = San Diego Natural History Museum
WTI = Western Tracking Institute

2.2.1.1 Holland Vegetation Communities

Holland vegetation descriptions are designed to be a “coarse filter” dividing the landscape into manageable vegetation units (Holland 1986). Under the Holland system, MTRP contains a total of 18 vegetation communities and land cover types (Table 2-3, Figures 2-7a-e).

TABLE 2-3
HOLLAND VEGETATION COMMUNTIES AND LAND COVER TYPES WITHIN MTRP

Vegetation Community	Holland Code	Acres
Eucalyptus Woodland	11100	20.3
Disturbed Land	11300	127.3
Urban/Developed	12000	696
Open Water	13100	149.3
Diegan Coastal Sage Scrub	32500	3,545.10
Southern Mixed Chaparral	37120	1,280.50
Chamise Chaparral	37200	2,140.00
Scrub Oak Chaparral	37900	69.7
Native Grassland	42100	1.5
Valley Needlegrass Grassland	42110	17.2
Non-native Grassland	42200	1,161.00
Wildflower Field	42300	1.2
San Diego Mesa Vernal Pool	44320	0.8
Coastal and Freshwater Marsh	52410	4.3
Southern Riparian Scrub	63300	176.4
Mule Fat Scrub	63310	1.4
Southern Willow Scrub	63320	236.2
Coast Live Oak Woodland	71160	58.7

2.2.1.2 SANDAG Vegetation Communities

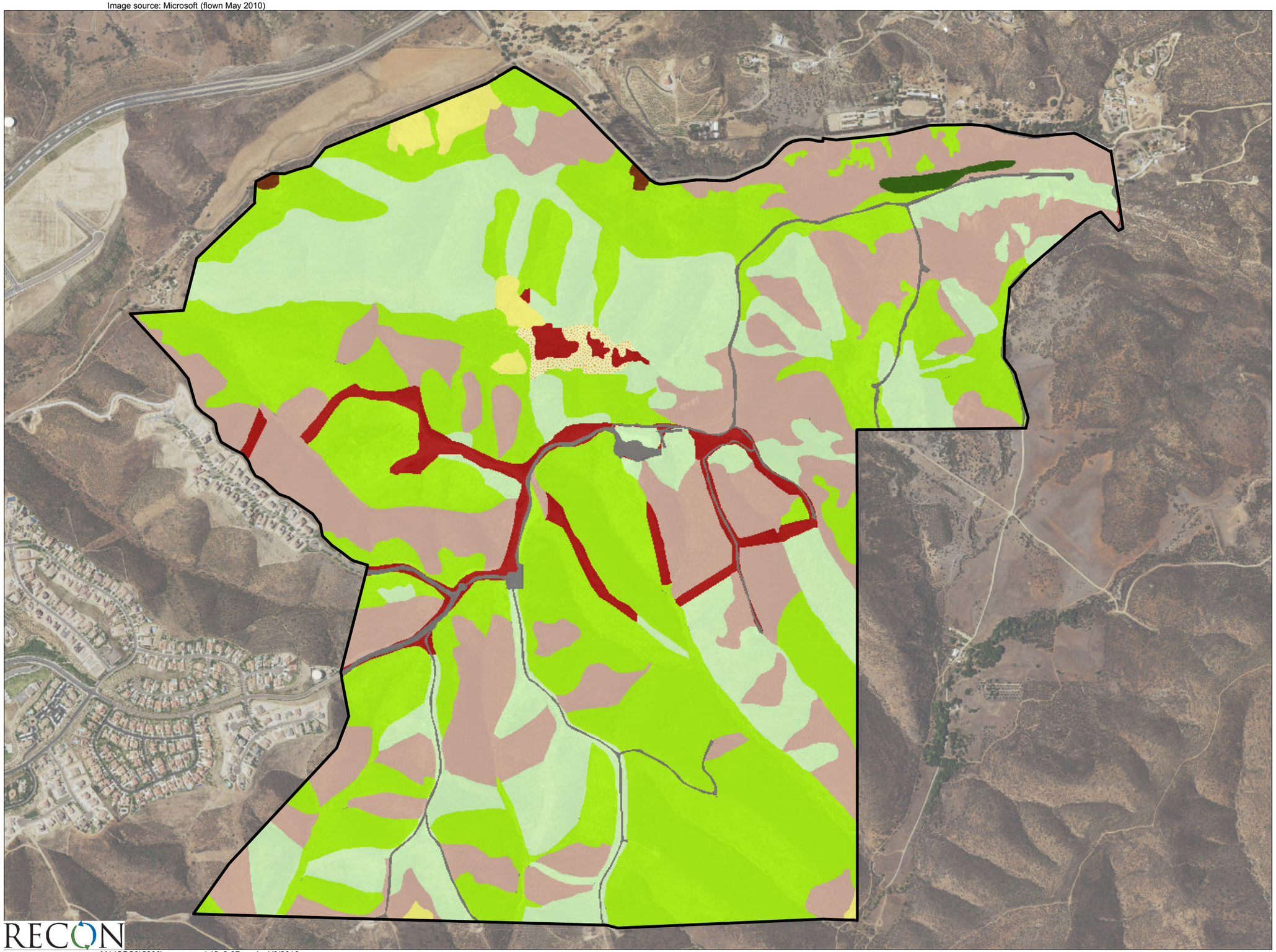
Vegetation community classifications below follow SANDAG (2011). Under this system, vegetation communities are first classified into Groups by similarities in diagnostic growth forms reflecting local environmental conditions (for example: Riparian Forests, Table 2-4).

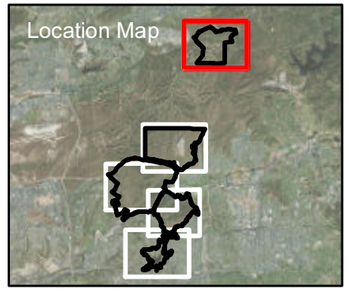
TABLE 2-4
SANDAG VEGETATION GROUPS WITHIN MTRP

Vegetation Group	Acres
Hydrophytic Herbaceous Vegetation	12.2
Riparian Forests and Woodlands	242.2
Riparian Shrublands	177.8
Sclerophyllous, Evergreen Shrublands	3,603.10
Soft-leaved, Drought-deciduous Shrublands	3,512.20
Upland Forests and Woodlands	79.4
Upland Herbaceous Vegetation	1,306.70

Within these Groups, vegetation communities are further divided into Alliances, which are classified by the dominant or co-occurring species. Subsequently, a subset of diagnostic plants within each Alliance is referred to as Associations. A total of seven groups, 38 Alliances, and 40 vegetation Associations were mapped within MTRP (Table 2-5 and Figures 2-8a-e).

Image source: Microsoft (flown May 2010)





Project Boundary

Vegetation Communities

(Holland Code)

- Chamise Chaparral (37200)
- Coast Live Oak Woodland (71160)
- Diegan Coastal Sage Scrub (32500)
- Disturbed Habitat (11300)
- Eucalyptus Woodland (11100)
- Non-native Grassland (42200)
- Southern Mixed Chaparral (37120)
- Urban/Developed (12000)
- Valley Needlegrass Grassland (42110)

0 Feet 1,000

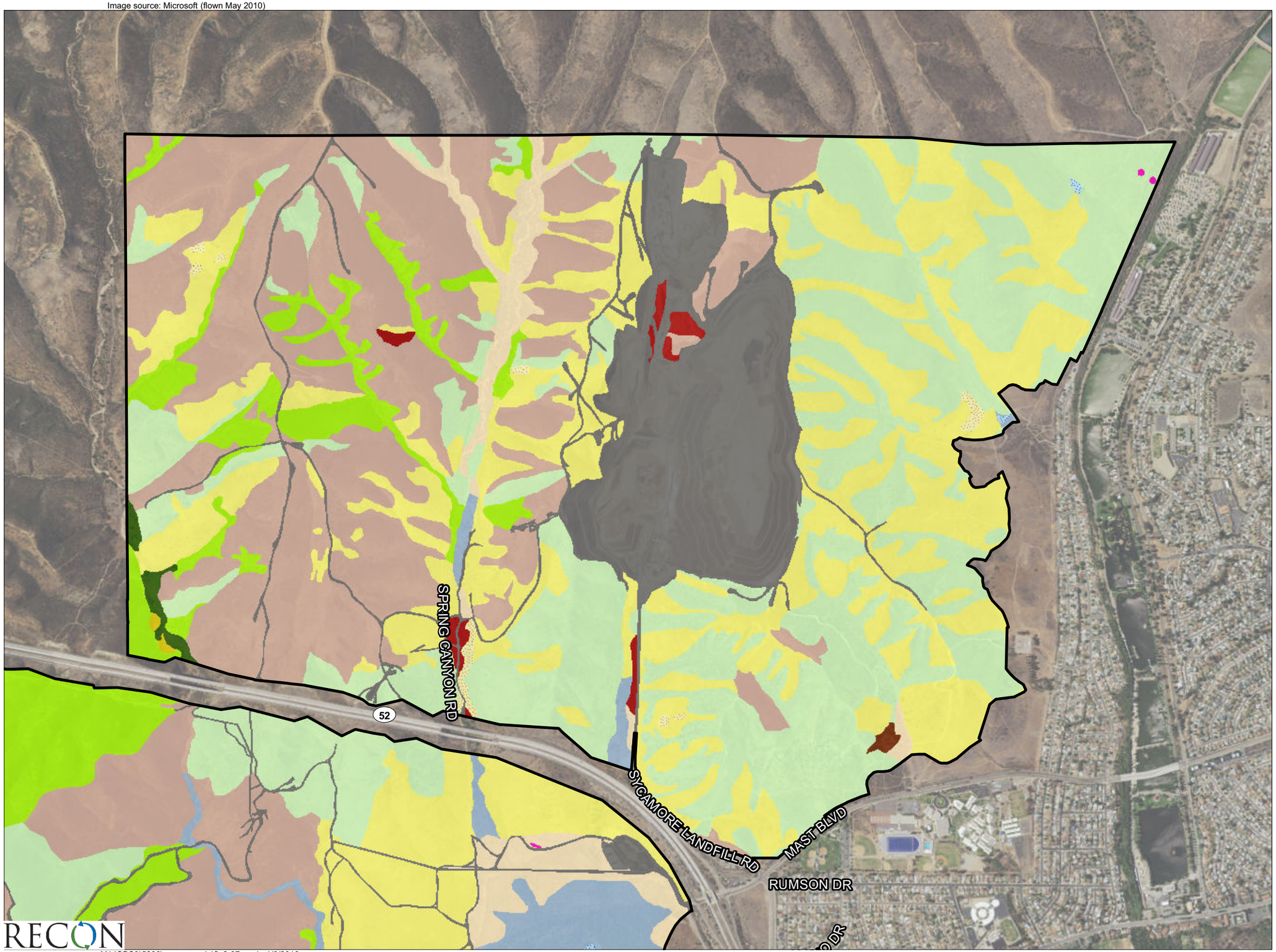
FIGURE 2-7a

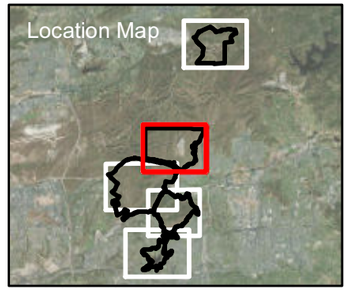
Vegetation Communities at MTRP (Holland Code)

RECON

M:\JOBS3\5286\common_gis\fig2-07.mxd 4/8/2016

Image source: Microsoft (flown May 2010)





Project Boundary

Vegetation Communities

(Holland Code)

- Chamise Chaparral (37200)
- Coast Live Oak Woodland (71160)
- Diegan Coastal Sage Scrub (32500)
- Disturbed Habitat (11300)
- Eucalyptus Woodland (11100)
- Native Grassland (42100)
- Non-native Grassland (42200)
- Open Water (13100)
- Southern Mixed Chaparral (37120)
- Southern Riparian Scrub (63300)
- Southern Willow Scrub (63320)
- Urban/Developed (12000)
- Valley Needlegrass Grassland (42110)
- Vernal Pool (44000)

0 Feet 1,000

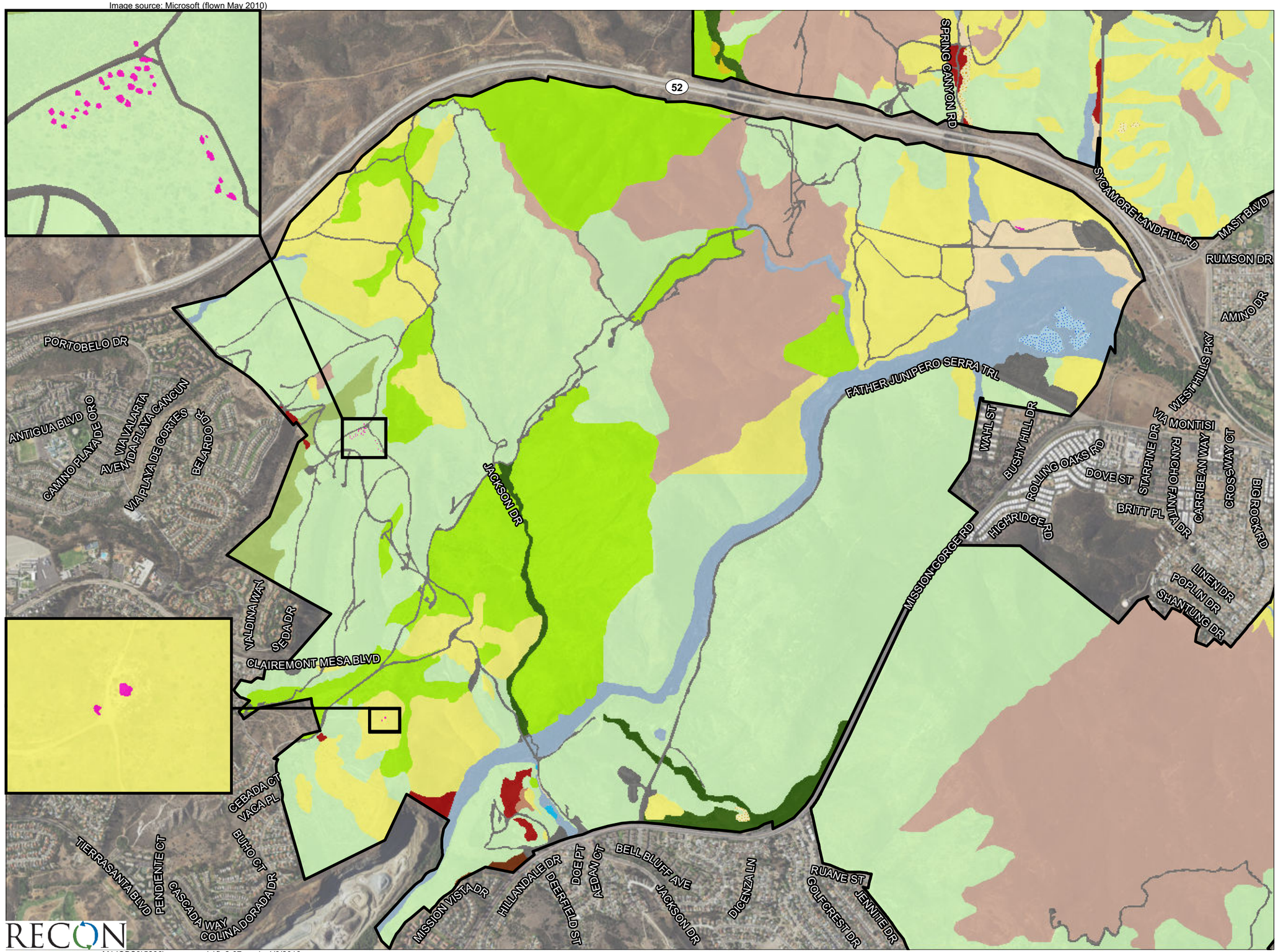
RECON

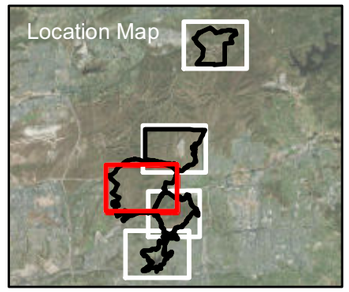
M:\JOBS3\5286\common_gis\fig2-07.mxd 4/8/2016

FIGURE 2-7b

Vegetation Communities at MTRP (Holland Code)

Image source: Microsoft (flown May 2010)





Project Boundary

Vegetation Communities

(Holland Code)

- Chamise Chaparral (37200)
- Coast Live Oak Woodland (71160)
- Coastal and Valley Freshwater Marsh (52410)
- Diegan Coastal Sage Scrub (32500)
- Disturbed Habitat (11300)
- Eucalyptus Woodland (11100)
- Mule Fat Scrub (63310)
- Native Grassland (42100)
- Non-native Grassland (42200)
- Open Water (13100)
- Scrub Oak Chaparral (37900)
- Southern Mixed Chaparral (37120)
- Southern Riparian Scrub (63300)
- Southern Willow Scrub (63320)
- Urban/Developed (12000)
- Valley Needlegrass Grassland (42110)
- Vernal Pool (44000)

0 Feet 1,000

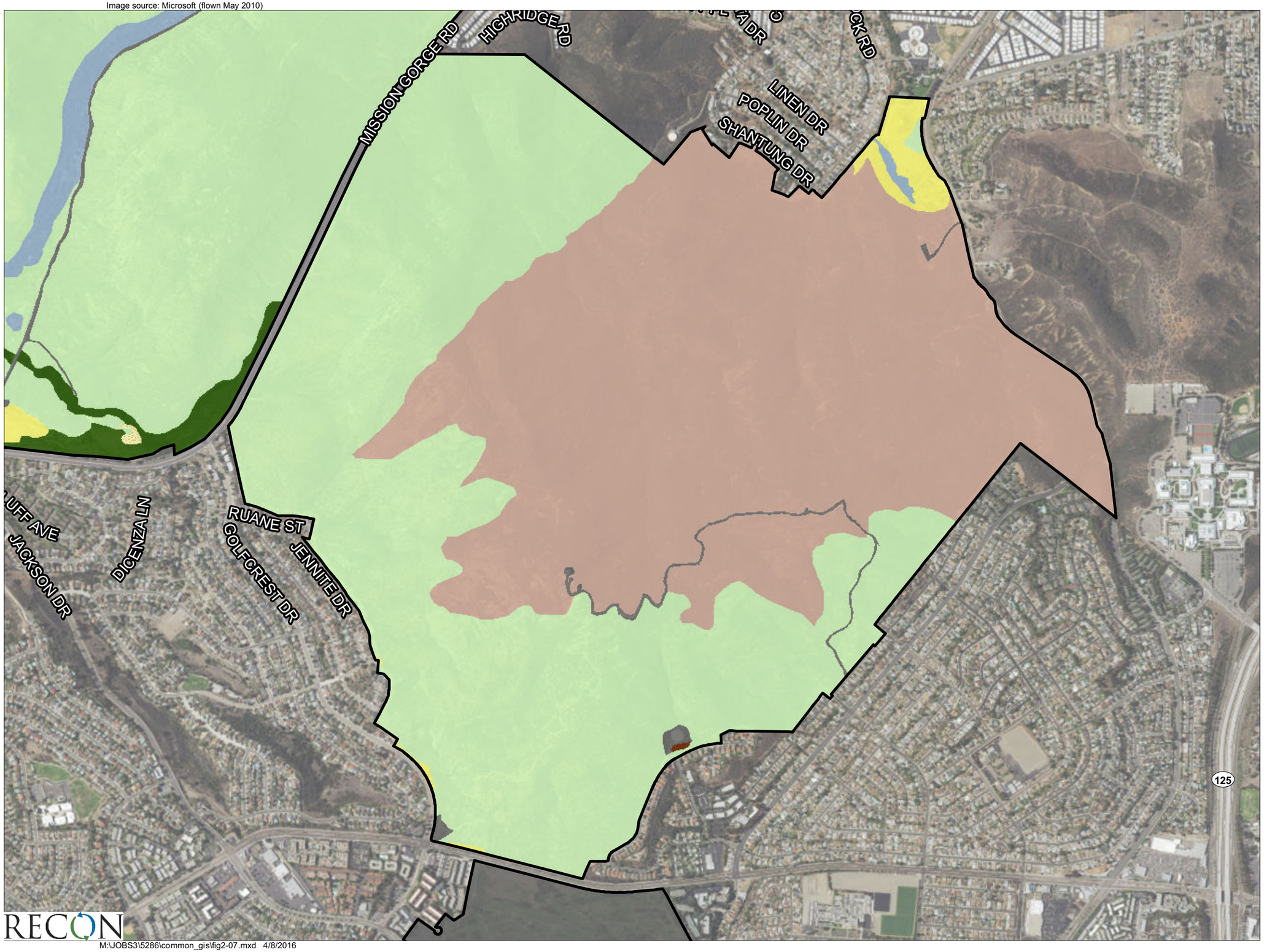
FIGURE 2-7c

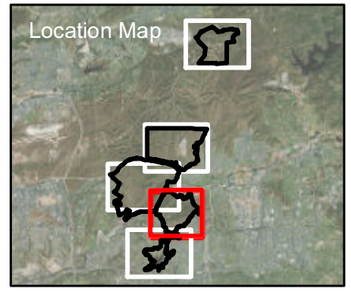
Vegetation Communities at MTRP (Holland Code)

RECON

M:\JOBS3\5286\common_gis\fig2-07.mxd 4/8/2016

Image source: Microsoft (flown May 2010)





Project Boundary

Vegetation Communities

(Holland Code)

- Chamise Chaparral (37200)
- Coast Live Oak Woodland (71160)
- Diegan Coastal Sage Scrub (32500)
- Eucalyptus Woodland (11100)
- Non-native Grassland (42200)
- Southern Mixed Chaparral (37120)
- Southern Willow Scrub (63320)
- Urban/Developed (12000)
- Valley Needlegrass Grassland (42110)

0 Feet 1,000

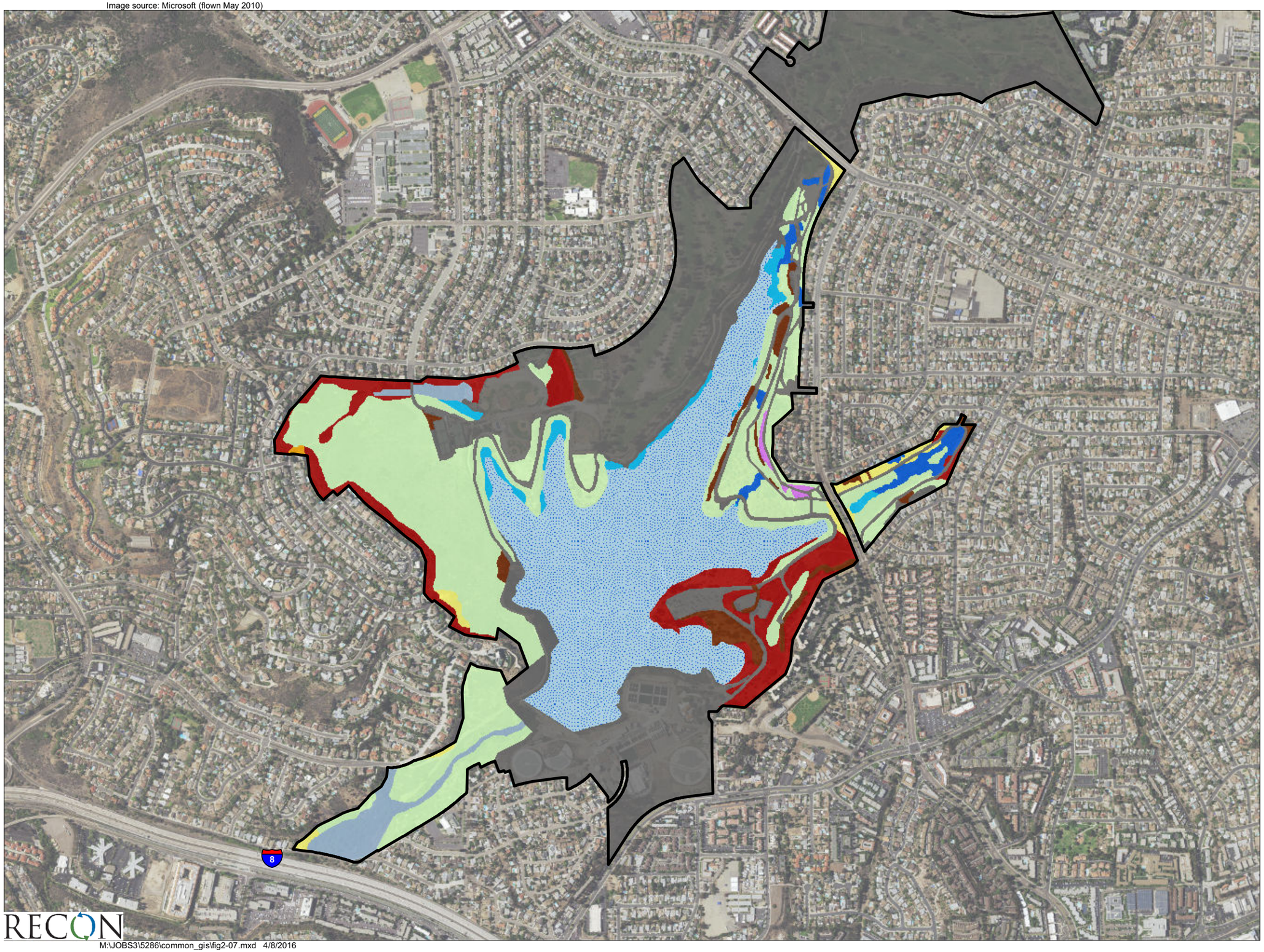
RECON

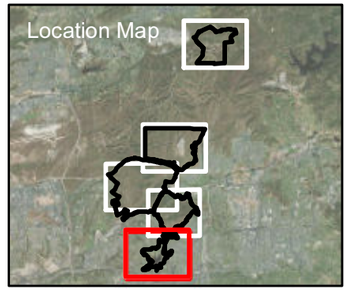
M:\JOBS3\5286\common_gis\fig2-07.mxd 4/8/2016

FIGURE 2-7d

Vegetation Communities at MTRP (Holland Code)

Image source: Microsoft (flown May 2010)





Project Boundary

Vegetation Communities

(Holland Code)

- Coastal and Valley Freshwater Marsh (52410)
- Diegan Coastal Sage Scrub (32500)
- Disturbed Habitat (11300)
- Disturbed Wetland (11200)
- Eucalyptus Woodland (11100)
- Non-native Grassland (42200)
- Non-native Vegetation (11000)
- Open Water (13100)
- Southern Willow Scrub (63320)
- Urban/Developed (12000)
- Wildflower Field (42300)

0 Feet 1,000

FIGURE 2-7e

Vegetation Communities at MTRP (Holland Code)

RECON

M:\JOBS3\5286\common_gis\fig2-07.mxd 4/8/2016

TABLE 2-5
SANDAG VEGETATION COMMUNITY ALLIANCE AND ASOCIATIONS OBSERVED AT MTRP

Group	Alliance	Association	Acres
Riparian Forests and Woodlands			**242.2**
	Western Sycamore Woodland		**26**
	Platanus racemosa	*Platanus racemosa*	20.7
		Platanus racemosa-Populus spp./*Salix lasiolepis*	5.3
	Black Willow Woodland		**164.4**
	Salix gooddingii	*Salix gooddingii*	164.4
	Arroyo Willow Woodland		**51.8**
	Salix lasiolepis	*Salix lasiolepis*	51.8
Upland Forests and Woodlands			**79.4**
	Coast Live oak woodland		**58.8**
	Quercus agrifolia	*Quercus agrifolia*	35.5
		Quercus agrifolia/Toxicodendron diversilobum/Grass	23.3
	Peppertree woodland	-	**0.32**
	Schinus semi-natural stands*		0.32
	Eucalyptus woodland	-	**20.3**
	Eucalyptus semi-natural stands*		20.3
Riparian Shrublands			**177.8**
	Mule Fat Scrub		**1.4**
	Baccharis salicifolia	*Baccharis salicifolia*	1.4
	Broom Baccharis		**176.4**
	Baccharis sarothroides	*Baccharis sarothroides*	176.4

TABLE 2-5
SANDAG VEGETATION COMMUNITY ALLIANCE AND ASOCIATIONS OBSERVED AT MTRP
(continued)

Group	Alliance	Association	Acres
Sclerophyllous, Evergreen Shrublands			**3,603.1**
	Chamise Chaparral		**1,103.70**
	Adenostoma fasciculatum	*Adenostoma fasciculatum*	154.9
		Adenostoma fasciculatum-Acmispon glaber	263.9
		Adenostoma fasciculatum-Ceanothus tomentosus	129.7
		Adenostoma fasciculatum (Eriogonum fasciculatum, Artemisia californica, Salvia mellifera)	539.5
		Adenostoma fasciculatum-Xylococcus bicolor-Ceanothus tomentosus	15.7
	Chamise-Mission Manzanita Chaparral		**1,036.40**
	Adenostoma fasciculatum-Xylococcus bicolor	*Adenostoma fasciculatum-Xylococcus bicolor*	288
		Adenostoma fasciculatum-Xylococcus bicolor-Ceanothus tomentosus	688.5
		Adenostoma fasciculatum-Xylococcus bicolor-Quercus berberidifolia	59.9
	Eastwood Manzanita Chaparral		**162.2**
	Arctostaphylos glandulosa	*Arctostaphylos glandulosa-Adenostoma fasciculatum*	162.2
	Ramona lilac Chaparral		**245.7**
	Ceanothus tomentosus	*Ceanothus tomentosus*	245.7
	Toyon Chaparral		**44.5**
	Heteromeles arbutifolia	*Heteromeles arbutifolia*	44.5
	Coastal Bushmallow Scrub		**51.6**
	Malacothamnus fasciculatus	*Malacothamnus fasciculatus*	51.6
	Laurel Sumac Chaparral		**852**
	Malosma laurina	*Malosma laurina*	415.1
		Malosma laurina-Acmispon glaber	436.9
	Scrub oak Chaparral		**69.7**
	Quercus (berberidifolia, x acutides)	*Quercus (berberidifolia, x acutides)*	69.7
	Red Berry Scrub		**7.2**
	Rhamnus crocea	*Rhamnus crocea*	7.2
	Lemonade Berry Scrub		**30.1**
	Rhus integrifolia	*Rhus integrifolia*	30.1

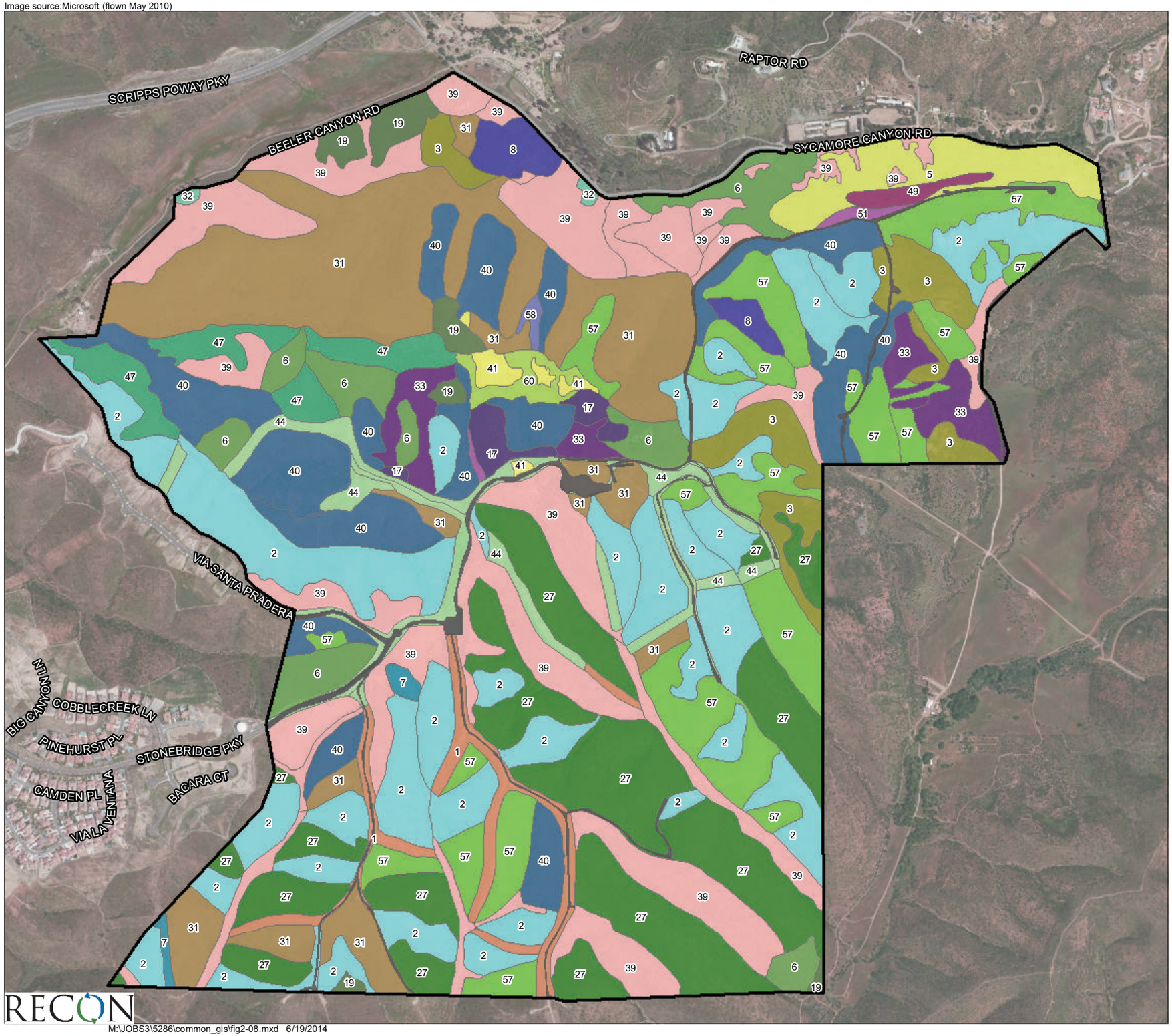
TABLE 2-5
SANDAG VEGETATION COMMUNITY ALLIANCE AND ASOCIATIONS OBSERVED AT MTRP
(continued)

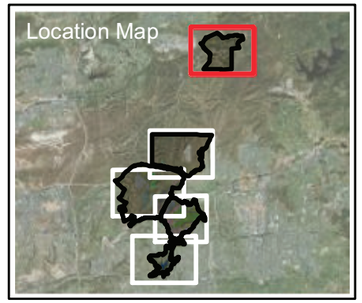
Group	Alliance	Association	Acres
Soft-leaved, Drought-deciduous Shrublands			**3,512.2**
	Deer weed scrub		**352.1**
	Acmispon glaber	*Acmispon glaber*	352.1
	Coastal sagebrush scrub		**1139.3**
	Artemisia californica	*Artemisia californica*	1130
		Artemisia californica-Mimulus aurantiacus	9.3
	Coastal sagebrush-California buckwheat scrub		**588.2**
	Artemisia californica-Eriogonum fasciculatum	*Artemisia californica-Eriogonum fasciculatum*	532.4
		Artemisia californica-Eriogonum fasciculatum- Malosma laurina	55.8
	Coastal sagebrush-Black sage scrub		**80.5**
	Artemisia californica-Salvia mellifera	*Artemisia californica-Salvia mellifera*	80.5
	San Diego sunflower scrub		**94.8**
	Bahiopsis lacinata	*Bahiopsis lacinata*	0.6
		Bahiopsis lacinata-Artemisia californica- Eriogonum fasciculatum	94.2
	Bush sunflower scrub		**0.7**
	Encelia californica	*Encelia californica*	0.7
	California buckwheat Scrub		**399.4**
	Eriogonum fasciculatum	*Eriogonum fasciculatum*	399.4
	White sage Scrub		**4.2**
	Salvia apiana	*Salvia apiana-Artemisia californica*	4.2
	Black sage Scrub		**853**
	Salvia mellifera	*Salvia mellifera*	300.4
		Salvia mellifera-Malosma laurina	552.6

TABLE 2-5
SANDAG VEGETATION COMMUNITY ALLIANCE AND ASOCIATIONS OBSERVED AT MTRP
(continued)

Group	Alliance	Association	Acres
Hydrophytic Herbaceous Vegetation			**12.2**
	Beard-less wild rye		**1.5**
	Elymus triticoides	*Elymus triticoides*	1.5
	Cat tail		
	Typha (angustifolia, domingensis, latifolia)	-	**8.4**
	Naturalized Warm-Temperate Riparian and Wetland	-	**1.5**
	Semi-Natural Stands*		
	Vernal pools **	-	**0.8**
Upland Herbaceous Vegetation			**1,306.7**
	Purple Needlegrass grassland		**17.2**
	Stipa pulchra	*Stipa pulchra*	17.2
	Tarweed field		**1.2**
	Deinandra fasciculata		1.2
	Wild oat grassland*		**787.7**
	Avena (barbata, fatua) Semi-Natural Stands*		787.7
	Mustard field*		**38.2**
	Brassica (nigra) and Other Mustards Semi-Natural stands*		38.2
	Brome grassland*		**369.5**
	Bromus (diandrus, hordeaceus)-Brachypodium distachyon		369.5
	Semi-Natural Stands*		
	Disturbed Habitat*		**37.5**
	Mediterranean California Naturalized Annual and Perennial		37.5
	Grassland Semi-Natural Stands*		
	Purple fountain grassland*		**55.4**
	Pennisetum setaceum Semi-Natural Stands*		55.4

Image source:Microsoft (flown May 2010)





Project Boundary

Vegetation Communities (SANDAG)

ID--Alliance\Association

- 1--Acmispon glaber\Acmispon glaber
- 2--Adenostoma fasciculatum
- 3--Adenostoma fasciculatum-Xylococcus bicolor
- 5--Adenostoma fasciculatum-Xylococcus bicolor\Adenostoma fasciculatum-Xylococcus bicolor-Quercus berberifolia
- 6--Adenostoma fasciculatum\Adenostoma fasciculatum
- 7--Adenostoma fasciculatum\Adenostoma fasciculatum-Acmispon glaber
- 8--Adenostoma fasciculatum\Adenostoma fasciculatum-Ceanothus tomentosus
- 17--Artemisia californica\Artemisia californica
- 19--Avena (barbata, fatua) Semi-Natural Stands
- 27--Ceanothus tomentosus\Ceanothus tomentosus
- 29--Urban\Developed
- 31--Eriogonum fasciculatum\Eriogonum fasciculatum
- 32--Eucalyptus semi-natural stands
- 33--Heteromeles arbutifolia
- 39--Malosma laurina\Malosma laurina
- 40--Malosma laurina\Malosma laurina-Acmispon glaber
- 41--Mediterranean California Naturalized Annual and Perennial Grassland Semi-Natural Stands
- 44--Pennisetum setaceum Semi-Natural Stands
- 47--Quercus (berberidifolia, x acutides)\Quercus (berberidifolia, x acutides)
- 49--Quercus agrifolia\Quercus agrifolia-Toxicodendron diversilobum-Grass
- 51--Rhamnus crocea\Rhamnus crocea Provisional Association
- 57--Salvia mellifera\Salvia mellifera
- 58--Salvia mellifera\Salvia mellifera-Malosma laurina
- 60--Stipa pulchra\Stipa pulchra

0 Feet 1,000

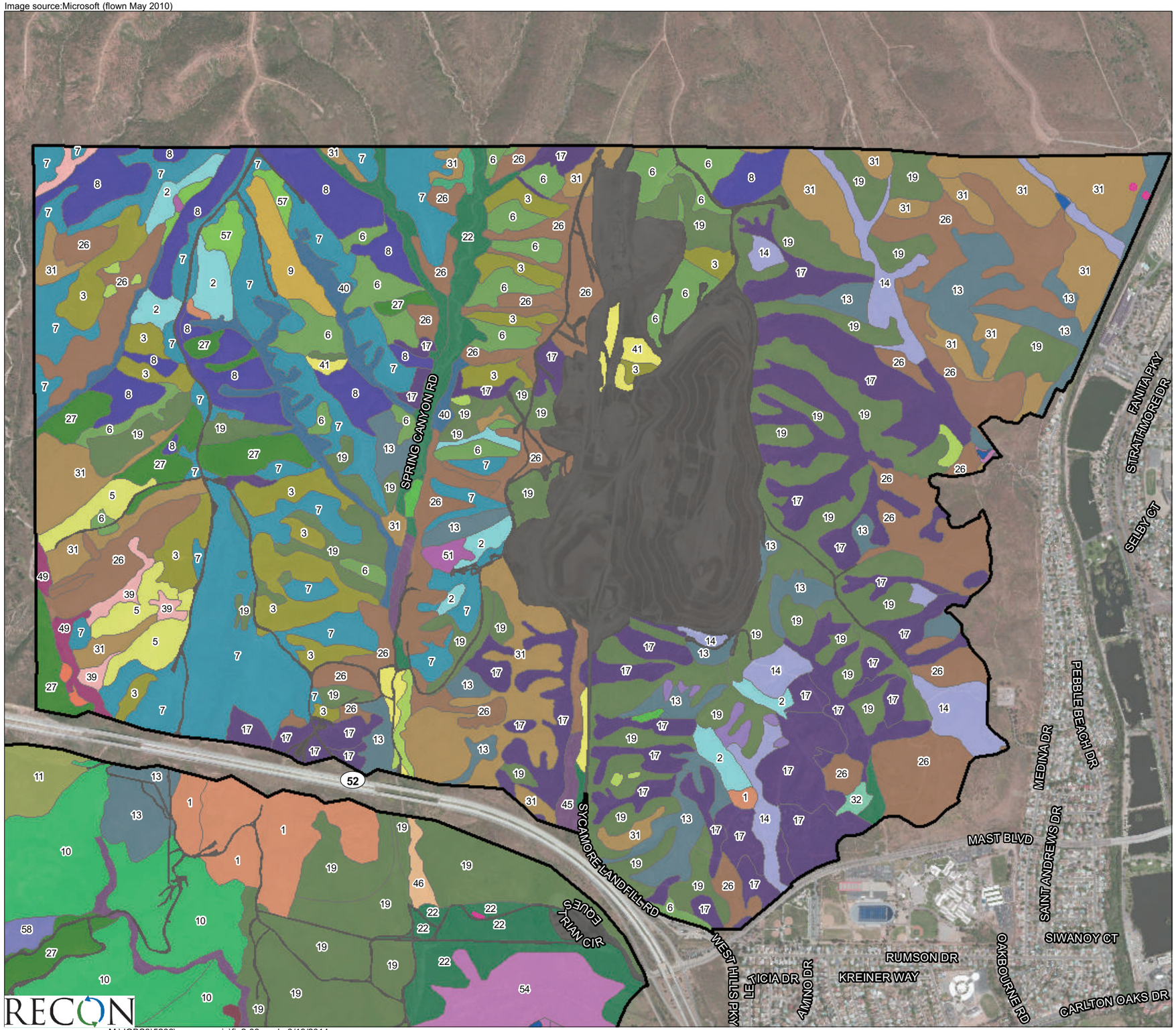
RECON

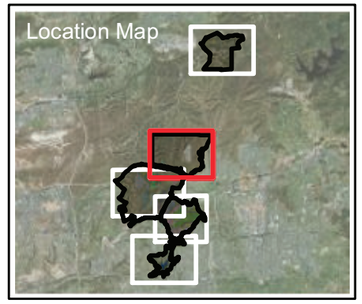
M:\JOBS3\5286\common_gis\fig2-08.mxd 6/19/2014

FIGURE 2-8A

Vegetation Communities at MTRP (SANDAG)

Image source:Microsoft (flown May 2010)





Project Boundary

Vegetation Communities (SANDAG)

ID--Alliance\Association

- 1--Acmispon glaber\Acmispon glaber
- 2--Adenostoma fasciculatum
- 3--Adenostoma fasciculatum-Xylococcus bicolor
- 5--Adenostoma fasciculatum-Xylococcus bicolor\Adenostoma fasciculatum-Xylococcus bicolor-Quercus berberifolia
- 6--Adenostoma fasciculatum\Adenostoma fasciculatum
- 7--Adenostoma fasciculatum\Adenostoma fasciculatum-Acmispon glaber
- 8--Adenostoma fasciculatum\Adenostoma fasciculatum-Ceanothus tomentosus
- 9--Adenostoma fasciculatum\Adenostoma fasciculatum-Xylococcus biocolor-Ceanothus tomentossus
- 10--Adenostoma fasciculatum\Adenostoma fasciculatum (Eriogonum fasciulatum, Artemesia californica, Salvia me
- 11--Arctostaphylos glandulosa\Arctostaphylos glandulosa-Adenostoma fasciculatum
- 13--Artemisia californica-Eriogonum fasciculatum\Artemisia californica-Eriogonum fasciculatum
- 14--Artemisia californica-Eriogonum fasciculatum\Artemisia californica-Eriogonum fasciculatum-Malosma laurina
- 17--Artemisia californica\Artemisia californica
- 19--Avena (barbata, fatua) Semi-Natural Stands
- 22--Baccharis sarothroides\Baccharis sarothroides
- 24--Bahiopsis lacinata\Bahiopsis lacinata-Artemisia californica-Eriogonum fasciculatum
- 26--Bromus (diandrus, hordeaceus)-Brachypodium distachyon Semi-Natural Stands
- 27--Ceanothus tomentosus\Ceanothus tomentosus
- 29--Urban\Developed
- 31--Eriogonum fasciculatum\Eriogonum fasciculatum
- 32--Eucalyptus semi-natural stands
- 35--Leymus triticoides\Leymus triticoides
- 36--Malacothamnus fasciculatum\Malacothamnus fasciculatum
- 38--Malosma laurina
- 39--Malosma laurina\Malosma laurina
- 40--Malosma laurina\Malosma laurina-Acmispon glaber
- 41--Mediterranean California Naturalized Annual and Perennial Grassland Semi-Natural Stands
- 43--Open Water
- 45--Platanus racemosa\Platanus racemosa
- 46--Platanus racemosa\Platanus racemosa-Populus spp./Salix lasiolepis
- 47--Quercus (berberidifolia, x acutides)\Quercus (berberidifolia, x acutides)
- 49--Quercus agrifolia\Quercus agrifolia-Toxicodendron diversilobum-Grass
- 51--Rhamnus crocea\Rhamnus crocea Provisional Association
- 54--Salix gooddingii\Salix gooddingii
- 57--Salvia mellifera\Salvia mellifera
- 58--Salvia mellifera\Salvia mellifera-Malosma laurina
- 60--Stipa pulchra\Stipa pulchra
- 62--Vernal Pool

0 Feet 1,000

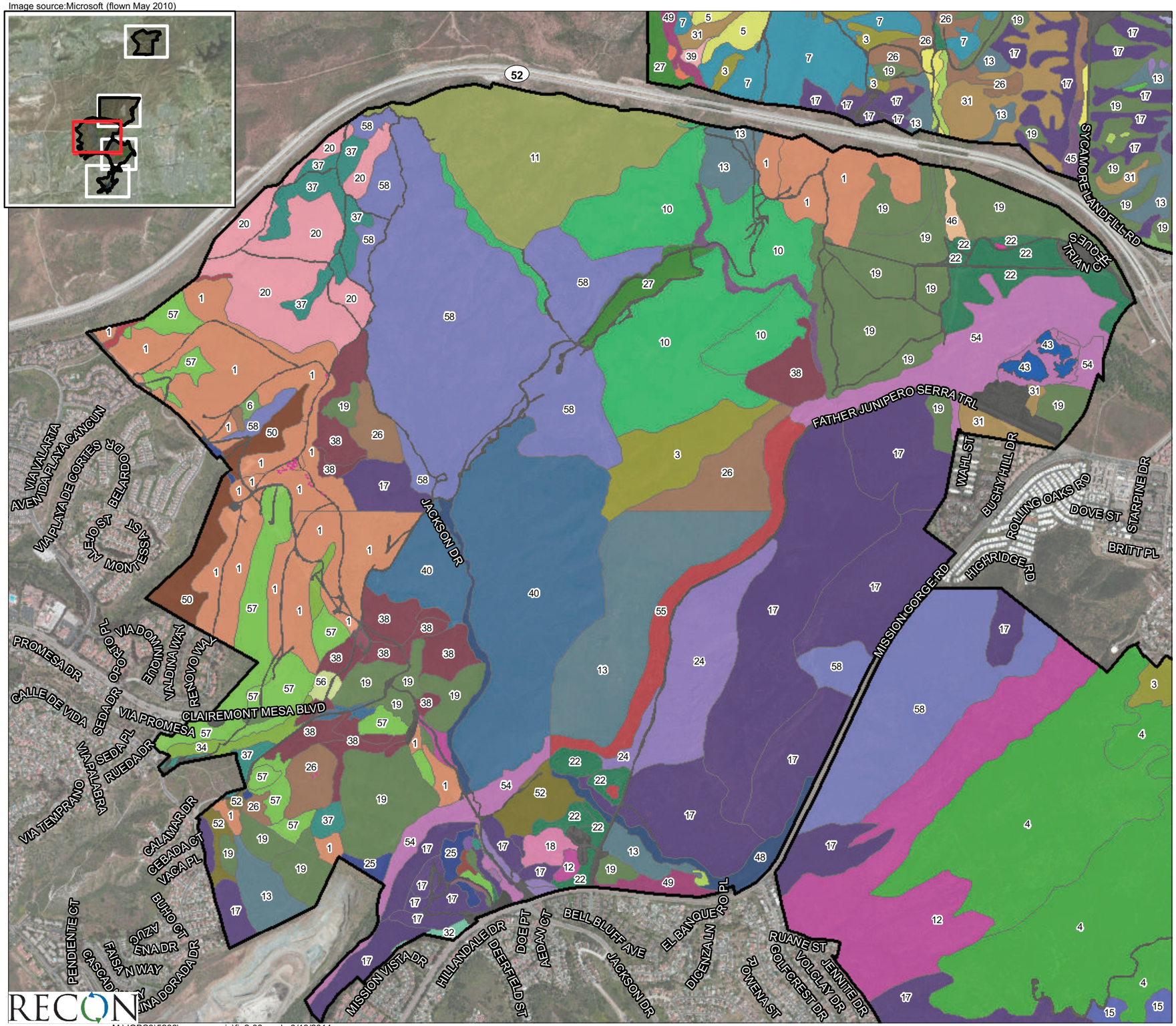
RECON

M:\JOBS3\5286\common_gis\fig2-08.mxd 6/19/2014

FIGURE 2-8B

Vegetation Communities at MTRP (SANDAG)

Image source:Microsoft (flown May 2010)



Project Boundary

Vegetation Communities (SANDAG)

ID--Alliance\Association

1--Acmispon glaber\Acmispon glaber

2--Adenostoma fasciculatum

3--Adenostoma fasciculatum-Xylococcus bicolor

4--Adenostoma fasciculatum-Xylococcus bicolor\Adenostoma fasciculatum-Xylococcus bicolor-Ceanothus tomentosus

5--Adenostoma fasciculatum-Xylococcus bicolor\Adenostoma fasciculatum-Xylococcus bicolor-Quercus berberifolia

6--Adenostoma fasciculatum\Adenostoma fasciculatum

7--Adenostoma fasciculatum\Adenostoma fasciculatum-Acmispon glaber

10--Adenostoma fasciculatum\Adenostoma fasciculatum (Eriogonum fasciulatum, Artemesia californica, Salvia me

11--Arctostaphylos glandulosa\Arctostaphylos glandulosa-Adenostoma fasciculatum

12--Artemisia californica-Eriogonum fasciculatum

13--Artemisia californica-Eriogonum fasciculatum\Artemisia californica-Eriogonum fasciculatum

14--Artemisia californica-Eriogonum fasciculatum\Artemisia californica-Eriogonum fasciculatum-Malosma laurina

15--Artemisia californica-Salvia mellifera

16--Artemisia californica-Salvia mellifera\Artemisia californica-Salvia mellifera

17--Artemisia californica\Artemisia californica

18--Artemisia californica\Artemisia californica-Mimulus aurantiacus

19--Avena (barbata, fatua) Semi-Natural Stands

20--Avena (barbata, fatua) Semi-Natural Stands\Avena (barbata, fatua) Semi-Natural Stands

21--Baccharis salicifolia\Baccharis salicifolia

22--Baccharis sarothroides\Baccharis sarothroides

23--Bahiopsis lacinata\Bahiopsis lacinata

24--Bahiopsis lacinata\Bahiopsis lacinata-Artemisia californica-Eriogonum fasciculatum

25--Brassica (nigra) and Other Mustards Semi-Natural stands

26--Bromus (diandrus, hordeaceus)-Brachypodium distachyon Semi-Natural Stands

27--Ceanothus tomentosus\Ceanothus tomentosus

29--Urban\Developed

31--Eriogonum fasciculatum\Eriogonum fasciculatum

32--Eucalyptus semi-natural stands

34--Heteromeles arbutifolia\Heteromeles arbutifolia

35--Leymus triticoides\Leymus triticoides

36--Malacothamnus fasciculatum\Malacothamnus fasciculatum

37--Malacothamnus fasciculatus

38--Malosma laurina

39--Malosma laurina\Malosma laurina

40--Malosma laurina\Malosma laurina-Acmispon glaber

41--Mediterranean California Naturalized Annual and Perennial Grassland Semi-Natural Stands

43--Open Water

45--Platanus racemosa\Platanus racemosa

46--Platanus racemosa\Platanus racemosa-Populus spp./Salix lasiolepis

48--Quercus agrifolia\Quercus agrifolia

49--Quercus agrifolia\Quercus agrifolia-Toxicodendron diversilobum-Grass

50--Quercus berberidifolia\Quercus berberidifolia

52--Rhus integrifolia\Rhus integrifolia

54--Salix gooddingii\Salix gooddingii

55--Salix lasiolepis\Salix lasiolepis

56--Salvia apiana\Salvia apiana-Artemesia californica

57--Salvia mellifera\Salvia mellifera

58--Salvia mellifera\Salvia mellifera-Malosma laurina

60--Stipa pulchra\Stipa pulchra

61--Typha (angustifolia, domingensis, latifolia)

62--Vernal Pool

0 Feet 1,000

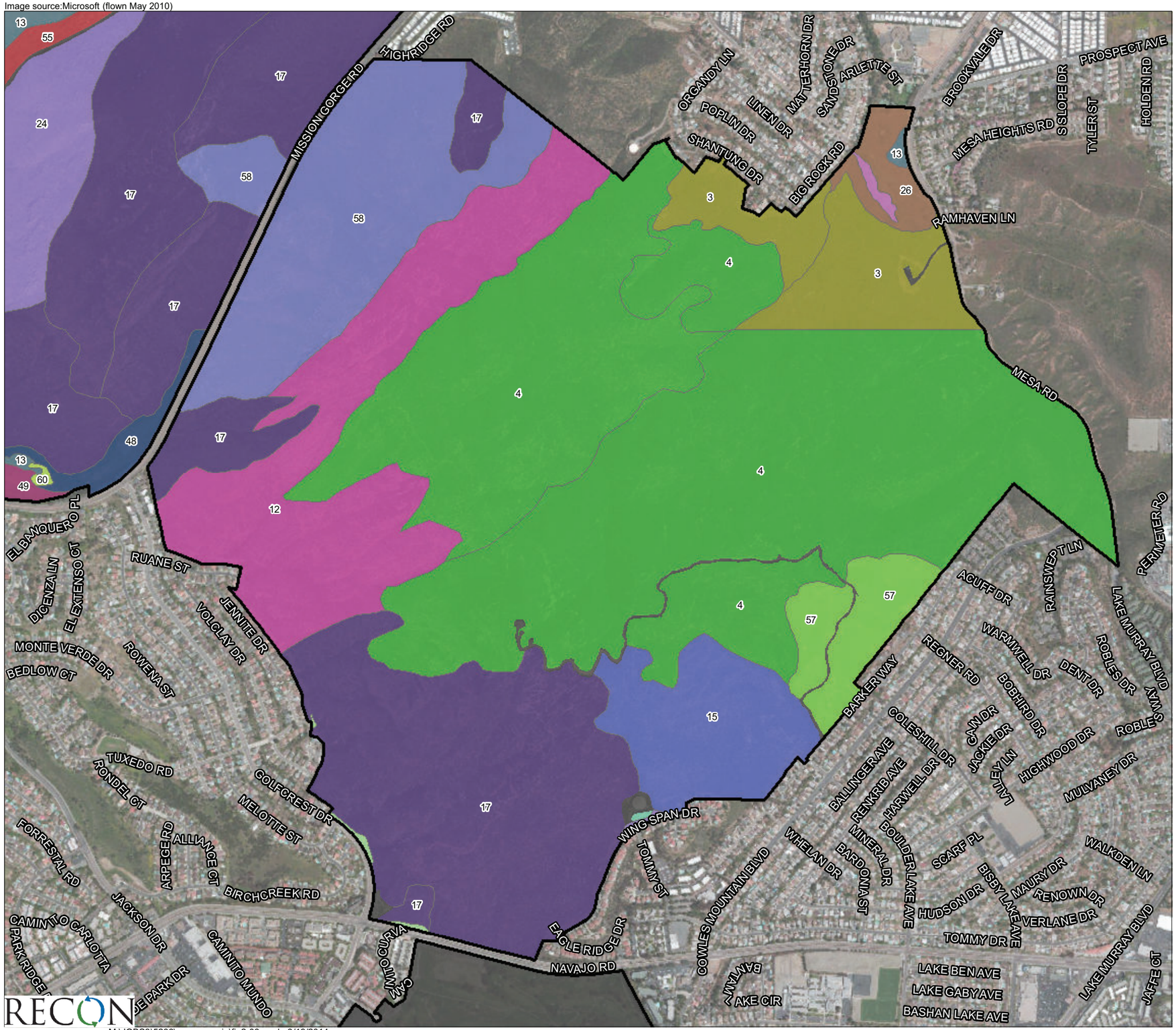
RECON

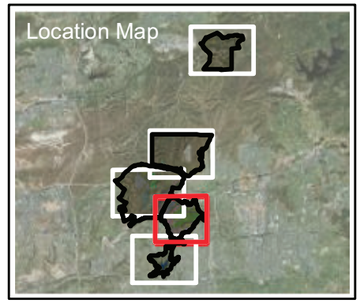
M:\JOBS3\5286\common_gis\fig2-08.mxd 6/19/2014

FIGURE 2-8C

Vegetation Communities at MTRP (SANDAG)

Image source:Microsoft (flown May 2010)





Project Boundary

Vegetation Communities (SANDAG)

ID--Alliance\Association

- 3--Adenostoma fasciculatum-Xylococcus bicolor
- 4--Adenostoma fasciculatum-Xylococcus bicolor\Adenostoma fasciculatum-Xylococcus bicolor-Ceanothus tomentosus
- 12--Artemisia californica-Eriogonum fasciculatum
- 13--Artemisia californica-Eriogonum fasciculatum\Artemisia californica-Eriogonum fasciculatum
- 15--Artemisia californica-Salvia mellifera
- 17--Artemisia californica\Artemisia californica
- 24--Bahiopsis lacinata\Bahiopsis lacinata-Artemisia californica-Eriogonum fasciculatum
- 26--Bromus (diandrus, hordeaceus)-Brachypodium distachyon Semi-Natural Stands
- 29--Urban\Developed
- 32--Eucalyptus semi-natural stands
- 44--Pennisetum setaceum Semi-Natural Stands
- 48--Quercus agrifolia\Quercus agrifolia
- 49--Quercus agrifolia\Quercus agrifolia-Toxicodendron diversilobum-Grass
- 54--Salix gooddingii\Salix gooddingii
- 55--Salix lasiolepis\Salix lasiolepis
- 57--Salvia mellifera\Salvia mellifera
- 58--Salvia mellifera\Salvia mellifera-Malosma laurina
- 60--Stipa pulchra\Stipa pulchra

0 Feet 1,000

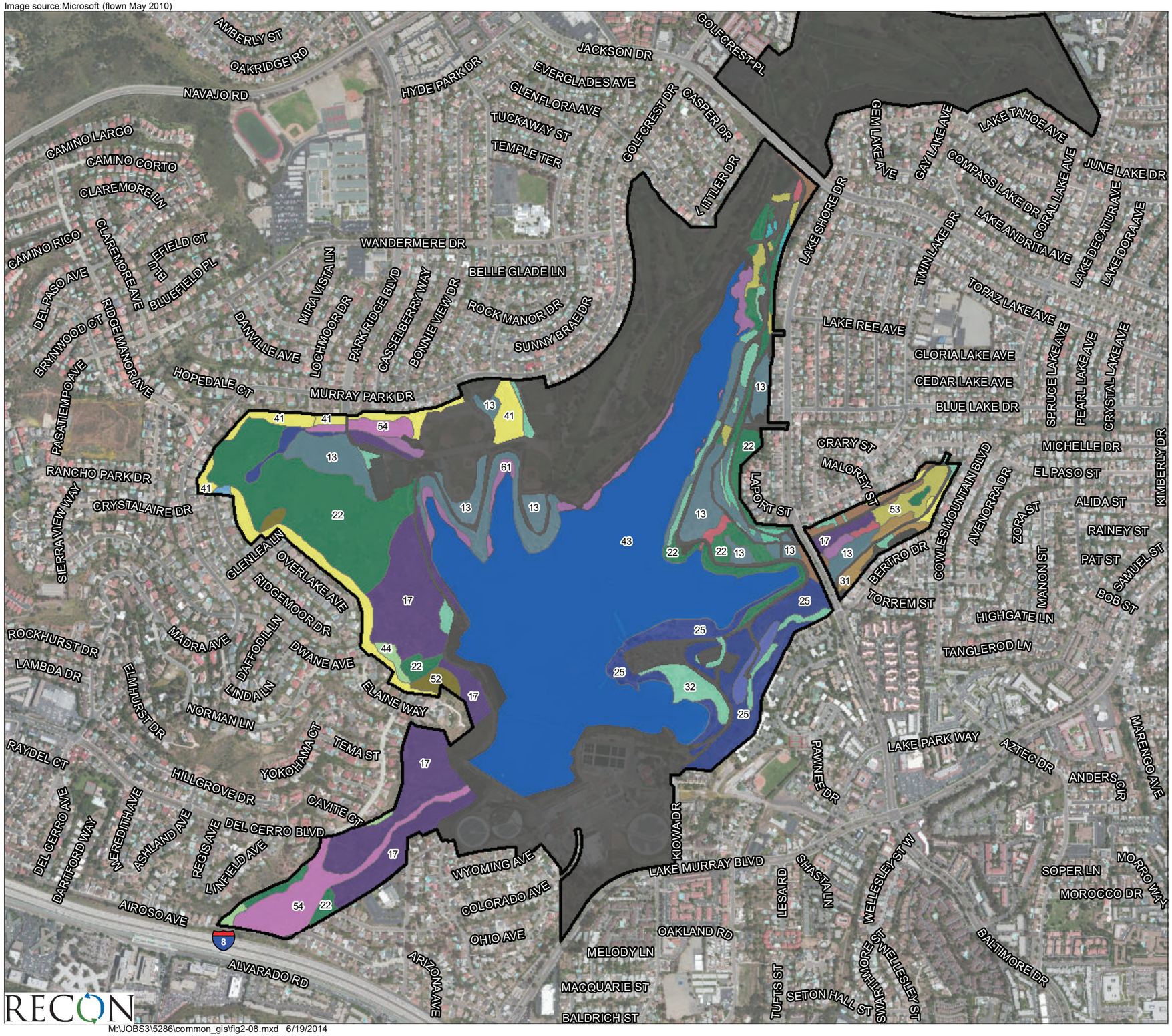
FIGURE 2-8D

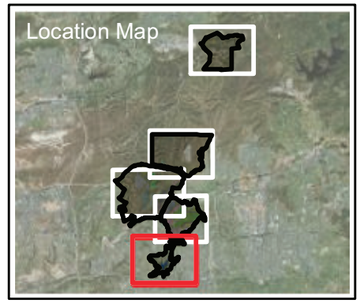
Vegetation Communities at MTRP (SANDAG)

RECON

M:\JOBS3\5286\common_gis\fig2-08.mxd 6/19/2014

Image source:Microsoft (flown May 2010)





Project Boundary

Vegetation Communities (SANDAG)

ID--Alliance\Association

- 13--Artemisia californica-Eriogonum fasciculatum\Artemisia californica-Eriogonum fasciculatum
- 15--Artemisia californica-Salvia mellifera
- 17--Artemisia californica\Artemisia californica
- 22--Baccharis sarothroides\Baccharis sarothroides
- 25--Brassica (nigra) and Other Mustards Semi-Natural stands
- 26--Bromus (diandrus, hordeaceus)-Brachypodium distachyon Semi-Natural Stands
- 28--Deinandra fasciculata
- 29--Urban\Developed
- 30--Encelia california
- 31--Eriogonum fasciculatum\Eriogonum fasciculatum
- 32--Eucalyptus semi-natural stands
- 41--Mediterranean California Naturalized Annual and Perennial Grassland Semi-Natural Stands
- 42--Naturalized Warm-Temperate Riparian and Wetland Semi-Natural Stands
- 43--Open Water
- 44--Pennisetum setaceum Semi-Natural Stands
- 52--Rhus integrifolia\Rhus integrifolia
- 53--Salix gooddingii
- 54--Salix gooddingii\Salix gooddingii
- 59--Schinus semi-natural Stands\
- 61--Typha (angustifolia, domingensis, latifolia)

0 Feet 1,000

FIGURE 2-8E

Vegetation Communities at MTRP (SANDAG)

RECON

M:\JOBS3\5286\common_gis\fig2-08.mxd 6/19/2014

2.2.2 Plant Species

MTRP contains a high diversity of plant species resulting from the multiple niches created by complex topography, soils, and its geographic location in coastal San Diego County. MTRP currently supports a total of 244 plant species, representing 61 plant families. Of this total, 196 (80 percent) are species native to southern California, and 52 (20 percent) are introduced species. Of these introduced species, the California Invasive Plant Council (Cal-IPC) has listed 2 as "High" (severe ecological damage potential), 19 as "Moderate" (significant, but not severe, ecological damage potential), and 9 as having "Limited" (minor ecological damage potential) (Cal-IPC 2012). Plant species that have been observed/detected in MTRP are listed in Appendix A-A.

2.2.3 Wildlife Species

MTRP currently supports a diverse wildlife population, including at least 26 mammals, 101 birds, 17 reptiles and amphibians, and over 600 invertebrate species (San Diego Natural History Museum 2009). The diversity of animal species observed or expected to occur within MTRP is typical of large, ecologically connected open space areas with a mix of coastal sage scrub, chaparral, grassland, and riparian woodland habitats in coastal San Diego County. MTRP's variety of habitats, topography, and hydrologic features further enhance this diversity:

- **Open grasslands** provide burrowing opportunities for many reptiles and small mammals, as well as foraging opportunities for many raptors.
- **Scrub communities** provide habitat for a wide variety of reptile, mammal, and avian species, and often include steeper topography and rocky outcrops.
- **Riparian corridors** provide a perennial water source for amphibians, mesic reptiles, riparian birds, and foraging mammals.
- **Steep cliff faces** host at least four bat species and provide shelter for nesting avian species.

Wildlife species that have been observed/detected in MTRP are listed in Appendix A-B.

2.2.4 Wildlife Corridors

Maintaining connectivity amongst core MSCP areas as well as to lands within the greater Southern California region is essential for maintaining the biodiversity of the MHPA and resilience of species and natural communities in San Diego (San Diego Management and Monitoring Program [SDMMP] 2010). Regionally, MTRP is a Core Biological Resource Area within the MHPA, as well as a critical regional open space link for the movement of animals between inland natural areas surrounding Marine Corps Air Station (MCAS) Miramar, west through Sycamore Canyon Preserve and various County parks in the Central Poway/San

Vicente Reservoir/North Poway Core Resource Area, and eventually east to the Cleveland National Forest (Ogden Environmental and Energy Services [Ogden] 1998, Figure 2-9).

2.2.4.1 Corridor Constraints within MTRP

MTRP areas are separated by man-made and topographic boundaries, and as a result, require a discussion of preserve level connectivity. Each area within MTRP has varying levels of urban edge and connectivity (Table 2-6). The Lake Murray area, while containing some significant biological resources, is not within an established MSCP Core Resource Area and is entirely bounded by developed lands abutting the Cowles Mountain area to the north. Natural vegetation between the Lake Murray and Cowles Mountain areas are separated by a golf course and two paved roads (Jackson Drive and Navajo Road). The Cowles Mountain area is within a Core Resource Area, and is approximately 85 percent bounded by developed lands and abuts the Mission Gorge area to the northwest. The Cowles Mountain and Mission Gorge areas are separated by Mission Gorge Road, a four-lane highway. The Mission Gorge area is approximately 24 percent bounded by developed lands, is within a Core Resource Area, and directly abuts Open Space to the southeast and northwest. The Fortuna Mountain area has developed lands on 29 percent of its boundaries and is adjacent to the Mission Gorge area along its southeastern border and East Elliott to the north. The Fortuna Mountain and East Elliott areas are separated by State Route 52 (SR-52). The East Elliott area shares approximately 47 percent of its boundaries with developed lands, including the City of Santee to the east and the Sycamore Landfill internally. East Elliott is bordered to the north by MCAS Miramar, which is predominantly open space and separates East Elliott from West Sycamore. The West Sycamore area is bounded by MCAS Miramar to the south, the Goodan Ranch Preserve to the east, and development to the northwest.

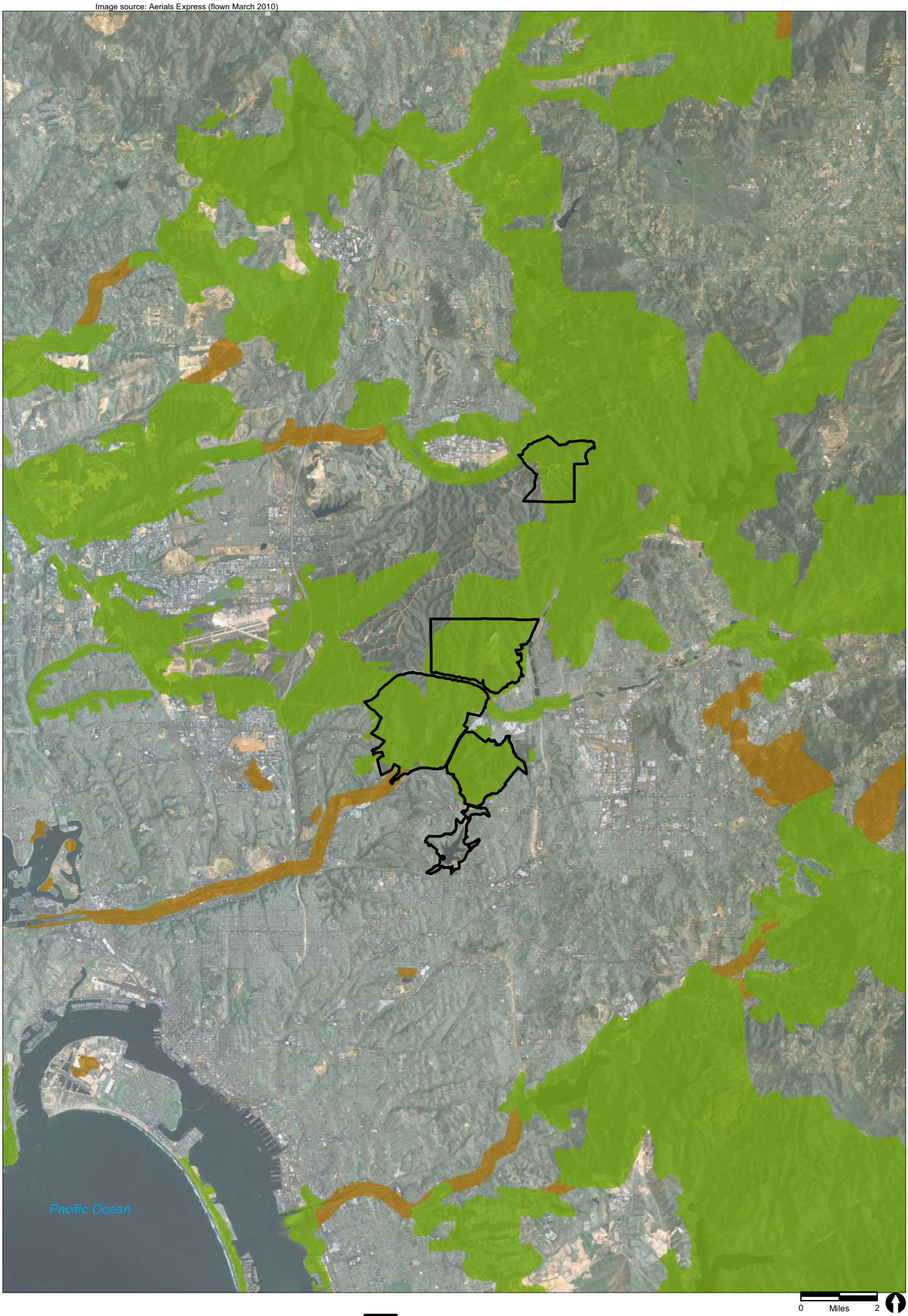
In 2010, the Western Tracking Institute (WTI) conducted a study on the presence and movement of mammals within MTRP. Although mammal populations were observed to be plentiful and relatively diverse, some concern was noted regarding internal constraints to wildlife movement, with particular emphasis on wildlife crossing beneath SR-52 (WTI 2010). Large, MSCP-covered mammals with extensive home ranges, such as mountain lion (*Puma concolor*) and mule deer (*Odocoileus hemionus*), require these crossings to extend foraging ranges and facilitate gene flow between disparate populations.

TABLE 2-6
PRESERVE LEVEL ADJACENCY TO OPEN SPACE AT MTRP

MTRP Area	% of Area Bounded by Developed Lands	MSCP Biological Core Area?*
Lake Murray	100	No
Cowles Mountain	85	Yes
Mission Gorge	24	Yes
Fortuna Mountain	29	Yes
East Elliott	47	Yes
West Sycamore	08	Yes

*Taken from Table 2-2 of the MSCP Plan.

Image source: Aerials Express (flown March 2010)



Project Boundary

Generalized Core and Linkage Areas (MSCP 1998)

Core Resources

Habitat Linkages

RECON

M:\JOBS3\5286\common_gis\fig2-09.mxd 10/3/2013

FIGURE 2-9

Regional Wildlife Corridors at Mission Trails Regional Park

SR-52 is a six-lane highway which bisects MTRP between the East Elliott area and the Fortuna Mountain area and poses a significant constraint on connectivity between “main MTRP” (Cowles Mountain, Fortuna Mountain, and Mission Gorge) and open space to the north (East Elliott and West Sycamore). A total of seven wildlife undercrossing choke points beneath SR-52 have been identified and are crucial to limiting the effects of habitat fragmentation to a number of species (WTI 2010). These crossings west to east are (1) the SR-52 “wildlife tunnel,” (2) the Oak Canyon Bridge undercrossing, (3) the Spring Canyon Bridge undercrossing, (4) the Mast Boulevard culverts, (5) the eastern San Diego River course, and (6 and 7) and two small culverts (Figures 2-10 and 2-11). Of these seven crossings, two (Oak Canyon Bridge undercrossing and Spring Canyon Bridge undercrossing) are considered viable movement corridors for large mammals.

Recreational activities, especially when conducted at night, can reduce wildlife movement through choke points. Passive and active nocturnal activities can result in the wildlife avoidance of undercrossings and associated increase of at-grade crossings. During the WTI study, animals were observed crossing at grade through broken exclusion fencing along SR-52, which has been subsequently repaired. As the freeway fencing along the north and south boundaries of SR-52 are maintained by the Department of Transportation, inspections and repairs to fencing near corridor chokepoints are currently being coordinated between California Department of Fish and Wildlife’s (CDFW’s) liason to California Department of Transportation (Caltrans) District 11 and City of San Diego Parks and Recreation staff.

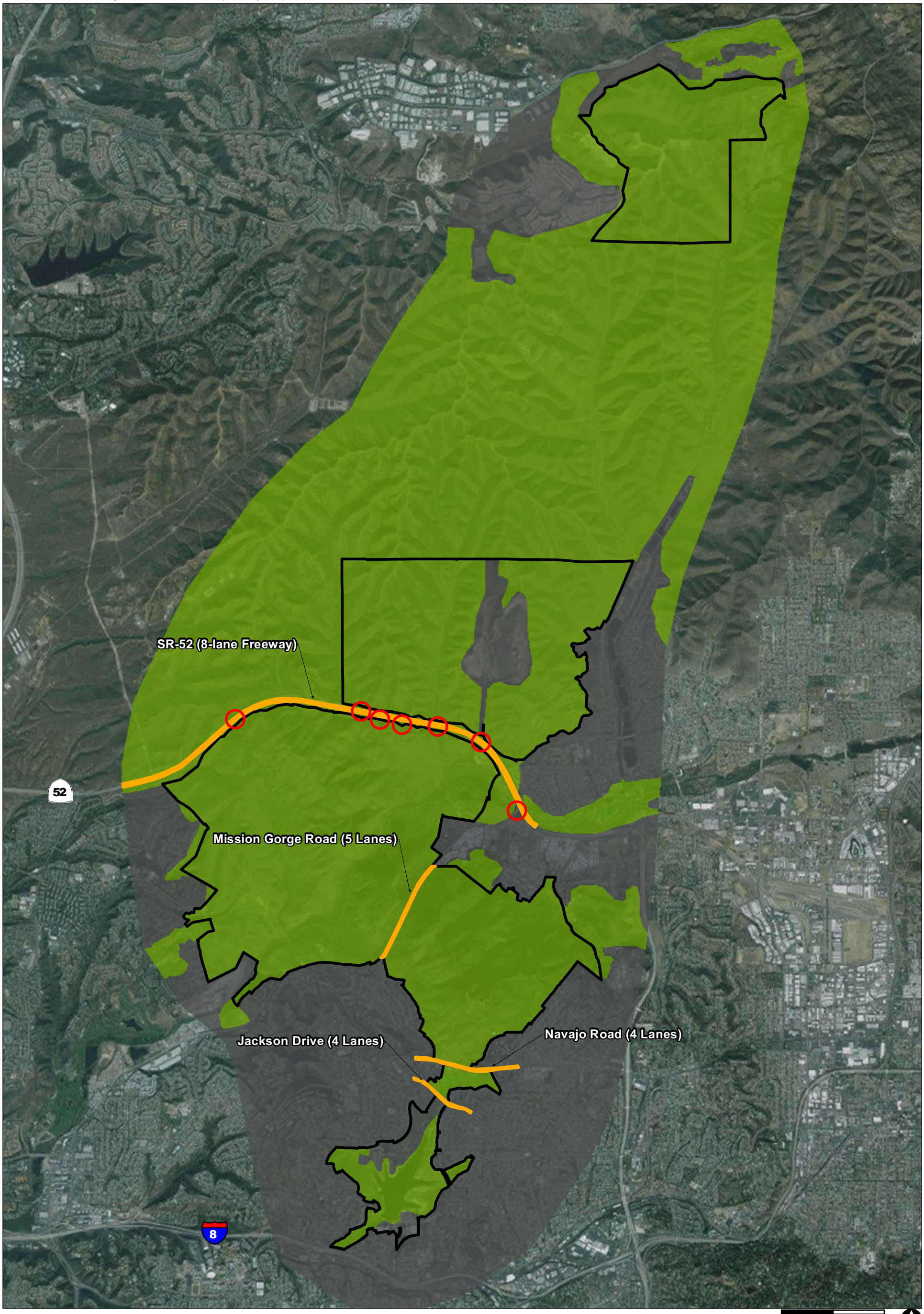
An analysis of the north-south corridor constraints across SR-52 at MTRP is presented below and is summarized in Table 2-7.

TABLE 2-7
WILDLIFE UNDERCROSSINGS AT SR-52

Name	Type	Diameter (m)	Height (m)	Width (m)	Length (m)	Openness Ratio	Substrate	Allowed Recreational Uses?	Wildlife use
Wildlife Tunnel	Wildlife underpass	4.57	-	-	90	0.73	Sand	No	Large mammals*, medium mammals, small mammals, reptiles
Oak Canyon Bridge	Divided Highway Bridge	-	20	50	50	94.00	Vegetation, soil, and water	Yes	Large mammals, medium mammals, small mammals, reptiles, amphibians
Culvert A	Culvert	1.5	-	-	82	0.09	Concrete	No	Small mammals
Culvert B	Culvert	0.6	-	-	150	0.01	Concrete	No	Small mammals
Spring Canyon Bridge	Divided highway Bridge	-	30	50	50	150.00	Vegetation, soil, and water	Yes	Large mammals, medium mammals, small mammals, reptiles, amphibians
Mast Culvert	Culvert	1.2	-	-	170	0.03	Concrete	No	Small mammals
San Diego River Course	Undivided highway Bridge	-	7	137	26	36.88	Vegetation, soil, and water	No	Large mammals, medium mammals, small mammals, reptiles, amphibians

*During WTI surveys in 2010, metal fencing was observed on MCAS Miramar side of wildlife tunnel, restricted potential access to large mammals.

Image Source: USDA FSA NAIP (flown May 2014)



RECON

M:\JOBS3\5286\common_gis\fig2-10.mxd 8/2/2016

FIGURE 2-10

Preserve Level Connectivity within Mission Trails Regional Park

Image Source: Microsoft (flown May 2010)

East Elliott Area
Cowles Mountain Area
Fortuna Mountain Area
Mission Gorge Area

Wildlife Crossings

1. Wildlife Tunnel
2. Oak Canyon Bridge Undercrossing
3. Culvert A
4. Culvert B
5. Spring Canyon Bridge Undercrossing
6. Mast Boulevard Culverts
7. San Diego River Course

0 Feet 2,000

RECON

M:\JOBS3\5286\common_gis\fig2-11.mxd 6/19/2014

FIGURE 2-11

Wildlife Crossings at Mission Trails Regional Park

a. The Wildlife Tunnel

This Wildlife Tunnel is a wildlife undercrossing approximately 1.8 miles north of the Tierrasanta trailhead. The Wildlife Tunnel under crosses SR-52 and connects the Fortuna Mountain area with lands managed by MCAS Miramar (see Figure 2-9). MCAS Miramar has installed a set of bars at the northern end of the tunnel to restrict recreational encroachment onto their property. Despite the barriers and exclusion signage, WTI observed that vandals have broken the barrier and frequently use the tunnel (day and nighttime) to illegally access trails on MCAS Miramar. Evidence collected during the study suggested that the mule deer will cross SR-52 at grade when fencing in this area is compromised (WTI 2010). Smaller mammals such as coyote (*Canis latrans*) and bobcats (*Lynx rufus*), however, continued to use the crossing. The combination of a partially functional gate and frequent recreational use appear to be limiting the wildlife tunnel's use by large mammals such as mule deer and mountain lion as a wildlife crossing.

It is recommended that City staff coordinate with MCAS Miramar to develop a plan to remove bars from the wildlife tunnel while addressing recreational encroachment onto federal lands.

b. Oak Canyon Bridge

The Oak Canyon Bridge is a high bridge (approximately 20 meters tall) about 1.15 miles west of the Fortuna Staging Area. It spans Oak Canyon and provides a large undercrossing that is relatively isolated from MTRP entrances and trails (see Figure 2-9). Mule deer were observed to use this corridor; additionally, the corridor is likely used by mountain lion (WTI 2010). Due to the height and width of the undercrossing and the distance from major recreational uses, this wildlife crossing does not appear to be constrained, and no management actions are recommended.

c. Culverts A and B

Two small culverts undercrosss SR-52 between the Oak Canyon Bridge and Spring Canyon Bridge. These culverts were not evaluated under the WTI study in 2010. Their small diameter and great length make them unusable by wildlife to all but small mammals. No management actions are recommended for culverts A and B.

d. Spring Canyon Bridge

The Spring Canyon Bridge is another high bridge (approximately 30 meters tall) located approximately 0.5 mile from the Fortuna Staging Area. The Spring Canyon Bridge has a higher rate of recreational usage than other crossings, but the bridge height, large undercrossing, and abundant vegetation appear to provide a functional crossing. Mule deer were observed to use this corridor; and is likely used by mountain lion (WTI 2010). Therefore, this tunnel appears to be a functional wildlife corridor, and no management actions are recommended at this time.

e. Mast Culverts

Two adjacent pipe culverts under cross SR-52 approximately 0.1 mile north of East Fortuna Staging Area in the Fortuna Mountain area (see Figure 2-9). These culverts serve primarily to drain Little Sycamore Canyon to the north through an unnamed drainage into the San Diego River to the south. These culverts are used regularly by a variety of smaller wildlife to transit between Little Sycamore Canyon in the East Elliott area to the San Diego River flood plain within the Fortuna Mountain and Mission Gorge areas. At the time of the 2010 WTI study, exclusion fencing to the north and south of the SR-52 freeway near the culvert appeared to be compromised. This culvert serves as a functional crossing for smaller species such as desert cottontail (*Sylvilagus audubonii*), bobcat, and raccoon (*Procyon lotor*).

f. San Diego River Course

The San Diego River is vegetated with mature, native vegetation and flows into MTRP from the east via the City of Santee. The San Diego River meanders approximately 4 miles through MTRP and drains into a developed flood plain containing industrial and commercial uses approximately 12 miles upstream of the Pacific Ocean. The San Diego River within MTRP has marginal value as a regional, large mammal wildlife corridor (WTI 2010).

While the river channel habitat within MTRP is of relatively high quality, directly east (upstream) of the MTRP boundary the river floodplain is heavily constrained by urban development, contains a golf course, and suffers from dense weed infestation (i.e., giant reed [*Arundo donax*]), trash accumulation, and various homeless encampments. Although mule deer were observed using habitat east (outside) of the MTRP, it is unclear whether they can move via the San Diego River to available habitat east of MTRP. As these corridor constraints at the San Diego River course lie beyond the MTRP boundaries, no direct park management of the San Diego River course for the corridor use is included in this plan. That being said, the City of San Diego continues to actively manage City-owned lands along the river course and actively partners and collaborates with local and regional land managers to improve and maintain regional wildlife corridors along the San Diego River. These plans and partnerships include the approval of the San Diego River Park Master Plan (City of San Diego 2013) and continued coordination with the San Diego River Park Foundation and San Diego River Coalition.

3.0 Regulatory Framework

3.1 Multiple Species Conservation Program

The MSCP is a regional habitat conservation plan that addresses preservation of multiple species and natural vegetation communities within southwestern San Diego County. The MSCP provides a framework for preserving and protecting natural resources through mitigation of impacts to covered species and their habitats from direct, indirect, and cumulative impacts of future development on both public and private lands. The MSCP is implemented through the Final MSCP Plan (Ogden 1998), jurisdictional subarea plans such as the City MSCP Subarea Plan (City of San Diego 1997), and associated municipal codes which contain resource management requirements.

The MTRP NRMP includes Area Specific Management Directives required in MSCP Implementing Agreement Section 10.6.B, City's MSCP Subarea Plan Section 1.5.6, and Final MSCP Plan Section 6.3.

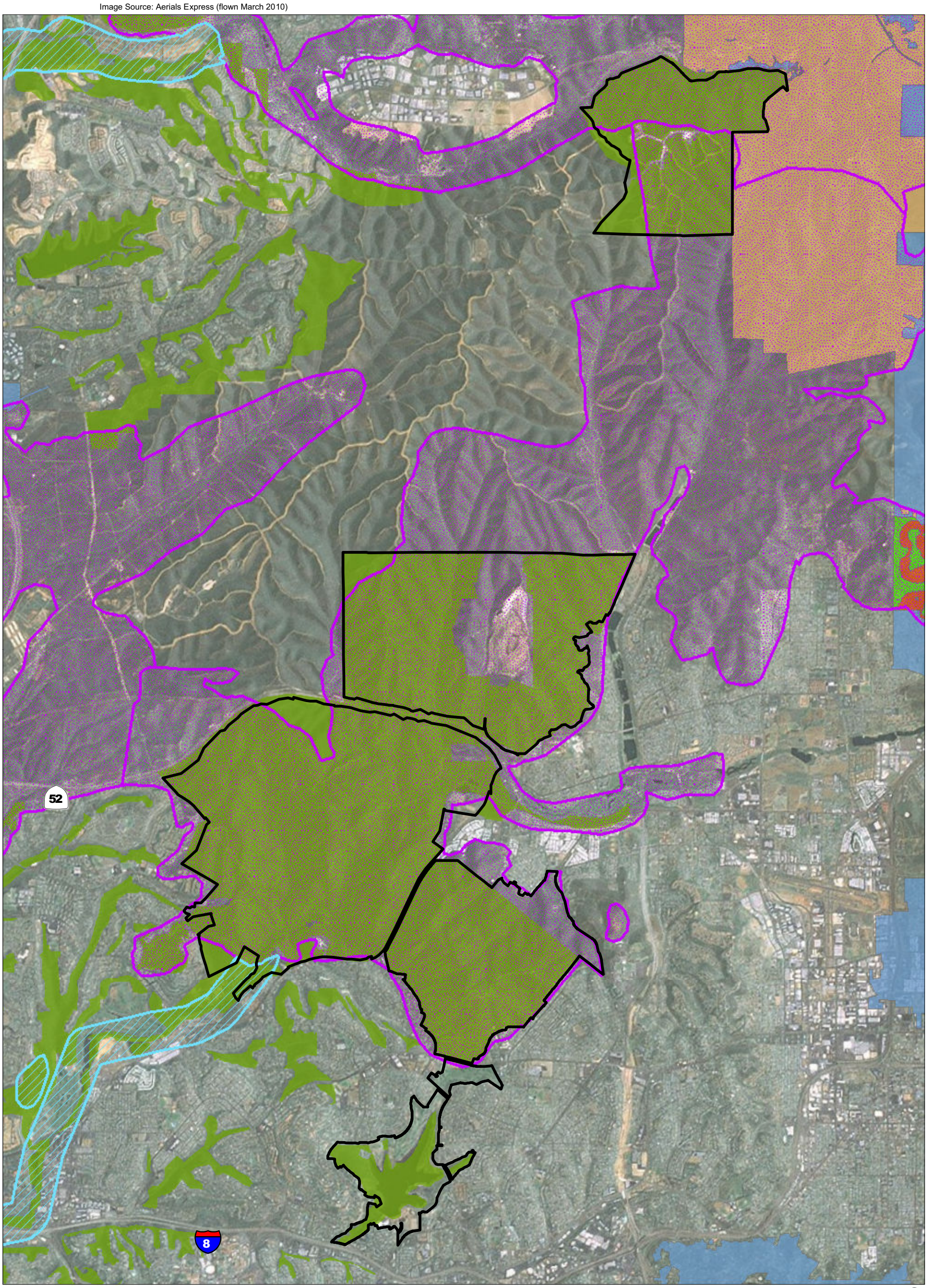
3.2 Multi-Habitat Planning Area Guidelines for MTRP

The MSCP's MHPA includes regional wildlife corridors and core biological areas that are targeted for conservation. These lands have been determined to provide the necessary habitat quality, quantity, and connectivity to sustain the unique biodiversity of the San Diego region, and sensitive biological resources under the City's Environmentally Sensitive Lands Regulation. Conditionally compatible uses within the MHPA include passive recreation, utility lines and roads, limited water facilities and essential public facilities, limited low-density residential use, brush management zone 2, and limited agriculture (MSCP Subarea Plan Section 1.4.1). The majority of lands at MTRP are located within the MHPA (Figure 3-1).

Section 1.5.2 of the City's MSCP Subarea Plan provides general management directives which apply to all areas within the MHPA. These general directives provide guidance on access and recreation within open space areas, including MTRP. Priority directives include:

- Install sufficient signage and barriers identifying access to the MHPA
- Locate trails, overlooks, and staging areas in least-sensitive areas in MHPA
- Avoid paving trails
- Minimize recreational trail widths
- Limit equestrian trails near sensitive resources
- Prohibit recreational off-road and cross county access to MHPA
- Remove homeless camps from habitat areas
- Regularly maintain equestrian trails to remove manure

Image Source: Aerials Express (flown March 2010)



Project Boundary

City of San Diego MHPA

Generalized Core and Linkage Areas (MSCP 1998)

Core Resources Areas

Habitat Linkages

County of SD MSCP Sub Area Plan

Pre-Approved Mitigation Area

Hardline Preserve

Take Authorized

Unincorporated Land in Metro-Lakeside-Jamul Segment

0 Miles 1

RECON

M:\JOBS3\5286\common_gis\fig3-1.mxd 10/3/2013

FIGURE 3-1

Project in Relation to MSCP Preserve Area

- Sections 1.2.2, 1.2.4, 1.5.6, and 1.5.8 of the City's Subarea Plan provide guidelines for MHPA compliance and specific management recommendations within MTRP. The following MHPA guidelines are relevant to park management within the lifespan of the NRMP. MHPA directive compliance responses are taken from both the MTRP NRMP and Master Plan Update (MPU).

Priority 1 (MSCP required directives):

1) Prepare an NRMP for the park to preserve and protect natural resources while encouraging public use and implementation of the Master Development Plan.

   - MPU: MSCP directive satisfied by implementation of MPU

   - NRMP: MSCP directive satisfied by the production of this document.

2) Maintain and clearly demarcate trails around the visitor center and other areas of high public use to minimize habitat destruction.

   - High-use trails surrounding the Visitor Center are currently demarcated with signage and maintained by MTRP staff.

   - MPU: General Facility Recommendations #6 — Maintain and repair existing signage on an as-needed basis.

   - MPU: General Habitat/Species Recommendations #3 — Construct wildlife-compatible fencing where necessary to protect sensitive species, habitats, and cultural/historic resources.

   - MPU: General Habitat/Species Recommendations #6 — Close unauthorized, user-created trails where appropriate to reduce habitat fragmentation and encroachment.

   - MPU: General Management Recommendations #13 — Develop and implement a public information and education program focused on the requirements of the MSCP relative to the management and use of different areas of the park.

3) Limit future equestrian trails to specified trails which minimize trail edge disturbances and are no greater than 25 percent gradient.

   - MPU: Proposed equestrian trails have been designed to minimize edge disturbances, and are no greater than 25 percent gradient.

   - MPU: Trails analysis discussion regarding both steep and fall-line trails.

   - MPU: Recommendations intro regarding MSCP requirements, safety, and sustainability as foundation for all recommendations.

- MPU: General Recreation Recommendations #1 — Comply with the City's current Trail Policies and Standards per the current *City of San Diego Consultants Guide to Park Design and Development* for all new and rerouted trails. Utilize other state and national sustainable trail guidelines as supplements to the City's Standards.

4) Seasonally restrict, if necessary, areas along the San Diego River, including riparian restoration areas (except along established trails), to prevent disturbance of breeding areas.

   - MPU: Recommendations introduction: As additional environmental surveys are conducted and management actions implemented, conflicts between resource management objectives and recreational use may arise. When these conflicts are identified, temporary, seasonal, or permanent closures of the recreational use may be required. If permanent closure is required, then an alternate location or route for the recreational use should be identified and implemented.

5) As envisioned in the Master Development Plan, revegetate areas with eroded or denuded slopes for slope stability and habitat enhancement.

   - NRMP: Since the most recent fire in 2003, large vegetated areas in MTRP denuded by fire and fire breaks created to contain fire have naturally been recolonized by native and exotic species. As a result, there are few large areas in the park where erosion poses a threat to slope stability, water quality, and/or sensitive habitats. One significant departure from this trend is continuing erosion and channel degradation in the West Sycamore area. Erosional flows emanating from a previously graded construction pad and a utility road may be impacting a population of willowy monardella (*Monardella vimnea*), an MSCP covered species. Plans to control erosion within the West Sycamore area are found in Section 4.4.4.4.

   - MPU: Habitat/Species Recommendations LM-H3, CM-H4, MG-H2, FM-H4, EE-H3, and WS-H5 — Conduct habitat restoration or revegetation activities within disturbed areas as needed.

6) Incorporate adequate setbacks into future plans to develop an equestrian center near the San Diego River in order to minimize impacts associated with brown-headed cowbird (*Molothrus ater*) parasitism. Establish a cowbird trapping program to minimize effects on the least Bell's vireo (*Vireo bellii pusillus*) and other song birds.

   - NRMP: The East Fortuna Staging Area was dedicated in 2004. A cowbird trapping program is on ongoing, and detailed in Section 4.5.4.3 and 4.5.4.4.

   - MPU: General Habitat/Species Recommendation #15 — Coordinate with regional efforts (U.S. Geological Survey Western Ecological Research Center) to refine and develop cowbird trapping optimization studies.

- MPU: General Habitat/Species Recommendation #16 — Plan and implement a cowbird trapping program along the San Diego River as deemed necessary by City biologists.

7) Minimize lighting for the campground, and collect garbage frequently to reduce nuisance wildlife (raccoons, opossums, skunks, and ravens).

   - MPU: Currently, lighting is minimized at the Kumeyaay campground. No permanent artificial lighting is used at the campground except at the entry station. Phase 2 of the campground has been cancelled, and is not a part of the MPU.

8) Establish signs to direct access and provide educational information at the periphery of sensitive resource areas and at points of access. Post signs to prohibit campfires, pets, firearms, and camping (except where allowed). Also post road signs to identify wildlife corridors to help reduce road kills.

   - NRMP: Access and exclusion signage has been proposed for new or rerouted trails adjacent to sensitive resources. For details see Sections 4.4.1.4, 4.4.2.4, 4.4.4.4, 4.5.1.4, and 4.5.2.4.

   - MPU: General Facility Recommendations #6 — Maintain and repair existing signage on an as-needed basis.

   - MPU: General Facility Recommendations #10 — Develop and incorporate additional interpretive signage along the major trails near interpretable features, rest stops, or overlooks.

   - MPU: General Facility Recommendations #13 — Continue to prohibit fires in the park to reduce fire danger, except within developed fire rings at the Kumeyaay Lake Campground, the East Fortuna Staging Area, and Lake Murray.

   - MPU: General Habitat/Species Recommendations #3 — Construct wildlife-compatible fencing where necessary to protect sensitive species, habitats, and cultural/historic resources.

   - MPU: General Habitat/Species Recommendations #6 — Close unauthorized, user-created trails where appropriate to reduce habitat fragmentation and encroachment.

   - MPU: General Management Recommendations #13 — Develop and implement a public information and education program focused on the requirements of the MSCP relative to the management and use of different areas of the park.

9) Protect the remaining populations of San Diego ambrosia (*Ambrosia pumila*) in the private property area immediately to the east of the Kumeyaay Lake campground.

Explore methods to protect and enhance the San Diego ambrosia population, such as transplanting to more remote areas or the use of split-rail fencing.

- NRMP: The population of San Diego ambrosia within MTRP has been the subject of previous and ongoing research designed to answer questions that will optimize future management. The latest science has been used to design goals and objectives for San Diego ambrosia in this document. In addition, a San Diego ambrosia transplantation site was identified within the park (Section 4.4.2.4).

- MPU: General Habitat/Species Recommendations #2 — Protect populations of identified sensitive plants including: San Diego ambrosia. Reroute existing and proposed trails to avoid impacts.

- MPU: General Habitat/Species Recommendations #7 — Implement the adopted MTRP *San Diego Ambrosia Management Plan*.

- MPU: General Habitat/Species Recommendations #20 — Construct or repair and maintain wildlife compatible exclusionary fencing and signage around populations of San Diego ambrosia as necessary.

- MPU: Park Area Specific Recommendations: Cowles Mountain CM-H3 — Allow the transplant of San Diego ambrosia from areas outside MTRP to the identified restoration site. Construct and maintain wildlife compatible exclusionary fencing and signage as required.

  Mission Gorge MG-H1 — Use the closed trail (MG-R11) area to expand the population of San Diego ambrosia.

  Mission Gorge MG-R11 — Close and restore the western Kwaay Paay access trail from the Old Mission Dam staging area to avoid direct conflicts with the protection of San Diego ambrosia.

  Fortuna Mountain FM-R44 — Close and restore an unauthorized, user-created trail within the Grasslands area that encroaches on San Diego ambrosia habitat.

10) (East Elliott) Implement programs to educate future adjacent landowners pursuant to the general adjacency management guidelines in Section 1.5.2.

- MPU: Park Area Planning Recommendation EE-P1 — Allow the development of private property holdings within East Elliott consistent with the community plan, MSCP requirements, and the Mission Trails Design District Ordinance.

11) Preserve 90 percent of the population of San Diego ambrosia at MTRP.

- NRMP: The population of San Diego ambrosia at MTRP is conserved. Future plans which may have impacted San Diego ambrosia (Phase II of the Kumeyaay campground development) have been removed from the Master Plan (Section 4.4.2).

12) Monitor areas with a history of invasive species, such as artichoke thistle (*Cynara cardunculus*), tamarisk (*Tamarix* sp.), and giant reed (*Arundo donax*) for re-invasion.

- NRMP: Giant reed and tamarisk are currently monitored within the San Diego River for reinvasion (Section 4.5.4.3). A growing population of artichoke thistle was observed within the West Sycamore area. Artichoke thistle control measures are detailed in Section 4.5.5.4.

- MPU: General Habitat/Species Recommendations #8 — Eradicate non-native invasive species from the park whenever feasible. Control species that cannot be eradicated on a regular basis to prevent significant spreading. Restore native species and habitats, including vernal pool species, throughout the park utilizing local seed/nursery stock when available.

- MPU: General Habitat/Species Recommendations #14 — Conduct surveys for giant reed biannually (or six months after major flood events) to identify, map, and remove small infestations.

- MPU: Park Area Specific Recommendation: West Sycamore WS-H1 — Plan and implement a removal and control program for artichoke thistle.

Priority 2

1) Reclaim active and abandoned mineral extraction as required by State's Surface Mining and Reclamation Act.

- MPU: General Planning Recommendation #12 - Continue to subject sand and gravel, and/or other mineral extraction sites adjacent to the Park, to Conditional Use Permit (CUP) procedures, and include Reclamation Plans as required by the State's Surface Mining and Reclamation Act of 1975. Such plans should include both operations and rehabilitation programs that are compatible with Park objectives.

4.0 Biological Resource Management

Mission Trails Regional Park is an urban, open space park, which is home to populations of rare and highly sensitive biological resources. MTRP is bounded on three sides by urban development. Its varied topography and vegetation, while supporting niches for biodiversity, is also a magnet for variety of recreational uses and encroaching urban edge effects. As such, the ability to specifically manage these resources in the context of these preserve-level threats is essential for the long-term viability of the park's role as a core biological area under the MSCP's MHPA. Biological resource monitoring and management would be conducted in accordance with the NRMP by qualified City and/or consulting biologists, non-governmental biological organizations, or other trained individuals.

4.1 Sensitive Biological Resources

4.1.1 Sensitive Species within MTRP

MTRP contains 23 sensitive plant species and 41 sensitive wildlife species, including seven plant species and 16 wildlife species covered by the MSCP (Tables 4-1 and 4-2). Details of MSCP covered sensitive species, their conditions of coverage, and document reference to ASMDs are presented in Table 4-3.

For purposes of this plan, species are considered to be sensitive if they are (1) listed by state or federal agencies as threatened or endangered or are proposed for listing; (2) on Rank 1B (considered endangered throughout its range), Rank 2 (considered endangered in California but more common elsewhere), or Rank 4 (plants of limited distribution-a watch list) of the California Native Plant Society's (CNPS) *Inventory of Rare and Endangered Vascular Plants of California* (Skinner and Pavlik 1994); or (3) considered rare, endangered, or threatened by the California Natural Diversity Database (CNDDB; State of California 2000a, 2000b) or the City of San Diego's Biology Guidelines (City of San Diego 2012).

Determination of the potential occurrence for listed, sensitive, or noteworthy plant species was based upon known ranges and habitat preferences for the species (Zeiner et al. 1988, 1990; State of California 2011a; CNPS 2001), species occurrence records from the CNDDB (State of California 2011b), the San Diego MSCP rare plant data, and species occurrence records from other sites in the vicinity of the survey area.

4.2 Threats to Biological Resources at MTRP

Although direct habitat loss due to development is not a threat within conserved lands, habitat degradation due to both natural and anthropogenic threats continues to affect native species and habitats at MTRP. Threats are organized and analyzed below based on their scale and, consequently, the ability of preserve-level management actions effectiveness. For example, although climate change may pose a regional threat to some sensitive species, individual

management actions taken at MTRP to combat climate change are not expected to be at the scale necessary to address the threat. In order to standardize terms for our discussion, direct threats and stressor nomenclature will follow the classification structure developed by SDMMP in support of a Management Strategic Plan (MSP).

TABLE 4-1
SENSITIVE PLANT SPECIES OBSERVED WITHIN MTRP

Common Name	Scientific Name	CNPS Rank	Federal/ State	MSCP Covered?
San Diego thornmint	*Acanthomintha ilicifolia*	1B.1	FT/CE	Yes
San Diego ambrosia	*Ambrosia pumila*	1B.1	FE	Yes
San Diego sagewort	*Artemisia palmeri*	4.2	-	No
San Diego sunflower	*Bahiopsis (=Viguiera) lacinata*	4.2	-	No
San Diego goldenstar	*Bloomeria clevelandii*	1B.1	-	Yes
Orcutt's brodiaea	*Brodiaea orcuttii*	1B.1	-	Yes
Peninsular spineflower	*Chorizanthe leptotheca*	4.2	-	No
Delicate clarkia	*Clarkia delicata*	1B.2	-	No
Summer holly	*Comarostaphylis diversifolia* ssp. *diversifolia*	1B.2	-	No
Western dichondra	*Dichondra occidentalis*	4.2	-	No
Variegated dudleya	*Dudleya variegata*	1B.2	-	Yes
Graceful tarplant	*Holocarpha virgata* ssp. *elongata*	4.2	-	No
Decumbent goldenbush	*Isocoma menziesii* var. *decumbens*	1B.2	-	No
San Diego marsh elder	*Iva hayesiana*	2.2	-	No
San Diego barrel cactus	*Ferocactus viridescens*	2.1	-	Yes
Robinson's pepper grass	*Lepidium virginicum* var. *robinsonii*	1B.2	-	No
Willowy monardella	*Monardella viminea*	1B.1	FE/CE	Yes
California adder's-tongue fern	*Ophioglossum californicum*	4.2	-	No
Chaparral ragwort	*Senecio aphanactis*	2.2	-	No
Purple stemodia	*Stemodia durantifolia*	2.1	-	No
San Diego County needlegrass	*Stipa* [=*Achnatherum*] *diegoensis*	4.2	-	No
Rush-like bristleweed	*Xanthisma juncea*	4.3	-	No

TABLE 4-2
SENSITIVE WILDLIFE SPECIES OBSERVED WITHIN MTRP

Common Name	Scientific Name	Federal/ State*	MSCP Covered?
Invertebrates			
San Diego fairy shrimp	*Branchinecta sandiegonensis*	FE	Yes
Hermes copper butterfly	*Lycaena hermes*	CSA	No
Quino checkerspot	*Euphydryas editha quino*	FE	No
Amphibians			
Western spadefoot toad	*Spea hammondii*	CSC	No
Reptiles			
Belding's orange-throated whiptail	*Aspidoscelis hyperthra beldingi*	CSC	Yes
Coastal western whiptail	*Aspidoscelis tigris stejnegeri*	CSA	No
Southern Pacific pond turtle	*Actinemys marmorata pallida*	CSC	Yes
Coronado skink	*Eumeces skiltonianus interparietalis*	CSC	No
San Diego horned lizard	*Phrynosoma coronatum blainvillii*	CSC	Yes
Coast patch-nosed snake	*Salvadora hexalepis virgultea*	CSC	No
Two-striped garter snake	*Thamnophis hammondi*	CSC	No
Northern red diamond rattlesnake	*Crotalus ruber*	CSC	No
Birds			
Cooper's hawk	*Accipiter cooperi*	CSA	Yes
Southern California rufous-crowned sparrow	*Aimophila ruficeps canescens*	CSC	Yes
Golden eagle	*Aquila chrysaetos canadensis*	CSC, CFP	Yes
Grasshopper sparrow	*Ammodramus savannarum*	CSC	No
Great blue heron	*Ardea herodias*	CSA	No
Coastal cactus wren	*Campylorhynchus brunneicapillus couesi*	CSC	Yes
Great egret	*Casmerodius albus*	CSA	No
Northern harrier	*Circus cyaneus*	CSC	Yes
Yellow warbler	*Dendroica petechia*	CSC	No
White-tailed kite	*Elanus leucurus*	CFP	No
Southwestern willow flycatcher	*Empidonax traillii extimus*	FE/SE	Yes
California horned lark	*Eremophila alpestris actia*	CSC	No
Peregrine falcon	*Falco peregrinus anatum*	SE, CFP	Yes
Yellow-breasted chat	*Icteria virens*	CSC	No
Black-crowned night heron	*Nycticorax nycticorax*	CSA	No
Double-crested cormorant	*Phalacrocorax auritus albociliatus*	CSC	No
California gnatcatcher	*Polioptila californica californica*	FT, CSC	Yes
Western bluebird	*Sialia mexicana occidentalis*	-	Yes
Light-footed clapper rail	*Rallus longirostris levipes*	FE/SE, CFP	Yes
Least Bell's vireo	*Vireo bellii pusillus*	FE/SE	Yes
Mammals			
Dulzura California pocket mouse	*Chaetodipus californicus femoralis*	CSC	No
Northwestern San Diego pocket mouse	*Chaetodipus fallax fallax*	CSC	No
Western mastiff bat	*Eumops perotis californicus*	CSC	No
Western red bat	*Lasiurus blossevillii*	CSC	No
San Diego black-tailed jackrabbit	*Lepus californicus bennettii*	CSC	No
Southern mule deer	*Odocoileus hemionus fuliginata*	-	Yes
Mountain lion	*Puma concolor*	CFP	Yes
Pocketed free-tailed bat	*Nyctinomops femorosacca*	CSC	No
Big free-tailed bat	*Nyctinomops macrotis*	CSC	No

*****Federal/State
FE = Federally listed endangered
FT = Federally listed threatened
SE = State listed endangered
CSC = California Department of Fish and Game species of special concern
CSA = California Department of Fish and Game Special Animal
CFP = California fully protected species

TABLE 4-3
MSCP COVERED SPECIES, REQUIRED AREA SPECIFIC MANAGEMENT DIRECTIVES (ASMDs), AND ASSOCIATED SECTIONS WITHIN THE MTRP NRMP

Common name	Scientific name	Required ASMD*	Corresponding NRMP Section
San Diego thornmint	*Acanthomintha ilicifolia*	- Specific measures to protect against detrimental edge effects	4.4.1 4.5.3
San Diego ambrosia	*Ambrosia pumila*	- Monitoring of transplanted populations - Specific measures to protect against detrimental edge effects	4.4.2
San Diego goldenstar	*Bloomeria clevelandii*	- Specific measures to protect against detrimental edge effects	4.5.2 4.5.3
Orcutt's brodiaea	*Brodiaea orcuttii*	- Specific measures to protect against detrimental edge effects	4.5.4
Variegated dudleya	*Dudleya variegata*	- Specific measures to protect against detrimental edge effects	4.4.3 4.5.3
San Diego barrel cactus	*Ferocactus viridescens*	- Specific measures to protect against detrimental edge effects - Specific measures to protect against unauthorized collection - Fire management	4.5.2 4.5.5
Willowy monardella	*Monardella viminea*	- Specific measures to protect against detrimental edge effects	4.4.4 4.5.4
Belding's orange-throated whiptail	*Aspidoscelis hyperthra beldingi*	- Specific measures to protect against detrimental edge effects	4.5.3 4.5.4 4.5.5
San Diego horned lizard	*Phrynosoma coronatum blainvillii*	- Specific measures to protect against detrimental edge effects - Measures to maintain native ant populations	4.5.2
Cooper's hawk	*Accipiter cooperi*	- 300 foot impact avoidance of active nests - Minimization of disturbance of oak woodlands and oak riparian forests	4.5.4
Southern California rufous-crowned sparrow	*Aimophila ruficeps canescens*	- Maintenance of dynamic processes, such as fire, to perpetuate some open phases of coastal sage with herbaceous components	4.5.2 4.5.3 4.3.5
Golden eagle	*Aquila chrysaetos canadensis*	- 4000 foot impact avoidance of active nests within preserve lands - Monitoring of nest sites to determine use/success	4.5.1
Coastal cactus wren	*Campylorhynchus brunneicapillus couesi*	- Restoration of maritime succulent scrub , cactus patches - Active/adaptive management of cactus wren habitat - Monitoring of populations within preserves - Measures to protect against detrimental edge effects	4.4.5 4.5.5

TABLE 4-3
MSCP COVERED SPECIES, REQUIRED AREA SPECIFIC MANAGEMENT DIRECTIVES (ASMDs), AND ASSOCIATED SECTIONS WITHIN THE MTRP NRMP
(continued)

Common name	Scientific name	Required ASMD*	Corresponding NRMP Section
Northern harrier	*Circus cyaneus*	- Manage agricultural and disturbed lands within 4 miles of nesting habitat - Roosting impact avoidance area (900 feet or maximum possible within preserve)	No history of species nesting at MTRP
Southwestern willow flycatcher	*Empidonax traillii extimus*	- Measures to provide appropriate successional habitat and upland habitat - Measures to provide appropriate cowbird control - Measures to protect against detrimental edge effects	4.5.4
Peregrine falcon	*Falco peregrinus anatum*	- None	-
California gnatcatcher	*Polioptila californica californica*	- Specific measures to protect against detrimental edge effects - Minimize disturbance during nesting period - Fire protection measure to reduce the potential for habitat degredation - Measures to maintain or improve habitat quality	4.5.3 4.5.5
Western bluebird	*Sialia mexicana occidentalis*	- None	-
Light-footed clapper rail	*Rallus longirostris levipes*	- Active management of wetlands to ensure healthy saltmarsh habitat - Specific measures to protect against detrimental edge effects	4.5.4
Least Bell's vireo	*Vireo bellii pusillus*	- Measures to provide appropriate successional habitat and upland habitat - Measures to provide appropriate cowbird control - Measures to protect against detrimental edge effects	4.5.4
Southern mule deer	*Odocoileus hemionus fuliginata*	- None	-
Mountain lion	*Puma concolor*	- None	-

* Taken from Table 3-5 in Final MSCP Plan (1998)

4.2.1 Preserve-level Threats

Preserve-level threats are those which MTRP managers have the ability, jurisdiction, and budget to effectively address; therefore, the resource management actions recommended here focus on preserve-level threat management. The following are brief descriptions of preserve-wide threats to sensitive species and habitats at MTRP.

4.2.1.1 Human Use of Preserves

Recreational uses can impact natural resources within MTRP through erosion, habitat fragmentation, trampling, and the invasion of non-native plant species associated with trail building and their use. Recreational use stressors can differ in intensity and extent depending on whether use is authorized or unauthorized.

Current recreational uses at MTRP include:

- Mountain biking
- Rock climbing
- Horseback riding
- Hiking
- Running (group events and individual runners)
- Birding
- Geocaching

Trail-associated recreation creates long linear impacts with relatively small widths. Trail widening and migration may occur as a result of group events where participants crowd trails. Impacts include:

- Soil disturbance especially during off-trail use and/or when the substrate is saturated
- Trampling damage to plant material
- Compacted soils which may inhibit root growth from adjacent vegetation and/or seedling recruitment
- Introduction vector for invasive plant species (such as weed seeds transported via dirt clods in bike treads or weed seeds found in horse feces)
- Significant negative effects on wildlife corridors, especially when recreation occurs at night when many large mammals are active
- Local fragmentation of the distribution of species sensitive to edge effects, the presence of humans, and/or associated domestic animals and recreational equipment.

Educating visitors about proper trail etiquette, designing trails to avoid sensitive resources, limiting authorized trail access to daylight hours, having clearly posted regulations, and having a

clear patrol and violation enforcement strategy can help reduce some of the risks posed by recreation. MTRP currently has a signage and user education system in place within the Lake Murray, Cowles Mountain, Mission Gorge, West Sycamore, and Fortuna Mountain areas. However, the East Elliott area is not fully owned by the City and, consequently, does not have an active signage or user education program installed. Signage and user education within this area is being addressed in the MPU.

4.2.1.2 Invasive/Exotic Species

Exotic species threaten natural resources within MTRP through direct competition with native species, habitat degradation, and the introduction of disease.

a. Plants

Invasive plant species have the potential to displace and dominate native species, hybridize with native plant species, provide food and habitat for invasive animal species, and disturb normal ecosystem functions such as nutrient cycling, wetland hydrology, sedimentation, fire frequency, and erosion (Brossard et al. 2000). Disturbances, such as fire, mammal burrowing, recreational activities, and development adjacent to natural open space, create opportunities for non-native species to invade and establish themselves. MTRP contains a matrix of recreational trails, maintenance roads, and utility right-of-ways and, consequently, opportunities for the introduction and establishment of invasive species. Presence and density invasive species at MTRP differs between species and disturbance history. For example, during weed surveys, exotic annual grasses were observed at a landscape scale in areas of MTRP recovering from recent burns, while within intact vegetation communities it was observed only along trail and utility right-of-way margins. Invasive plants observed within MTRP are listed in Appendix A-A.

b. Animals

Populations of native plants and animals can be significantly disrupted by the introduction of exotic wildlife and domestic animals into intact and disturbed habitats at MTRP. Exotic wildlife and domestic animals can threaten multiple species of native flora and fauna through direct predation, competition for resources, the introduction of disease, and eutrophication of water sources. Examples of exotic wildlife species observed at MTRP include brown-headed cowbirds, black rats (*Rattus rattus*), bullfrogs (*Rana catesbeiana*), and Argentine ants (*Linepithema humile*). Domestic animals, such as dogs, cats, and horses, have been shown to be linked with increased weed cover and density (via nutrients and seeds found in feces) (Bureau of Land Management 2012).

4.2.1.3 Altered Fire Regime

Southern California plant and wildlife species have evolved strategies to cope with fire, and some even require fire to complete part of their life cycle (Keeley 2008). However, with the increase of human activities, fire frequency has increased in some areas within MTRP. This has

altered the plant community structure at MTRP through species loss and type conversion (especially the eastern portion of the East Elliott area). The secondary effects of frequent fire are increased erosion, increased sediment load, alteration of hydrology, and invasion of exotic plant species. For an in depth discussion of fire and fire management at MTRP, see Appendix A-D.

4.2.1.4 Altered Hydrology

Hydrology plays a major role in the formation and/or sustainability of many habitats. When a watershed is significantly altered, peak flow rates and flow duration can change the overall character of the stream bed and the associated vegetation community (Poff et al. 1997). Increased hydrological flows due to very high rainfall (2005) after the Cedar fire (2003) have been implicated in the destruction of habitat for a population of willowy monardella within the West Sycamore area of MTRP (B. Miller. pers. comm.). Natural and altered sedimentation due to hydrologic flows may eventually impact historical structures at MTRP, including the Old Mission Dam.

4.2.1.5 Habitat Fragmentation

Habitat fragmentation limits habitat areas, isolates populations, reduces dispersal and gene flow, and degrades habitat quality through edge effects. When species are isolated by physical barriers such as roads, trails, urban areas, and utility right-of-ways, the ability of meta-populations to interbreed or cross-pollinate is reduced, leading to lower genetic variability which puts them at risk of localized extinction.

Regional habitat fragmentation at MTRP is managed by the maintenance of linkages to adjacent biological core areas. Preserve-level fragmentation (caused by MTRP roads, facilities, trails, and utility right-of-ways) at MTRP is managed by minimization of local fragmentation stressors (i.e., the reduction of trail redundancies and rerouting of existing trails away from habitats which are sensitive to local fragmentation and associated edge effects).

4.2.1.6 Pests and Disease

Several regional infestations have the potential to impact natural resources at MTRP and require preserve level management. The goldspotted oak borer beetle (*Agrilus coxalis*) was accidentally introduced to Riverside and San Diego counties in the late 1990s and has since caused extensive damage to local red oaks, including coast live oak (*Quercus agrifolia*) and black oak (Q*uercus kelloggii*) (University of California Integrated Pest Management 2013). The transport of infected firewood has been implicated in spreading the pest from disparate locations. In order to slow the spread of the goldspotted oak borer beetle, the Kumeyaay camp ground at MTRP restricts the importation of firewood by campers. In addition, invasive shot hole borer species were detected within the City of San Diego in 2014 and has caused significant destruction to native riparian areas throughout the County. The City coordinates with other land managers and regional research entities to utilize the best available science to monitor and

address this threat to MTRP. West Nile virus is a mosquito-borne pathogen that can cause morbidity and mortality in birds, small mammals, horses, and humans (Center for Disease Control 2012). The disease was first observed in the western United States in 2003, and has been found in birds in San Diego County every year since (County of San Diego 2014). In order to combat West Nile virus (and other mosquito borne disease), the County of San Diego vector control program currently conducts aerial applications of mosquito larvicides to mosquito habitat throughout the county (including Kumeyaay Lake within MTRP) every three to four weeks.

4.2.1.7 Sycamore Canyon Landfill expansion

In 2012 the San Diego City Council approved the expansion of the landfill site by 26 acres, totaling of 517 acres of landfill planning designation in the center of the East Elliott area. The Sycamore canyon landfill is located on parcels that have been excluded, or white holed, from the MHPA and are recognized as “landfill” by the City of San Diego MSCP subarea plan. Although the direct impact footprint landfill expansion is excluded from MTRP plan area, the increase in geographic proximity of landfill activities to preserved areas within MTRP may increase edge effect encroachment onto MTRP lands. The landfill expansion environmental impacts have been analyzed under CEQA and been permitted under a City Site Development Permit, which includes provisions for mitigation and long-term management requirements in accordance with the Cities Environmentally Sensitive Lands section of the Municipal Code. Upon closure, the landfill will be revegetated with native plant species selected to integrate with adjacent habitats, converted to open space, and incorporated into MTRP pursuant to future City action (City of San Diego 2012b).

4.2.2 Region-wide Threats

Region-wide threats are those which occur at large spatial scales and, though they may be identified as significant contributors to overall population decline, are outside of the geographic and jurisdictional scope of MTRP managers. Management of region-wide threats requires region-wide actions, and will not be a significant portion of the recommendations of this document. An MSP is being developed by the SDMMP to identify and prioritize countywide threats to open space areas in San Diego..

4.2.2.1 Habitat Loss

Habitat loss occurs when an area utilized by a species becomes unsuitable for the species’ use. Habitat loss can come in the form of new permanent impacts (residential development, utilities, roads, trails) or via the degradation of available habitat by increased external stressors (invasive species, noise, erosion, etc.). Lands within MTRP are considered to be either fully preserved within City-owned park lands or to have limited development potential on private parcels in East Elliott within the MHPA. Private land wholly within the MHPA is allowed only up to 25 percent development in the least sensitive area per the City’s MSCP Subarea Plan. Should more than 25 percent development be desired, an MHPA boundary line adjustment may be proposed. The City’s MSCP Subarea Plan states that adjustments to the MHPA boundary line are permitted

without the need to amend the City's Subarea Plan, provided the boundary adjustment results in an area of equivalent or higher biological value. To meet this standard, the area proposed for addition to the MHPA must meet the six functional equivalency criteria set forth in Section 5.4.2 of the Final MSCP Subarea Plan. Habitat degradation contributes to habitat loss at MTRP, but will be managed under specific stressors (see Section 4.1.2.1).

4.2.2.2 Urban Runoff

Water pollution has potential to negatively affect wildlife and riparian plant species (Hogan 2007). Eutrophication is the gradual, abnormal increase in nutrients such as nitrogen and phosphorus in water from sources such as fecal matter and other constituents of urban runoff (National Academy of Sciences [NAS] 1969). The excess nutrient causes algal blooms, which can deprive the water of oxygen, causing fish die-offs and altering the water's pH balance (NAS 1969). In addition to eutrophication, urban runoff has the potential to contain other contaminants such as harmful bacteria, pesticides, and herbicides. Urban runoff is not known to be a significant threat to habitats at MTRP. Urban runoff is managed under Jurisdictional Runoff Management Plan (JRMPs) and the Clean Water Act (CWA) Sections 404 and 401 administered by the U.S. Army Corps of Engineers (USACE) and the State Regional Water Quality Control Board (RWQCB).

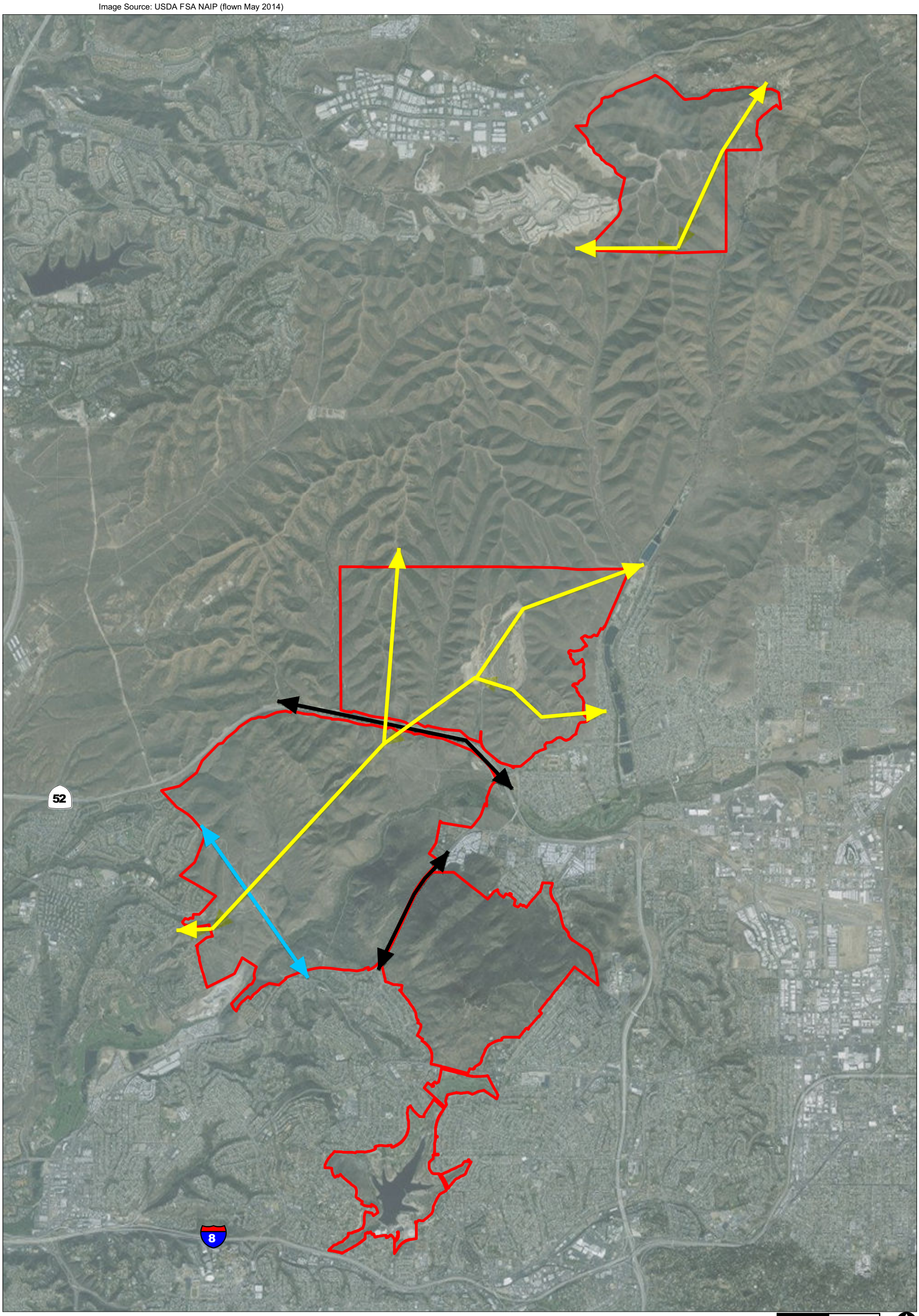
4.2.2.3 Drought

Drought may exacerbate hydrological problems, such as flow restriction and water pollution (McDowell et al. 2008), decrease vegetation cover, stress wetland habitats, and increase fire risk. The upland communities found within MTRP are adapted to moderate drought stress due to our arid climate, but severe and continued drought conditions may lead to a reduction in quality of wetland and upland habitats.

4.2.2.4 Utility and Service Lines

There are several linear infrastructure right-of-ways which cross through MTRP, including San Diego Gas & Electric (SDG&E) transmission lines, San Diego County Water Authority (SDCWA) pipelines, sewer lines, water lines, and the SR-52 expressway (Figure 4-1). In addition to existing structures (electric towers and pipe access), utility right-of-way impacts often include maintained access roads and maintenance staging areas. Both utilities with easements within MTRP (SDG&E and SDCWA) have developed independent Natural Community Conservation Plans to provide long-term conservation of habitats and species, including land set aside for the protection of plants and animals (SDG&E 1995; SDCWA and U.S. Fish and Wildlife Service [USFWS] 2010). The conservation efforts of SDG&E and SDCWA are independent of MTRP and the City MSCP Subarea Plan, but generally overlap in their conservation goals.

Image Source: USDA FSA NAIP (flown May 2014)



Project Boundary

Electrical (SDG&E)

Transportation (Highways)

Water (SDCWA)

RECON

M:\JOBS3\5286\common_gis\fig4-01.mxd 4/14/2016

FIGURE 4-1

Approximate Location of Utility and Service Lines within Mission Trails Regional Park

4.3 Adaptive Management

An adaptive management approach will be implemented as part of this Plan. Adaptive management is a systematic process for managing in the face of uncertainty (i.e., when best management practices are lacking) and continually improving management policies and practices by learning from the outcomes of operational procedures. If operational procedures are not meeting management goals, methods are adjusted until they are achieved. Adaptive management of MTRP will consist of the following key elements: establishment of management goals, identification of threats, assessment and selecting of techniques, implementation of management actions, monitoring/assessment of management action effects, and periodic review of management goals and restoration methods.

4.3.1 Management Action Tool Kit

Resource managers at MTRP have a limited but significant array of management action to treat threats to natural resources within the park. These include, but are not limited to, trail closure, trail reroutes, invasive species control, habitat restoration, and ranger patrols.

4.3.1.1 Trail Closure

Both authorized and unauthorized trails can be closed in order to treat direct and indirect threats to natural resources at MTRP. Currently unauthorized trail closure is conducted by ranger staff and volunteer groups within the park. After being identified, unauthorized trails are closed by a variety of methods including: blocking access points with via brush and/or fencing, installation of exclusionary signage, and habitat restoration.

4.3.1.2 Trail Reroutes

In cases where previously authorized trails allow access too close to identified natural resources with sensitivity to edge effects and/or do not conform with current City trail guidance, trail alignments may be rerouted. Trail reroutes are genereally paired directly with trail closure and subsequent habitat restoration.

4.3.1.3 Invasive Species Control

Control of invasive species may include herbicide application, mechanical control, hand pulling, and/or trapping actions. Due to the landscape level distribution of some invasive species within MTRP, control efforts for this plan were prioritized depending on their ability to improve specific sensitive species and/or vegetation type habitat quality and/or those part of regional weed control efforts.

4.3.1.4 Habitat Restoration

Habitat restoration is the active intervention in repairing degraded, damaged, or destroyed ecosystems and habitats. Habitat restoration can be conducted to A) increase the acreage of available habitat of a sensitive species, B) repair fragmentation effect on extant closed trails, c) restore trail width in areas where trails have expanded and migrated over time.

4.3.1.5 Ranger Patrols

MTRP utilizes a flexible, adaptive enforcement strategy, allowing rangers to respond to unauthorized access threats within the park. Supervising rangers distribute ranger patrols within MTRP based on needs. Patrols and increased enforcement actions are dispatched based on multiple factors including, but not limited to:

- Unauthorized trail construction
- Evidence of night-time park use
- Evidence of repeat unauthorized use patterns
- Unauthorized off-trail recreational uses
- Exclusionary signage and/or signage vandalism
- Litter accumulation
- Impacts to specific biological or cultural resources
- User complaints

MTRP Park Rangers have citation authority (infractions and misdemeanors) via the City of San Diego municipal code. Rangers currently use a progressive enforcement strategy where, for common violations, first contact is met with a warning and educational discussion. Second contacts and/or flagrant offenders are cited. Park Rangers track offenders and offences internally. In order to meet the increasing need of enforcement within MTRP, the City of San Diego Parks and Recreation has hired new Park Ranger staff for MTRP to increase patrol flexibility.

4.3.2 Management Prioritization

A prioritization system for management actions was developed for species and habitats at MTRP using survey data, information gleaned from a thorough literature review, and the combined knowledge of City biologists and rangers, members of the Institute of Ecological Monitoring and Management at San Diego State University (SDSU), and RECON biologists (Tables 4-4 and 4-5).

4.3.2.1 Management Guilds

Many sensitive species and vegetation types at MTRP share similar edaphic and geographic habitat requirements, are subject to analogous threat types, and have the potential to benefit from comparable management actions. For example, trail closures/reroutes barring recreational

trail users from fragile biologic crusts in East Elliott may benefit several sensitive plants associated with this niche type. Selected sensitive species with similar threat types were placed into groups ("Management Guilds") defined by geography and/or dominant vegetation type. Management guilds will allow the modeling of adaptive management actions across multiple species and habitat types simultaneously.

The sensitive species and management guilds within MTRP were prioritized using the following criteria:

- Regional threat level (spatial and temporal)
- Preserve threat level
- Ability to effectively manage threats at MTRP

TABLE 4-4
PRIORITY SENSITIVE SPECIES AT MTRP

Common Name	Species
San Diego thornmint	*Acanthomintha ilicifolia*
San Diego ambrosia	*Ambrosia pumila*
variegated dudleya	*Dudleya variegata*
willowy monardella	*Monardella viminea*
coastal cactus wren	*Campylorhynchus brunneicapillus*

TABLE 4-5
PRIORITY MANAGEMENT GUILDS AT MTRP

Management Guild
Tierrasanta Clay Ridge
East Elliott Clay Ridgelines
Riparian Woodlands
Cliffs and Rock Outcrops
Artemisia-dominated Coastal Sage Scrub

A list of sensitive species observed at MTRP, but not prioritized for single-species management, is provided in Appendix A-C. Rationales for not selecting individual species for prioritization included low threat levels within MTRP, regional threats not actionable at preserve-level, and/or species threats were covered by actions under a selected management guild. For description of management guilds and their constituent sensitive species, see Section 4.5.

4.4 Priority Species Management at MTRP

The following is an analysis of threats, conceptual modeling, and ASMDs for prioritized sensitive species management at MTRP. As the ASMDs are specific to threats at MTRP, management recommendations will focus on preserve-level threats. Management of regional threats are addressed in the Management Strategic Plan for Conserved Lands in Western San Diego County (SDMMP 2013).

4.4.1 San Diego Thornmint (*Acanthomintha ilicifolia*)

4.4.1.1 Background

San Diego thornmint was listed by the state of California as an endangered species in 1982 (State of California 2011c) and federally listed as a threatened species in 1998 (USFWS 1998). It is a narrow endemic species covered under the MSCP and a CNPS (2001) Rank 1B.1 species. This aromatic annual in the mint family (Lamiaceae) grows about six inches tall and bears white and rose-colored flowers in April and May (Hickman 1993; Photograph 4-1). It usually occurs in openings in chaparral, coastal sage scrub, native grassland communities, and near vernal pools (CNPS 2001). It is restricted to heavy clay soils, either of gabbroic parent material or derived from calcareous marine sediments (USFWS 1998), particularly Las Posas or San Miguel–Exchequer soils (Reiser 2001). It is often found at sites with native spring annuals, bulbiferous perennials, and herbaceous species (Reiser 2001). At MTRP, San Diego thornmint occurs on friable clay lenses within coastal sage scrub and chaparral vegetation (Photograph 4-2).

As San Diego thornmint is an herbaceous annual, population sizes can fluctuate significantly year-to-year depending on environmental conditions (USFWS 2009). A pollination study completed in 2009 observed that individual plants were visited relatively infrequently by potential pollinators. Those San Diego thornmint flowers that received insect visits appeared to be pollinated by small (> 6 millimeters) generalist flying insects, bees being the most effective (Klein 2009). Experiments have shown that the reproductive output of San Diego thornmint can increase significantly when weed species have been removed (USFWS 2009). Management actions at MTRP which encourage pollinator floral access (dethatching, weed removal) are recommended (see Section 4.4.1.4).

Photograph 4-1: San Diego thornmint within a clay lens at MTRP.

Photograph 4-2: Degraded San Diego thornmint habitat on friable clay lens within the Fortuna Mountain sub-area within MTRP. Note invasion of purple false brome (light green grass between shrubs).

San Diego thornmint has been recorded from the city of Oceanside in the north, east to Ramona, southeast to Jamul, and southward to San Quentin in Baja California (USFWS 2009). The San Diego thornmint population at MTRP (CNDDB Elemental Occurrence [EO] 33 and 34) is one of 88 known populations, 55 of which are conserved, and which are estimated to include a total of 150,000 – 170, 000 individuals (USFWS 2009). Due to its size, MTRP site is not designated as a 'major' population (greater than 1,000 individuals) by the MSCP (USFWS and California Department of Fish and Wildlife [CDFW] 1996). Although small, the site remains important as a geographically distinct population with potentially unique genetic diversity.

4.4.1.2 Presence in MTRP

A total of nine populations of San Diego thornmint have been observed in MTRP (Figure 4-2). Of these, eight populations (B, C, D, E, F, G, H, and I) burned in wildfires in 2003. One population (I) burned in both 1983 and 2003. Population A is located within an area with no recorded burn history. Although San Diego thornmint populations experience significant interannual variation at many sites (USFWS 2009), the CNDDB's Elemental Occurrence No. 33 (population D) at MTRP has remained relatively stable over nearly 30 years (Table 4-6).

TABLE 4-6
SIZE OF POPULATION D OVER TIME

Year	Census/Estimate	Surveyor
1986	300	Garrett
1994	300	McMillan and Stone
2001	354	City of San Diego
2002	0	Kelly and volunteers
2003	296	Kelly and volunteers
2004	21	Kelly and volunteers
2005	120	Kelly and volunteers
2006	107	City of San Diego
2008	250	City of San Diego
2009	150	City of San Diego
2010	618	City of San Diego/Kelly and volunteers
2011	302	City of San Diego
2012	598	City of San Diego
2013	737	City of San Diego
2014	21	City of San Diego
2015	510	City of San Diego
2016	105	City of San Diego

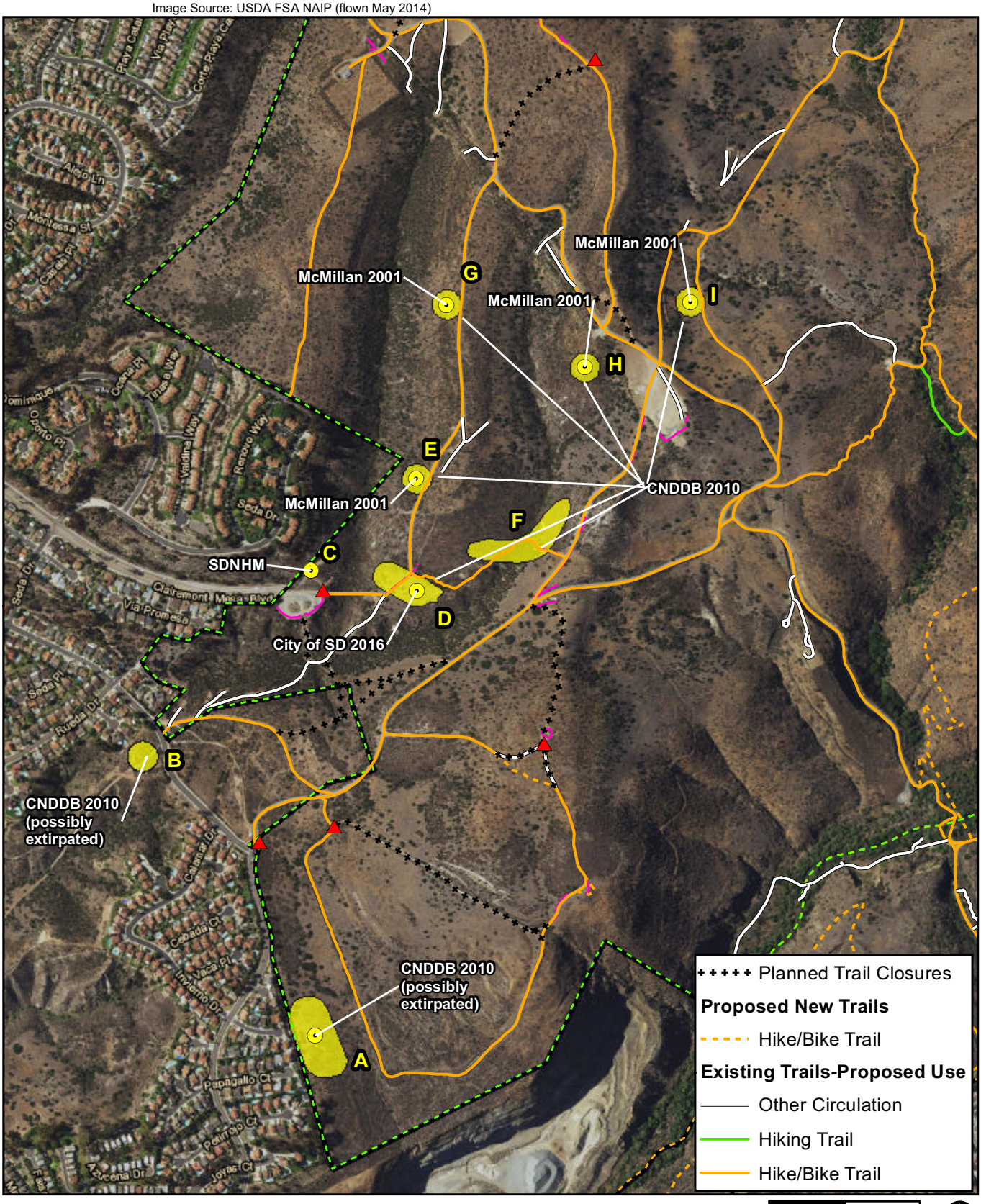


FIGURE 4-2

San Diego Thornmint *(Acanthomintha ilicifolia)*
Detected Occurrences: Mission Trails Regional Park

RECON

M:\JOBS3\5286\common_gis\fig4-02.mxd 8/2/2016

Populations A and B are sites which formerly contained vigorous populations of San Diego thornmint (Table 4-7). Surveys within populations A and B in 2010 were negative and noted extensive habitat destruction and degradation. The surveyor noted that the populations were "possibly extirpated." Confirmation of extirpation of vegetative structures and seed bank of San Diego thornmint at these sites is recommended.

TABLE 4-7
SIZE OF POPULATIONS A AND B OVER TIME

Year	Population A	Population B
1980	400-600	-
1986	-	200
1994	200-300	-
2010	0	0

A small section of the West Sycamore area contains available habitat and is adjacent to known San Diego thornmint locations within Sycamore Canyon. This area has a moderate to high potential for additional populations of San Diego thornmint to occur.

4.4.1.3 Anthropogenic Threats at MTRP

a. Invasive Non-native Species

Non-natives species present the highest priority threat to all extant populations of San Diego thornmint, including those at MTRP (USFWS 2009). For example, false brome (*Brachypodium distachyon*) at Area D has increased from 15 percent cover in 2006 to 80 percent cover in 2010 and 2012 (Figure 4-3) in a pattern that has been documented at San Diego thornmint sites throughout San Diego County. The City initiated a false brome eradication program in 2015. Experiments conducted in controlled and natural environments have shown that biomass and seed production of San Diego thornmint are negatively affected by the density and proximity of competitors, both grasses and forbs (Bauder and Sakrison 1999). The variation in level of effect has been related to growth habit, with tall, dense species such as wild oats (*Avena* sp.) more effectively limiting access to nutrients, light, water, and space (Bauder and Sakrison 1999). While limiting or removing competition in controlled or natural environments significantly increased fecundity or associated biomass factors, weeding in the field has not been shown to increase seedling survivorship except during above-average rainfall years.

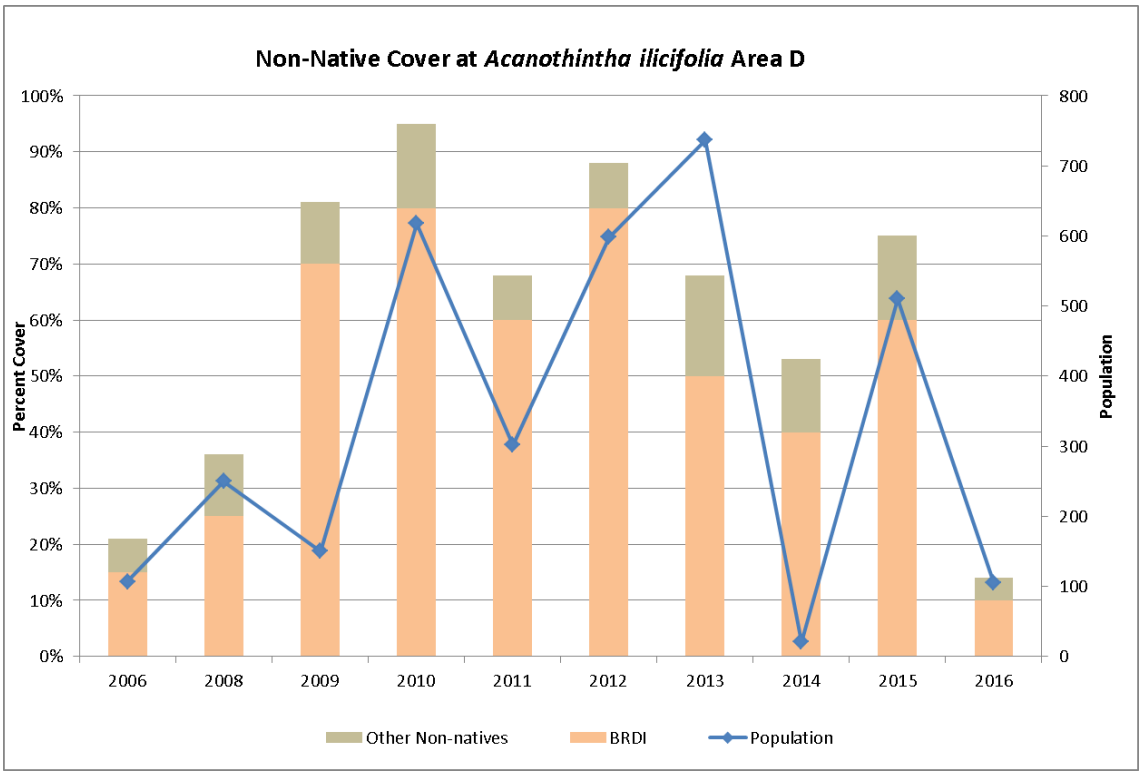


Figure 4-3: Comparison of purple false brome (BRDI) and other non-native species cover at Area D over time

In addition to direct competition for resources, large, dense weed stands may inhibit potential pollinators from gaining access to flowers and thereby decrease fecundity (Bauder and Sakrison 1997, 1999). Resulting thatch may also limit the patches of bare ground required by native pollinators for nesting, limiting the population of potential pollinators. San Diego thornmint flowers appear to be pollinated during infrequent visits from small (>6 millimeters) generalist flying insects, with bees more effective as successful pollinators (Klein 2009).

b. Recreational Activities – Trampling

San Diego thornmint is sensitive to direct mortality from non-motorized recreation activities, including trampling from off-trail hiking and mountain biking (USFWS 2009). Informational and directional signs and fencing effectively limit trampling from the trail to the west in Area D based on a review of routine patrols and annual monitoring surveys (see Figure 4-2).

c. Fire and Fire Suppression

According to fire mapping of the area, eight populations (B, C, D, E, F, G, H, and I) of San Diego thornmint at MTRP burned in wildfires in 2003. One population (I) of San Diego thornmint burned in both 1981 and 2003 (see Figure 4-2). Area D experienced limited recruitment during the 2004 growing season, with both the October 2003 fire and below average rainfall (5.18 inches) as potential drivers for population size. For example, during the very low rainfall year of 2002, thornmint did not germinate at Area D (see Table 4-6). Studies indicate that the thornmint

plants can produce up to 115 seeds per plant in good conditions, and that older seeds (>1 year old) germinate under a wider range of conditions (Bauder and Sakrison 1997), but the precise effects of fire on the seedbank are unknown.

4.4.1.4 Management Goals and Objectives

Goal: Maintain and enhance known populations of San Diego thornmint at MTRP (Figure 4-4).

Objective 1: Remove Exotic Weeds within Occupied San Diego Thornmint Habitat

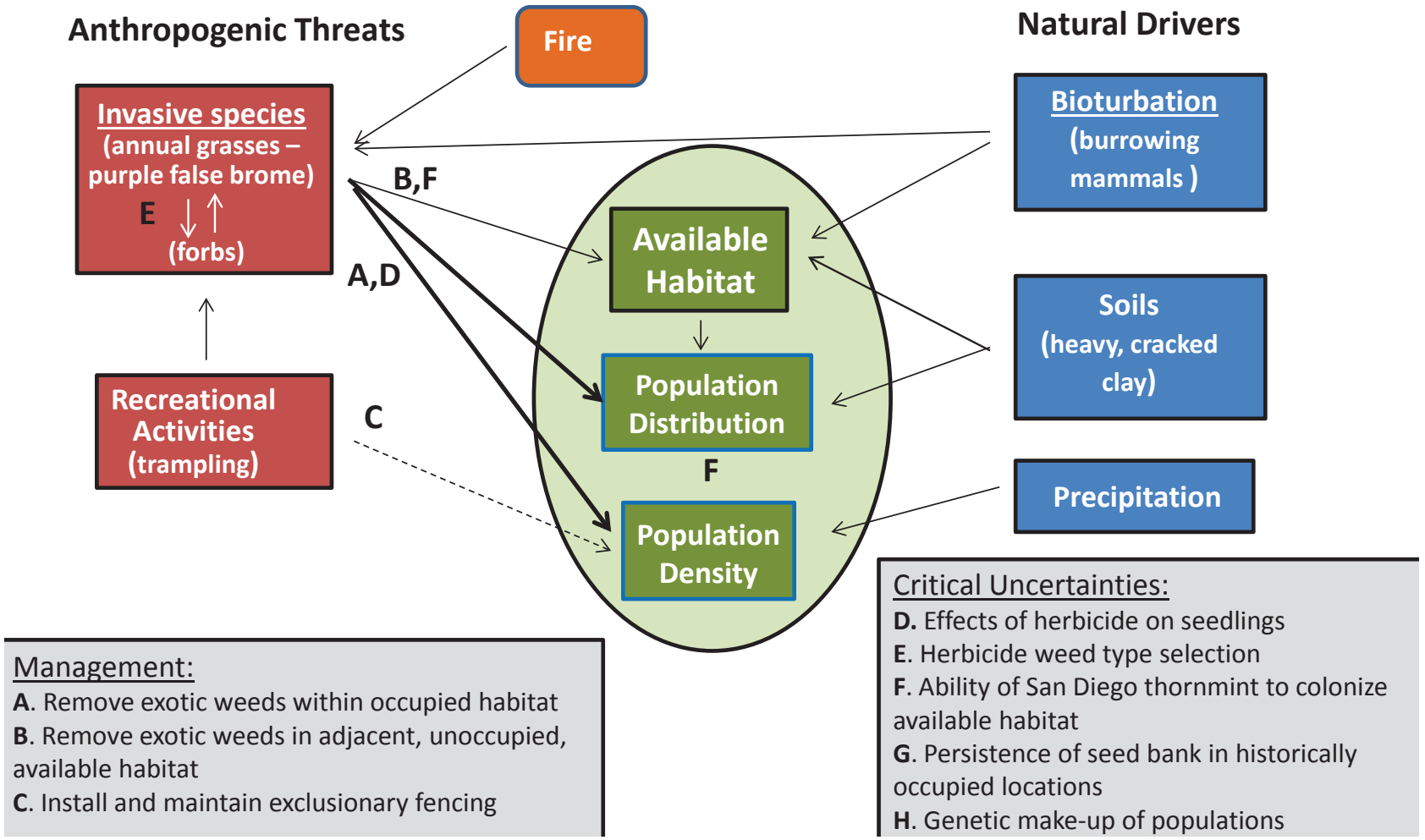
- Continue hand weeding the San Diego thornmint population at Area D with assistance of volunteers in winter and early spring. If funding becomes available, hand weeding may be contracted to a professional crew monitored by personnel familiar with the ecology of and threats to San Diego thornmint.
- Hand weeding shall include techniques designed to minimize soil disturbance and the potential of uprooting or damaging the root systems of adjacent San Diego thornmint. Successful hand weeding techniques include using scissors to cut grasses below their crown (basal meristem). This technique will kill annual grasses while minimizing deleterious edge effects of manual weeding (M. Dodero, pers. comm., 2011).
- Hand weeding within occupied habitat shall be initiated when absolute exotic weed cover exceeds 25 percent.

Objective 2: Review Status of Subpopulations Outside of Area D

- Review impacts for permitted projects by non-City entities near historic San Diego thornmint populations in MTRP.
- Conduct presence/absence surveys for San Diego thornmint at populations A and B in an average or above average rainfall year to confirm extirpation. In the event that San Diego thornmint is observed, evaluate sites for management.
- Survey remaining population areas (C and E-I) in an average or above-average rainfall year within three years of NRMP adoption if possible. Use a sub-meter global positioning system (GPS) to record population area and the MSCP annual plant monitoring data for general habitat assessment; this will allow information to be compared with existing monitoring data for Area D. Surveys shall occur when plants are visible at Area D.
- Evaluate sites for management or reintroduction potential based on population size, habitat quality and ability to protect sites from recreation and utility impacts.

San Diego thornmint (*Acanthomintha ilicifolia*)
Goal: Maintain and enhance known populations of San Diego thornmint at MTRP

Monitor responses of populations to threat management actions



RECON

FIGURE 4-4
Conceptual Model for San Diego Thornmint at MTRP

Objective 3: Continue to treat false brome based on CBI-developed methodologies in above-average rainfall years or as directed/determined based on monitoring.

- Expand the area of habitat suitability within the Area D Weed Management Area (WMA) by treating false brome outside the current population, beginning east of the trail with a circle around occupied areas and working outward within appropriate soils (Figure 4-5). As purple false brome (*Brachypodium distachyon*) can germinate several times during a growing season, repeat visits may be required and are at the discretion of the habitat manager.

- Grass-specific weed treatments throughout the San Diego region have resulted in successful eradication of the target species followed by an eruption of non-native forbs; therefore, smaller treatment areas with long-term weeding for diverse species are recommended over short-term single-species treatments over large areas (CBI ongoing).

    - Where appropriate, areas may be dethatched in the fall to reduce the false brome seedbank. All dethatched material shall be gathered, bagged, and removed from San Diego thornmint habitat.

    - Weeding has been shown to significantly affect seed set; however, it significantly affects survivorship in above-average rainfall years only (Bauder and Sakrison 1999). In fund-limited scenarios, weeding shall occur preferentially in above-average rainfall years.

    - Limit ancillary negative effects (e.g., trampling) to the clay lens from management actions through careful consideration of management type and implementation (see Section 4.4.1.7).

- Note invasion by woody shrubs into suitable San Diego thornmint soils, especially if fire suppression leads to type conversion. MSCP annual rare plant monitoring data provides photoplots and species percent cover data that can be reviewed to determine changes in habitat over time. Management actions may be necessary if native or non-native shrubs become dominant and compete with San Diego thornmint for access to resources.

- Treatment of exotic weeds within unoccupied habitat within Area D shall be initiated when absolute exotic weed cover exceeds 25 percent.

Image Source: USDA FSA NAIP (flown May 2014)

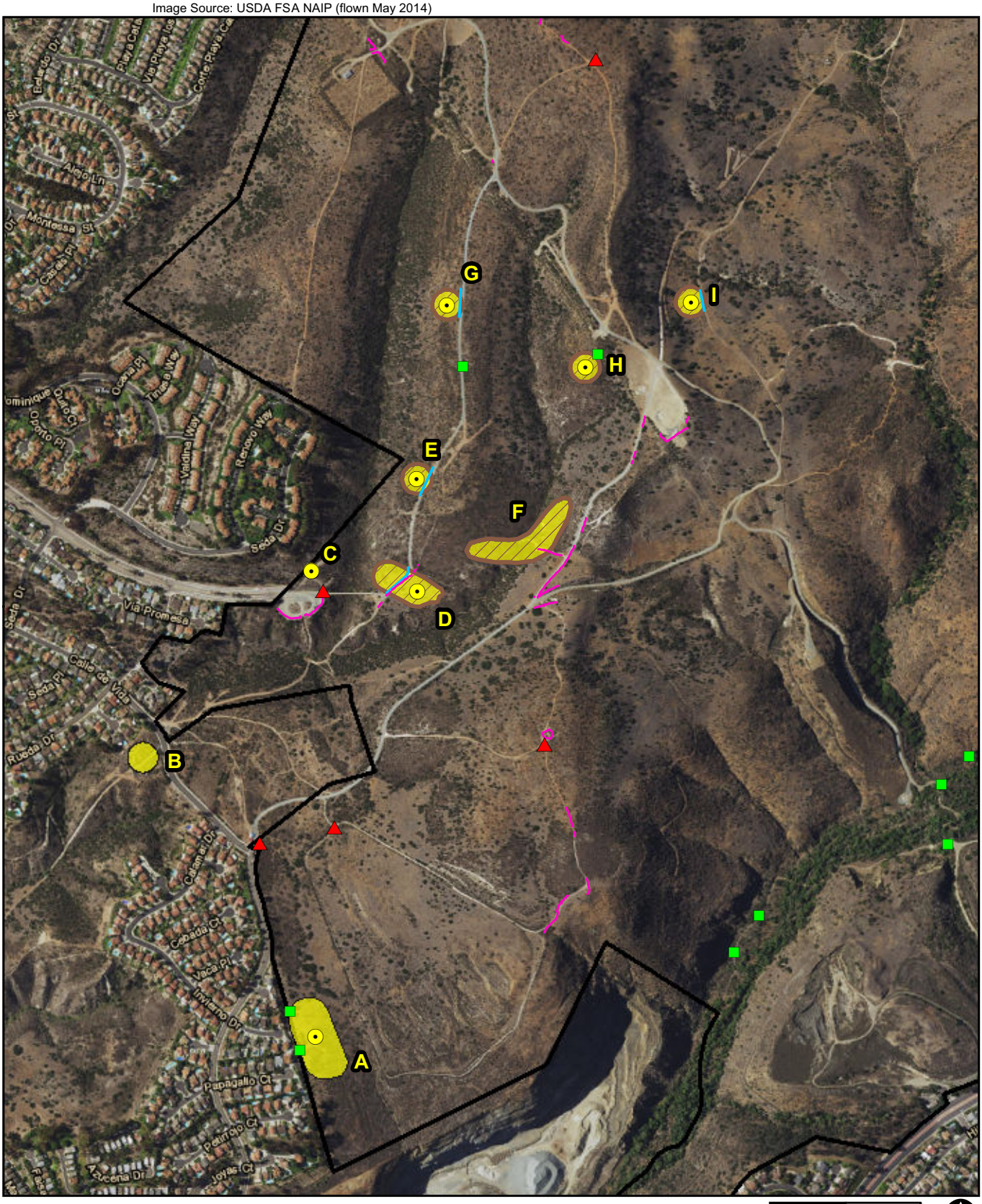


FIGURE 4-5

San Diego Thornmint *(Acanthomintha ilicifolia)*
Management Actions: Mission Trails Regional Park

RECON

M:\JOBS3\5286\common_gis\fig4-05.mxd 4/14/2016

Objective 4: Complete Exclusionary Fencing at All Populations at MTRP

- Install fencing between trails and San Diego thornmint populations at sites D, E, G, and I unless these are within a utility easement (see Figure 4-4). Fencing installation shall occur regardless of survey results (see Objective 2) because the species has been observed following 6+ years of negative survey results at Otay Lakes and Crestridge.

- Exclusionary signage shall be installed between trails and San Diego thornmint populations at sites F and H unless these are within a utility easement (see Figure 4-4).

Objective 5: Seed Banking

- Coordinate with SDMMP and other regional stakeholders to establish a seed bank repository of San Diego thornmint that operates in accordance with the Center for Plant Conservation Guidelines.

4.4.1.5 Monitoring

- Monitoring shall be based on the MSCP rare plant monitoring protocols which specify both the methods and the locations for monitoring actions. If not included in the current MSCP rare plant monitoring protocols, Area D shall be surveyed annually for population and threats, and the population boundary recorded with submeter GPS. Ancillary data, such as a full species and percent cover list, determined to be relevant to preserve-level management will also be collected.

- Weed treatment areas shall be monitored using methods comparable to those utilized by CBI during their TransNet-funded false brome study. Treatment methods, including type of herbicide, date of application, number of applicators, and location of application shall be documented and submitted to the SC-MTX database. Treatment and results shall also be documented annually using a sub-meter GPS to determine effectiveness and change. Short-term studies (<5 years) have not shown a significant relationship between weed reduction and San Diego thornmint survivorship (Bauder and Sakrison 1999); if possible, treatments shall be continued and followed for more than 5 years.

4.4.1.6 Minimization of Impacts of Management and Monitoring

In order to minimize soil disturbance and compaction impacts from foot traffic and weeding near existing San Diego thornmint populations, the following minimization measures shall be employed during monitoring and management:

- All monitoring and weeding of existing San Diego thornmint shall be conducted from outside of population boundaries to the greatest extent practicable.

- Ingress and egress to sites for weed control and monitoring shall be minimized.

- All activities shall be field supervised by qualified personnel familiar with the ecology and threats of San Diego thornmint.
- Care shall be taken to not transport weed seeds on shoes, clothing, or equipment between sites.

4.4.1.7 MSCP Conditions of Coverage

Area-specific management directives must include specific measures to protect against detrimental edge effects from surrounding development (MSCP 1998:Table 3-5).

Proposed management and monitoring goals and objectives in Sections 4.4.1.5 and 4.4.1.6 meet this condition of coverage by reducing the threat of edge effects via an active invasive species removal program, the closure and/or rerouting of authorized trails and signage maintenance near extant populations, and the use of seed banking to provide material for future habitat restoration/enhancement.

4.4.2 San Diego Ambrosia (*Ambrosia pumila*)

4.4.2.1 Background

San Diego ambrosia is federally listed as endangered (USFWS 2002), is a narrow endemic species under the MSCP, and is a CNPS Rank 1B.1 species. This perennial herb in the sunflower family (Asteraceae) emerges from rhizomes in winter and flowers from June to September (Photograph 4-3). San Diego ambrosia is assumed to be wind-pollinated based on the reproductive ecology of similar species within the genus (Johnson et al. 1999). Seeds have not been successfully germinated in greenhouse conditions, while genetic analysis indicates that sexual reproduction is rare but present (Dudek & Associates [Dudek] 2000; McGlaughlin and Friar 2007). A study at MTRP found a distinct genotype at each 0.25 meter^2 plot along a 20 meter transect, indicating limited spatial distribution of clones or genets within and among populations. Compared to research on other narrow endemic or clonal plant species, the regional San Diego ambrosia population contains greater levels of genetic diversity that in turn allow the species to respond to variability in environmental conditions. However, the MTRP site exhibited low genotypic diversity and low habitat quality when compared to other San Diego sites, raising questions about reproductive disadvantages associated with high cover and density of non-native invasive species (McGlaughlin and Friar 2007).

Photograph 4-3: San Diego ambrosia at MTRP.

San Diego ambrosia is found at elevations below 500 feet in western Riverside and San Diego counties, and in northern Baja California. Potential habitat in San Diego County is within terraces associated with creek beds, seasonally dry drainages, and floodplains along the edge of willow woodland or sandy alluvial soils (Reiser 2001), where it occurs in a variety of habitats including disturbed areas in chaparral, coastal scrub, grassland, or vernal pool communities (CNPS 2001, Photograph 4-4). At MTRP, San Diego ambrosia is found within non-native grassland and sparse coastal sage scrub on upper terraces and adjacent hillsides of the San Diego River. Soil testing at sites occupied by San Diego ambrosia in MTRP showed that the species is found in moderately acidic, sandy loam soils that were low in salinity (Dudek 2000). The San Diego ambrosia population at MTRP (CNDDB EO 12) is one of 16 currently extant populations, including seven conserved sites, out of 29 known historic occurrences (USFWS 2010). The MTRP site is the only ‘major’ population of San Diego ambrosia designated by the MSCP for conservation.

Photograph 4-4: San Diego ambrosia habitat within the Mission Gorge area, facing north.

In 1997, San Diego ambrosia within the footprint of Phase 1 of Kumeyaay Campground were translocated prior to construction. Phase 2 of the Kumeyaay Campground has been dropped from consideration, and is not a part of the MTRP MPU.

This NRMP conforms to the *City of San Diego Mission Trails Regional Park San Diego Ambrosia Management Plan for San Diego ambrosia within MTRP* (Dudek 2000) and implements its recommendations, including:

- 25-foot impact avoidance buffers
- Relocation of redundant MTRP trails
- Fencing and signage management
- Invasive weed removal
- Transplantation and restoration

4.4.2.2 Presence within MTRP

San Diego ambrosia within MTRP consists of four subpopulations (A-D) within the San Diego River floodplain within the Fortuna Mountain and Mission Gorge area near Kumeyaay Lake (Figure 4-6). Two smaller populations (A and B) are located within the Mission Gorge area: one south of the Father Junipero Serra Trail near the Old Mission Dam parking area (Occurrence A), and the second on a small hill slope north of the Old

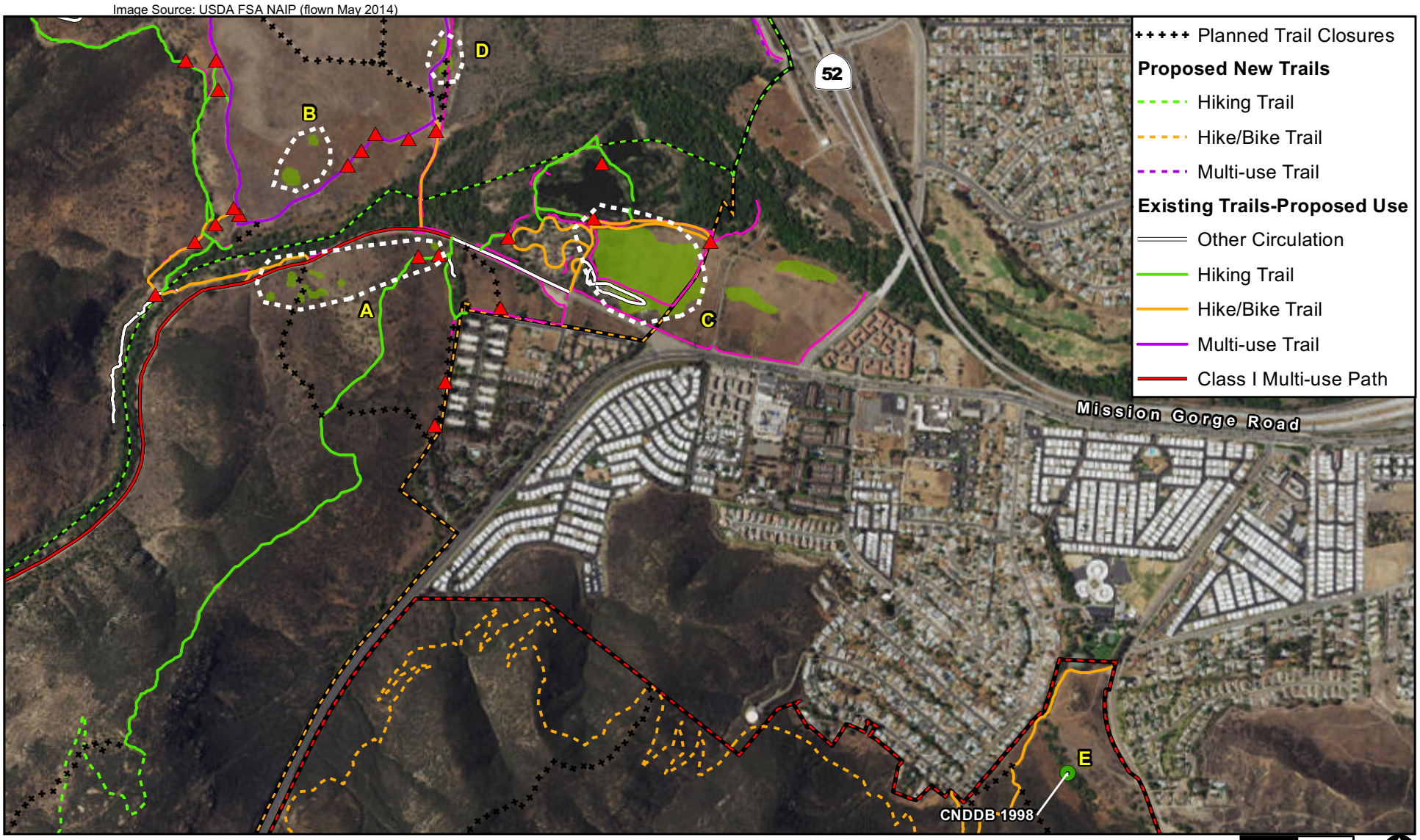


FIGURE 4-6

San Diego Ambrosia *(Ambrosia pumila)*
Detected Occurrences: Mission Trails Regional Park

RECON

M:\JOBS3\5286\common_gis\fig4-06.mxd 8/2/2016

Mission Dam (Occurrence B). The largest population is located directly east of the Kumeyaay campground (Occurrence C). A fourth population of transplanted individuals adjacent to the grasslands crossing trail, north of the trail head off of the Father Junipero Serra Trail, consists of individuals removed from impact areas within Caltrans Highway 52 project in 1988 and the City's Kumeyaay Campground project in 1998 (located in a rectangular fenced area). Of these four subpopulations, three burned in wildfires in 1981 (A, B, and D), one burned in both 1981 and 2003 (B), and one (C) burned in 1999.

Occurrence C has been monitored since 1999 using MSCP rare plant monitoring protocols, with a maximum estimated population size of 205,826 ramets in 2003. In McGlaughlin and Friar's study, the average number of individual stems or ramets per genet was 9.10; therefore, aboveground stem counts represent approximately 10 times the number of genetically unique individuals present (2007). The spatial extent of the population has also been recorded during select monitoring years and may be influenced by rainfall (Figure 4-7).

4.4.2.3 Anthropogenic Threats at MTRP

a. Development

Although up to 10 percent of the San Diego ambrosia population may be impacted without it being removed from the MSCP covered species list, designation of the species as a narrow endemic species requires that all impacts be avoided, minimized, and mitigated. Within MTRP, projects that would impact San Diego ambrosia, such as Phase 2 of the Kumeyaay Campground, have been removed from the MPU.

b. Invasive Non-native Species

Non-natives species present a significant threat to all extant populations of San Diego ambrosia (USFWS 2010) by competing directly for nutrients, light, water, and space at locations as well as limiting potential extra-floral pollination. Non-native species are a significant threat to the MTRP population where non-native species cover has ranged from 31 percent to 101 percent at Occurrence C from 2006 through 2012, with grasses constituting from 77 percent to 91 percent of total non-native cover. Rattail fescue has shown consistently high relative cover throughout the monitoring period and shall be addressed as a target species in non-native removal efforts. Small populations are most effectively weeded by hand, while the best management practice for larger patches of San Diego ambrosia is a combination of Fusilade II® and mowing (Center for Natural Lands Management 2009); however, other methods may be used as necessary to address the ineffectiveness of Fusilade II® on rattail fescue.

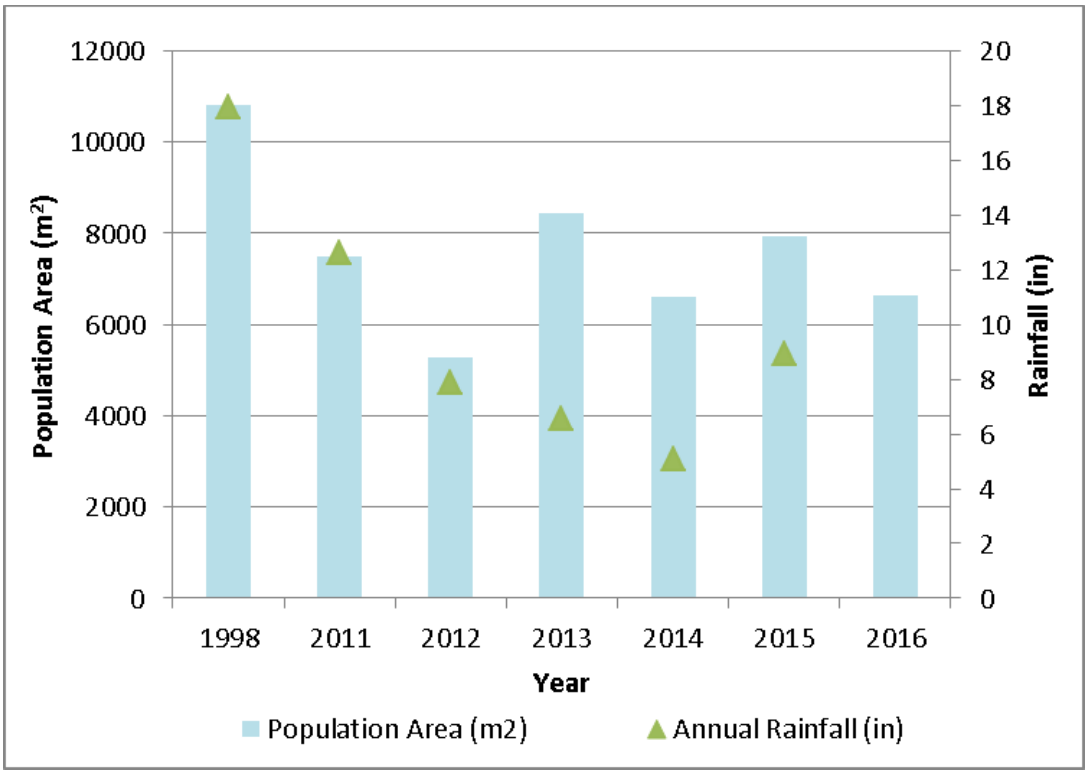


Figure 4-7 San Diego Ambrosia population area at MTRP Occurrence C

c. Recreational Activities – Trampling

San Diego ambrosia is sensitive to direct mortality from non-motorized recreation activities, including trampling from off-trail hiking and mountain biking (USFWS 2010). Trampling threats to San Diego ambrosia have been controlled at MTRP with a combination of signage, trail control, and fencing, with regular patrols required for maintenance and repair due to weathering and vandalism. Given the high number of visitors, a small percentage of MTRP users will likely disobey signs and cross fenced areas with potential damage to sensitive resources such as San Diego ambrosia.

4.4.2.4 Management Goals and Objectives

Goal: Increase the number of ramets, spatial extent of populations, and reduce stress/threats of San Diego ambrosia at MTRP (Figure 4-8).

Objective 1: Remove Exotic Weeds from Occupied Habitat

- Continue adaptive weed treatment at Occurrence C based on *A Comparison of Vegetation Management Techniques to Support Recovery of the Federally Endangered* Ambrosia pumila by Center for Natural Lands Management (2009) and additional studies by M. Kelly and M. Johnson Rocks (2008). This program includes a combination of

Fusilade II® treatments and mowing annually following rains after grasses have germinated. Continue the adaptive management monitoring program established with input from San Diego State University's Institute for Ecological Management and Monitoring which includes 50 meter transect surveys with species and cover data collected from one meter quadrats placed on alternate sides every five meters. In addition, the boundary of San Diego ambrosia and the boundary of the herbicide area are GPSed annually. In particular, review the effectiveness of treatments on rattail fescue (*Festuca* [=*Vulpia*] *myuros*), which is known to be resistant to Fusilade II®, and revise treatment program as necessary. Following consultation with the appropriate agencies, consider implementation of a pilot project to determine effectiveness of pre-emergent herbicide application to minimize cover of exotic annual plant species and any associated impacts to San Diego ambrosia.

Objective 2: Exclusionary Fencing/Signage

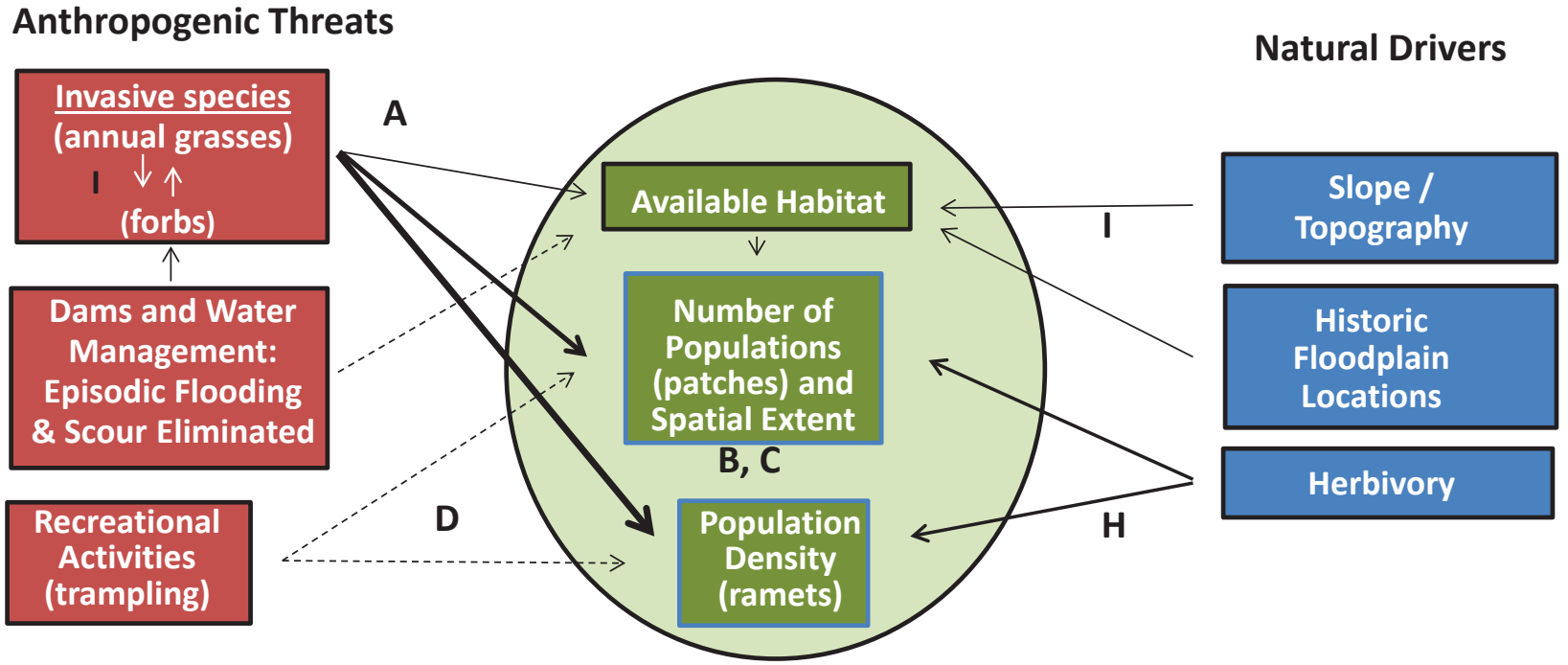
- Continue ranger patrols to monitor the northern edge of the trail 300 feet south of Occurrence B (Figure 4-9a) and install exclusionary signage if signs of trespass are detected. Occurrence A has some exclusionary signage between a trail and the main population of San Diego ambrosia. A small clump of San Diego ambrosia has been observed within Occurrence A near the trail head and is currently unfenced. This small population shall be fenced off from the trail head (see Figure 4-9a). In addition, fencing or exclusionary signage shall be installed near the Father Junipero Serra Trail pull off area to discourage transit through the population (see Figure 4-9a).

- The main population of San Diego ambrosia (Occurrence C) has been enclosed with exclusion fencing, and educational signage has been posted (Figure 4-9b). Existing fencing and signage at Occurrence C shall continue to be inspected and maintained to restrict recreational access to the site.

- Herbivory exclusion fences have been installed around populations of San Diego ambrosia within Occurrence C. If San Diego ambrosia ramet density and spatial extent increase significantly within testing sites, herbivore exclusion fencing shall be extended to other populations within Occurrences A, B, and appropriate patches within C.

San Diego Ambrosia (*Ambrosia pumila*)
Goal: Increase number of ramets and spatial extent of populations at MTRP

Monitor responses of populations to threat management actions



Management:
A. Weed control
B. Transplantation within occupied habitat
C. Transplantation to historically occupied habitat
D. Fencing repair
E. Signage installation

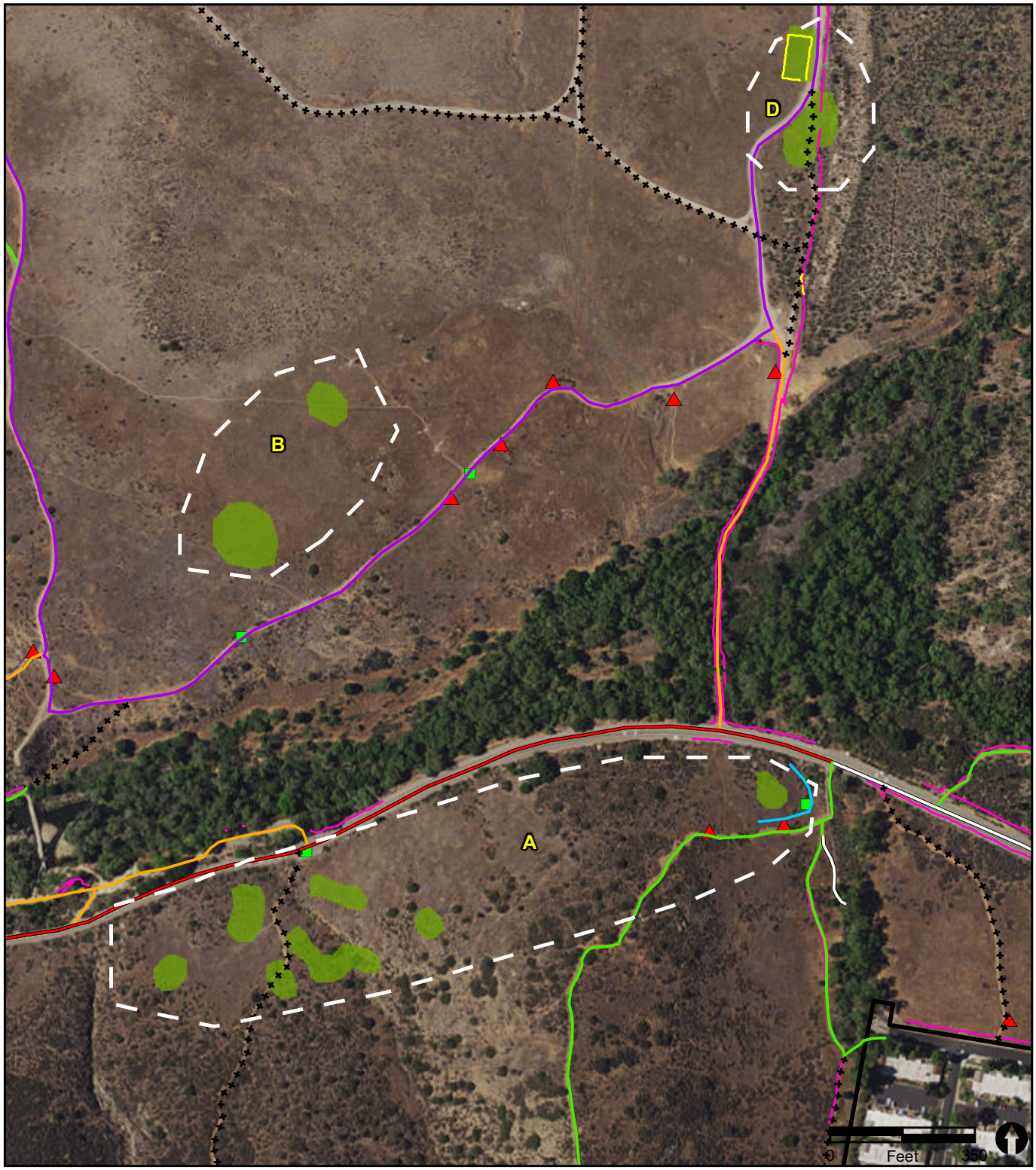
Critical Uncertainties:
F. Genetic effects of low seed set
G. Effect of herbivore exclusion fencing
H. Herbicide weed type selection
I. Microtopography effects within habitat

RECON

M:\JOBS3\5286\env\graphics\NRMP\fig4-8.ai 07/13/17 vem

FIGURE 4-8
Conceptual Model for San Diego Ambrosia at MTRP

Image Source: USDA FSA NAIP (flown May 2014)



Project Boundary

San Diego Ambrosia *(Ambrosia pumila)**

*(All polygons CNDDB 2008)

Exclusionary Signage

Proposed Exclusionary Signage

Fences

Broken Fences

Proposed Fencing

Existing Trails-Proposed Use

Planned Trail Closures

Other Circulation

Hiking Trail

Hike/Bike Trail

Multi-use Trail

Class I Multi-use Path

FIGURE 4-9a

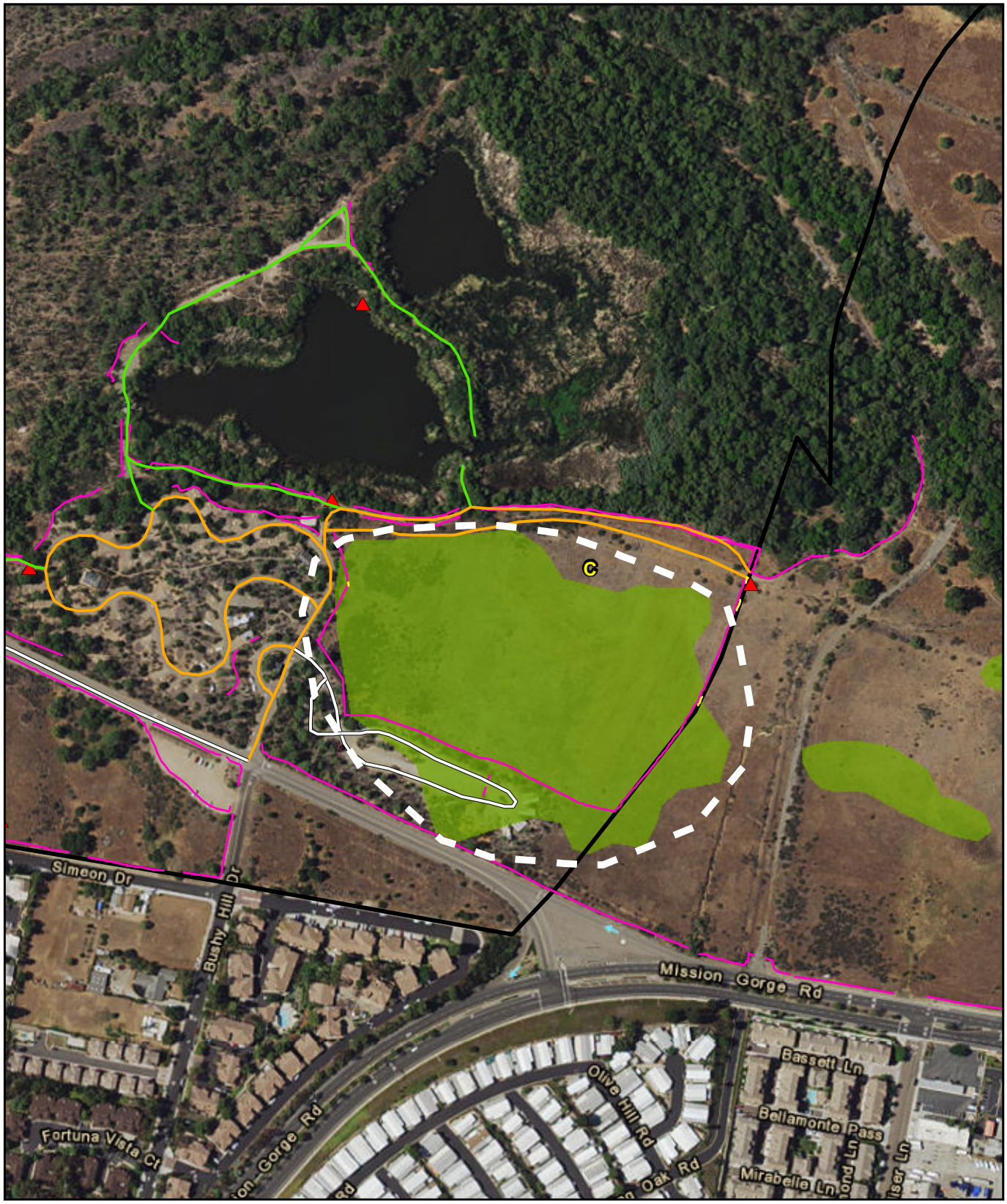
San Diego Ambrosia *(Ambrosia pumila)*

Management Actions: Mission Trails Regional Park

RECON

M:\JOBS3\5286\common_gis\fig4-09a.mxd 8/2/2016

Image Source: USDA FSA NAIP (flown May 2014)



Project Boundary

San Diego Ambrosia *(Ambrosia pumila)**

*(All polygons CNDDB 2008)

Exclusionary Signage

Fences

Broken Fences

Existing Trails-Proposed Use

Other Circulation

Hiking Trail

Hike/Bike Trail

0 Feet 350

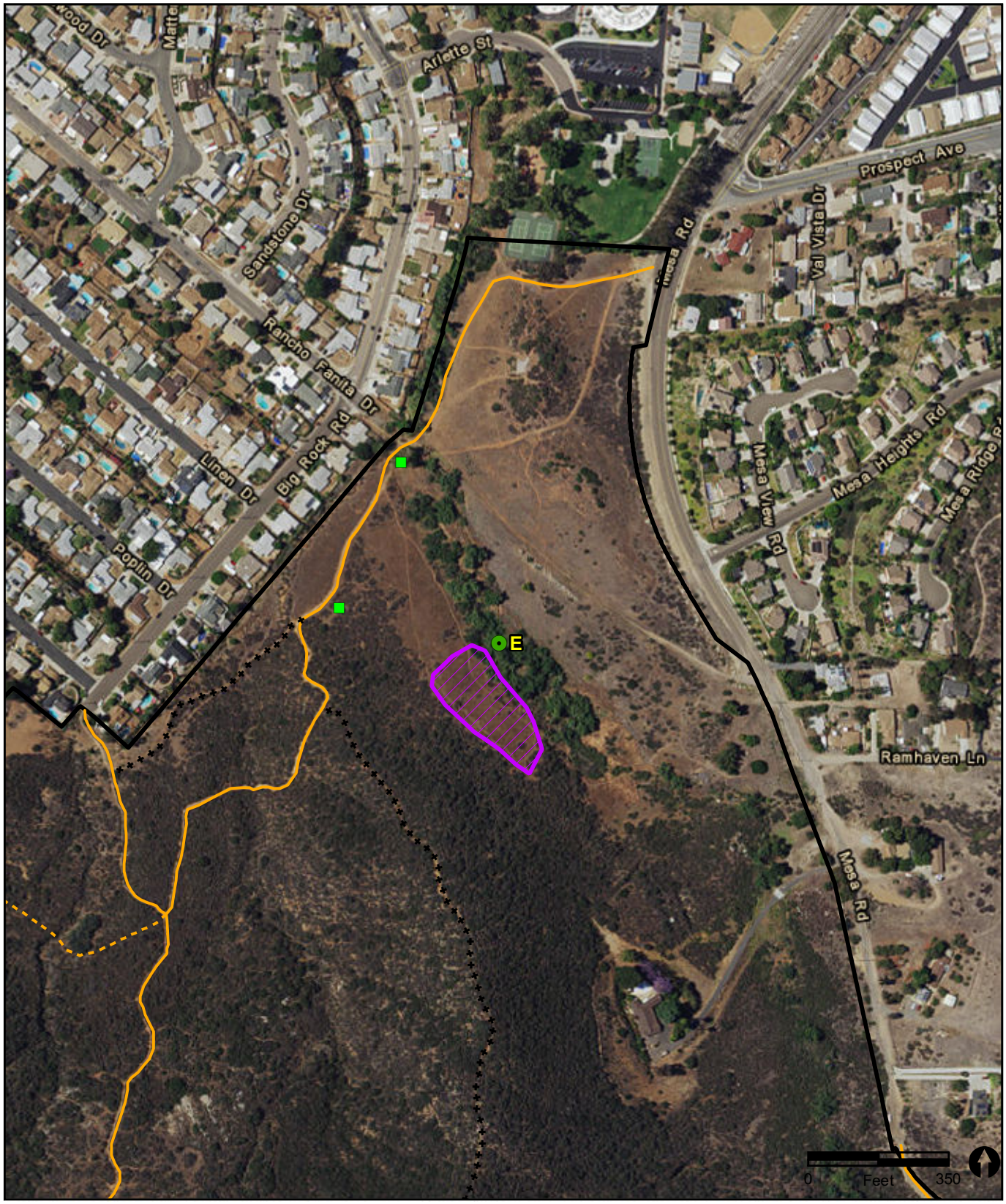
FIGURE 4-9b

San Diego Ambrosia *(Ambrosia pumila)*
Management Actions: Mission Trails Regional Park

RECON

M:\JOBS3\5286\common_gis\fig4-09b.mxd 8/2/2016

Image Source: USDA FSA NAIP (flown May 2014)



Project Boundary

San Diego Ambrosia *(Ambrosia pumila)**

Exclusionary Signage

Proposed Exclusionary Signage

Proposed Transplantation Area

Planned Trail Closures

Existing Trails-Proposed Use

Hike/Bike Trail

Proposed New Trails

Hike/Bike Trail

FIGURE 4-9c

San Diego Ambrosia *(Ambrosia pumila)*
Management Actions: Mission Trails Regional Park

RECON

M:\JOBS3\5286\common_gis\fig4-09c.mxd 8/3/2016

Objective 3: Trail Rerouting

- A redundant hiking trail leading from Father Junipero Serra Trail will be removed, as it crosses through a high density of San Diego ambrosia ramets within Occurrence A. It will be rerouted away from the San Diego ambrosia population in the Master Plan Update (see Figure 4-9a).

- An informal hiking trail crossing through Occurrence D along the Grassland Loop Trail has been closed via signage, fencing, and vegetation brushing (see Figure 4-9a).

- A 25-foot minimum buffer around known populations shall be assumed when conceptually planning any new temporary or permanent impacts, including trails, within MTRP (Dudek 2000).

Objective 4: Transplantation

- The City of San Diego is regularly approached with requests for MTRP to accept translocated San Diego ambrosia under threat of development impact. A historically occupied area (Occurrence E) within the Cowles Mountain area of MTRP, southeast of the main populations of San Diego ambrosia, known to be occupied in 1998 (State of California 2011a), has been identified as a receptor site for San Diego ambrosia transplantation (Figure 4-9c). This site shall be reviewed for project-specific suitability and utilized if possible to meet future translocation needs. In addition, any proposed use of the transplantation site for mitigation purposes must be accompanied by compensation and endowment funding for future maintenance and monitoring of the site.

- Alternatively, non-mitigation translocation may occur through collection of parent material for a total of 250 transplants collected from populations within MTRP. Care shall be taken to avoid impacts to co-occurring sensitive species, including inconspicuous plant species such as San Diego goldenstar (*Muilla clevelandii*) and variegated dudleya (*Dudleya variegata*).

- Translocation methods shall utilize lessons learned from previously failed efforts, as well as the standards provided in Section 12, Park Management Recommendations, in the *City of San Diego Mission Trails Regional Park San Diego Ambrosia Management Plan* (Dudek 2000). If implemented as a non-mitigation project, adaptive management methods shall be used to decrease future uncertainty associated with translocation of San Diego ambrosia. Mitigatory transplantation projects may use adaptive management, but will be under the discretionary authority of the permitting agency(ies).

- The transplanted population of San Diego ambrosia at Occurrence E shall be surrounded by exclusion fencing and added to adaptive management protocols for San Diego ambrosia at MTRP.

4.4.2.5 Monitoring

- Monitoring shall be based on the MSCP rare plant monitoring protocols which specify both the methods and the locations for monitoring actions.

- If not included in the current MSCP rare plant monitoring protocols, Occurrences A–D shall be surveyed annually for presence/absence and threats, and the population boundary recorded with a submeter GPS. Ancillary data determined to be relevant to preserve-level management shall also be collected.

- In addition to MSCP monitoring, transplanted populations of San Diego ambrosia shall be monitored for survivorship, recruitment, invasive species, and signs of herbivory by the responsible party. Notes shall also be taken on emergent threats to the transplanted population.

- Invasive species treatment projects shall utilize an adaptive management monitoring program similar or comparable to the methods established for the Occurrence C weeding treatment (begun in 2011) established with input from San Diego State University's Institute for Ecological Management and Monitoring. The monitoring methodology includes 50-meter transect surveys with species and cover data collected from one-meter quadrats placed on alternate sides every five meters. In addition, the boundary of San Diego ambrosia and the boundary of the herbicide area are GPSed annually.

4.4.2.6 MSCP Conditions of Coverage

Coverage of San Diego ambrosia is dependent on a 10 percent impact threshold at MTRP (the only major MSCP population). Area-specific management directives must include monitoring of transplanted populations and specific measures to protect against detrimental edge effects (MSCP 1998: Table 3-5).

Proposed management and monitoring goals and objectives in Sections 4.4.2.4 and 4.2.2.5 meet this condition of coverage by reducing the threat of edge effects via an active invasive species removal program, the closure and/or rerouting of authorized trails and signage maintenance near extant populations, and the expansion of the known population into areas previously occupied by the species.

4.4.3 Variegated Dudleya (*Dudleya variegata*)

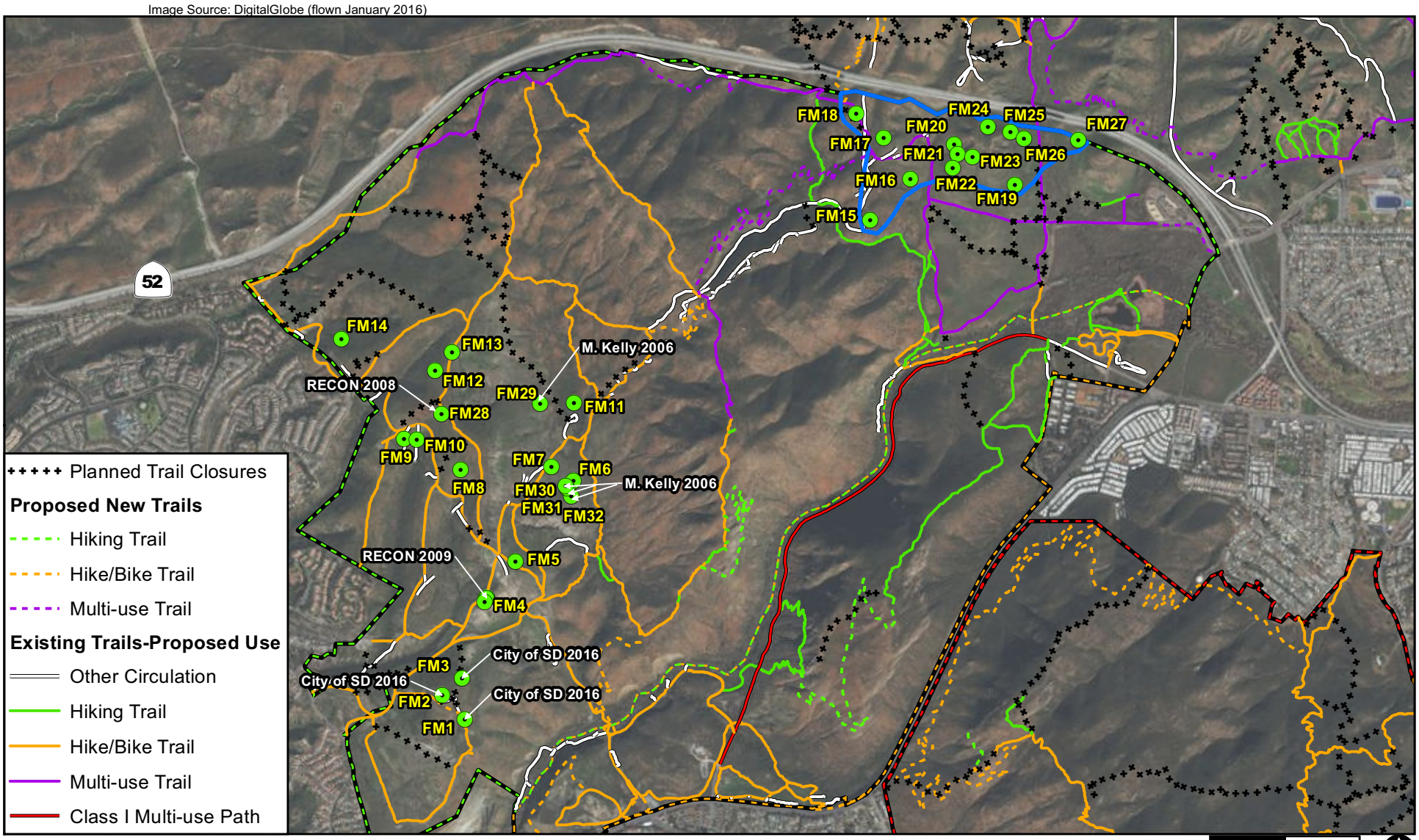
4.4.3.1 Background

Variegated dudleya is a CNPS (2001) Rank 1B.2 species and is a narrow endemic species covered by the MSCP. This small succulent perennial in the stonecrop family (Crassulaceae) emerges from a corm in spring and produces yellow flowers in May and June (Photograph 4-5). Its range extends from southwestern San Diego County to Baja California, where it occurs in

coastal sage scrub, grassland, and chaparral habitats below 500 feet. It usually grows in open areas of clay soil or cobbly clay soils with sparse to no shrub cover, on isolated rocky substrate in grasslands, and on mima mounds near vernal pools (Reiser 2001). At MTRP, variegated dudleya occurs on clay inclusions within gravelly loam soils (M. Dodero, pers. comm., 2011). Although the largest populations are known from Otay Mesa, it has been reported as far north as Black Mountain Road (State of California 2011c). This species can be distinguished from many-stemmed dudleya (*D. multicaulis*) by its spoon-shaped, rather than linear, leaves, and from Blochman's dudleya (*D. blochmaniae* ssp. *blochmaniae*) by its yellow, rather than white, flowers. This species is difficult to detect given the small size, cryptic form, and short season of detectability between spring and early summer. This species can be identified based on known species range and vegetative characters state in winter. As the proportion of individuals flowering fluctuates year to year, vegetative sampling shall provide a more accurate estimation of population size than floral-based estimates (M. Dodero, pers. comm. 2011).

Photograph 4-5: Variegated dudleya within the Fortuna Mountain area of MTRP

MTRP includes one of the 11 major MSCP populations (>500 individuals) for variegated dudleya (USFWS and CDFW 1996), which includes FM18 – FM 27, EE1 – EE21, and EE29 – EE33 (Figure 4-10a and 4-10c).



RECON

M:\JOBS3\5286\common_gis\fig4-10a.mxd 10/3/2018

FIGURE 4-10a

Variegated Dudleya *(Dudleya variegata)*

Detected Occurrences: Mission Trails Regional Park

Image Source: USDA FSA NAIP (flown May 2014)

Project Boundary

Lake Murray Area

Variegated Dudleya *(Dudleya variegata)*

+++++ Planned Trail Closures

Proposed New Trails

Hike/Bike Trail

Existing Trails-Proposed Use

Other Circulation

Hiking Trail

Hike/Bike Trail

Class I Multi-use Path

0 Feet 1,000

FIGURE 4-10b

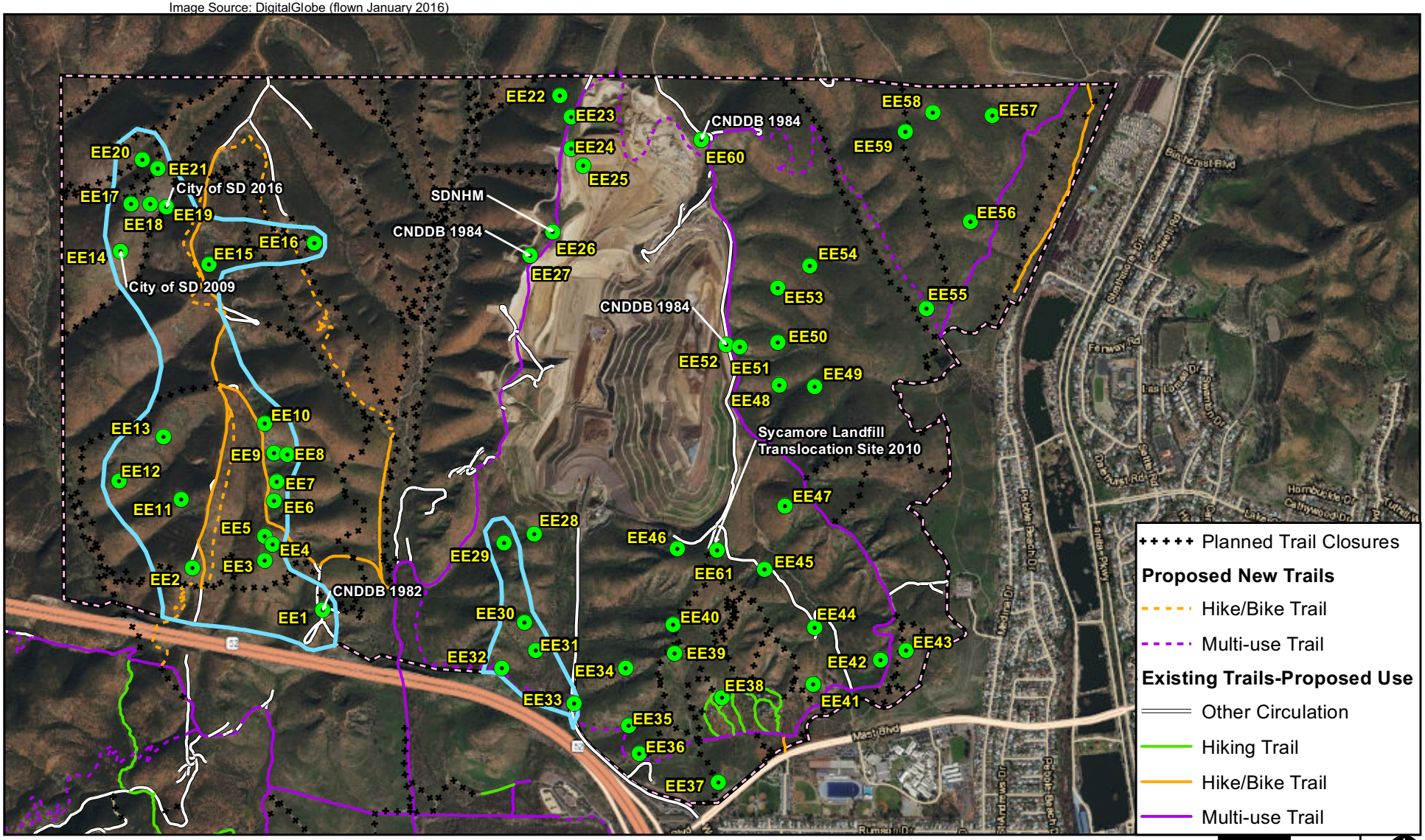
Variegated Dudleya *(Dudleya variegata)*

Detected Occurrences: Mission Trails Regional Park

RECON

M:\JOBS3\5286\common_gis\fig4-10b.mxd 8/2/2016

Image Source: DigitalGlobe (flown January 2016)



Project Boundary

MSCP Major Populations

East Elliott Area

Variegated Dudleya *(Dudleya variegata)**

(*All species points are McMillan 2001 unless otherwise noted.)

RECON

M:\JOBS3\5286\common_gis\fig4-10c.mxd 10/3/2018

FIGURE 4-10c

Variegated Dudleya *(Dudleya variegata)* Detected Occurrences: East Elliott

4.4.3.2 Presence within MTRP

Variegated dudleya is a highly cryptic species with an associated low detectability; thus, surveys conducted for the species may constitute a sampling of the total population of variegated dudleya at MTRP. Several surveys have been conducted within the NRMP boundary. A total of 97 subpopulations of variegated dudleya within the Lake Murray, Fortuna Mountain, and East Elliott areas (McMillan Biological Consulting and Conservation Biology Institute 2002, RECON 2000, State of California 2011c, City of San Diego 2009, see Figures 4-10a-c). Of these 97 known subpopulations, 53 are found on lands currently owned by the City. The remainder are located on parcels owned by private parties and other public jurisdictions within the City MHPA and projected MTRP boundaries (Table 4-8).

TABLE 4-8
VARIEGATED DUDLEYA LOCATION PARCEL OWNERSHIP WITHIN MTRP

Parcel Ownership	Lake Murray	Fortuna Mountain	East Elliott	Total
City of San Diego	2	34	17	53
Poway Unified School District	-		1	1
Private	-		29	29
Sycamore Landfill	-		14	14
TOTAL	2	34	61	97

A population of 1500 individuals was transplanted from a housing site near MTRP into the Fortuna Mountain area in 2004. After multiple plantings and five years of maintenance a total of 2860 plants were recorded within the transplantation area (RECON 2008). A sample of existing populations within MTRP has been monitored by volunteers, City staff, or City consultants since 2001, with the exception of 2007 (see Table 4-9).

TABLE 4-9
VARIEGATED DUDLEYA SURVEYS ON SELECTED SITES WITHIN MTRP (2001-2012)

Year	Number of Site(s) Surveyed	Census/Estimate	Surveyor
2001	2	316	McMillan and CBI
2002	1	0	WRI
2003	21	2368	Kelly and volunteers
2004	17	2085	City of San Diego
2005	4	2878	Kelly and volunteers
2006	6	1850	City of San Diego
2008	7	640	City of San Diego
2009	7	200	City of San Diego
2010	7	1785	City of San Diego
2011	7	47	City of San Diego
2012	7	2649	City of San Diego
2013	7	3252	City of San Diego
2014	7	733	City of San Diego
2015	7	1501	City of San Diego
2016	7	3786	City of San Diego

While variegated dudleya populations at the monitored sites within Fortuna Mountain area (FM1–FM 3) have generally remained steady or increased from 2004–2012 (Figure 4-11), those within East Elliott (EE14, EE19, EE21) have decreased significantly over the same period (Figure 4-12). Additional information is needed to determine if these findings are an anomaly resulting from limited sample size or if they are reflective of a general trends within the geographic areas of MTRP.

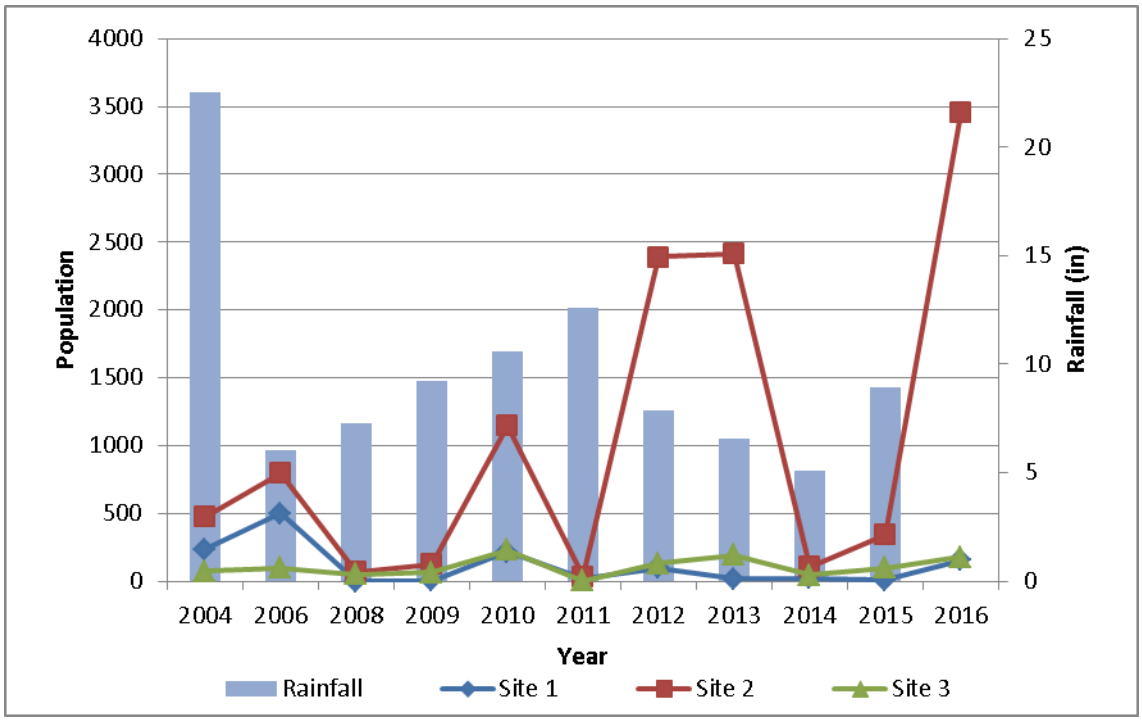


Figure 4-11: Three selected populations of variegated dudleya within Fortuna Mountain area. Population size overlaid with rainfall over time.

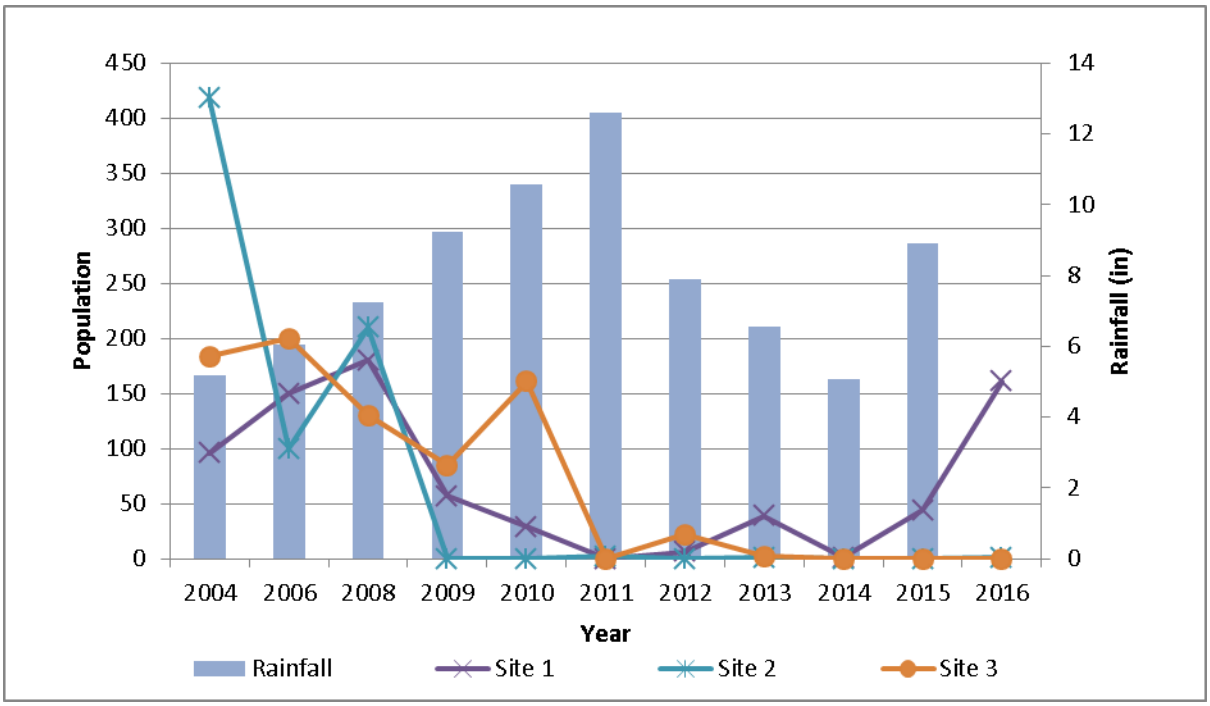


Figure 4-12: Three selected populations of variegated dudleya within the East Elliott area. Population size overlid with rainfall over time.

4.4.3.3 Anthropogenic Threats at MTRP

a. Development

The East Elliott area, and its large constituent populations of variegated dudleya, is not considered completely conserved. The City owns many parcels within the East Elliott area, but the remainder is owned by private landowners. Of the 60 populations of variegated dudleya that have been observed within the East Elliott area, 70 percent are located on private or semi-private parcels (29 on private property, 13 on Sycamore Landfill property) That being said, the threat of development impacts to variegated dudleya is low, as the remaining private parcels within the East Elliott area are located within a City MHPA. The MHPA designation and the variegated dudleya's status as a narrow endemic add significant development constraints to avoid, minimize, and mitigate impacts to the species.

b. Invasive Non-native Species

Non-native plant species are the highest priority threat to variegated dudleya, including those at MTRP (Regan et al. 2006), as they directly compete for nutrients, light, water, and space. Based on the sample of monitored sites at MTRP, non-native grasses are more prevalent than non-native forbs: species with over 20 percent cover at variegated dudleya sites include wild oats, false brome, rattail fescue, and filaree (*Erodium* sp.; City of San Diego monitoring data 2006,

2008–2016). Non-native forbs and grasses can colonize disturbed areas as an indirect result of fire, road and trail building, and altered hydrology.

The large size and density of invasive weeds (relative to the diminutive size of variegated dudleya) may inhibit potential pollinators from accessing flowers, and thus decrease reproductive success. Variegated dudleya occurs in areas with soil crusts susceptible to invasion by non-native plant species once disturbed. After weed invasion, a cyclical disturbance pattern has been observed with burrowing mammals colonizing variegated dudleya populations, exacerbating weed control by bioturbating the soil as well as directly eating dudleya shoots and corms, which then promotes the establishment of even more non-native plant species (M. Dodero, pers. comm., 2011).

c. Recreation – Trampling & Trail Building

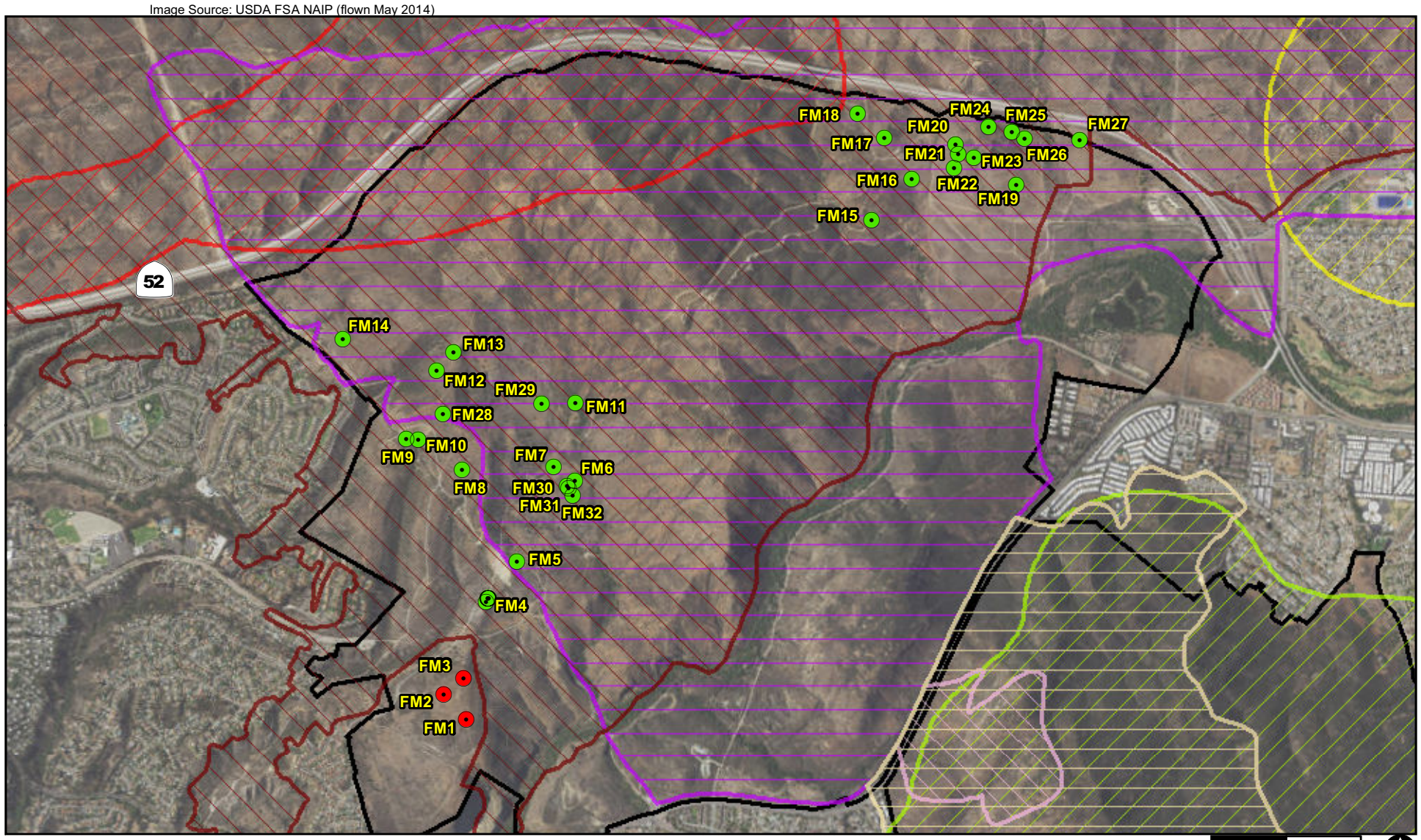
Variegated dudleya is sensitive to direct mortality from non-motorized recreation activities, including trampling from off-trail use (Regan et al. 2006). Trails through or near variegated dudleya populations increase the likelihood of trampling, dispersal of non-native plant species, and off-road vehicle use. In addition, recreational encroachment can provide a vector (via biological crust disturbance and seed transport) for aggressive non-native plant species to invade variegated dudleya habitat (Mark Dodero, pers. comm. 2011).

In addition to trampling impacts, variegated dudleya cannot withstand clearing, soil compaction, or erosion associated with trail building activities. Locations with variegated dudleya often have sparse shrub cover and are likely to be targeted for both official and unauthorized trail building.

A minimum buffer of 50 feet is recommended to separate trail use from existing populations of variegated dudleya. The MPU associated with this document has incorporated the recommended buffer into trail design and planning. In some cases existing utility and access roads were not able to be rerouted outside of the 50-foot variegated dudleya buffer due to additional environmental impacts associated with rerouting and/or lack of discretionary authority (SDG&E and SDCWA utility roads).

d. Fire

Although, as a corm species, variegated dudleya is somewhat resistant to direct mortality due to wildfires, associated weed invasion and type change can degrade available habitat to a point where it becomes unsuitable. According to fire mapping of the area, 79 populations of variegated dudleya burned in wildfires in both 1981 and 2003 (Figures 4-13a-c). An additional four populations, burned only in 2003 (FM4, FM8-10; see Figures 4-13a), including the monitored sites within the East Elliott area. The two populations of variegated dudleya within the Lake Murray area are located within an area that is mapped to have burned in 1944 (LM1-2; see Figures 4-10b) Three populations of variegated dudleya are located in areas with no recorded history of wildfire (FM1-3; see Figure 4-13a).



RECON

M:\JOBS3\5286\common_gis\fig4-13a.mxd 4/14/2016

FIGURE 4-13a

Variegated Dudleya *(Dudleya variegata)*

Management Actions: Mission Trails Regional Park

RECON

M:\JOBS3\5286\common_gis\fig4-13b.mxd 4/14/2016

FIGURE 4-13b

Variegated Dudleya *(Dudleya variegata)*

Management Actions: Mission Trails Regional Park

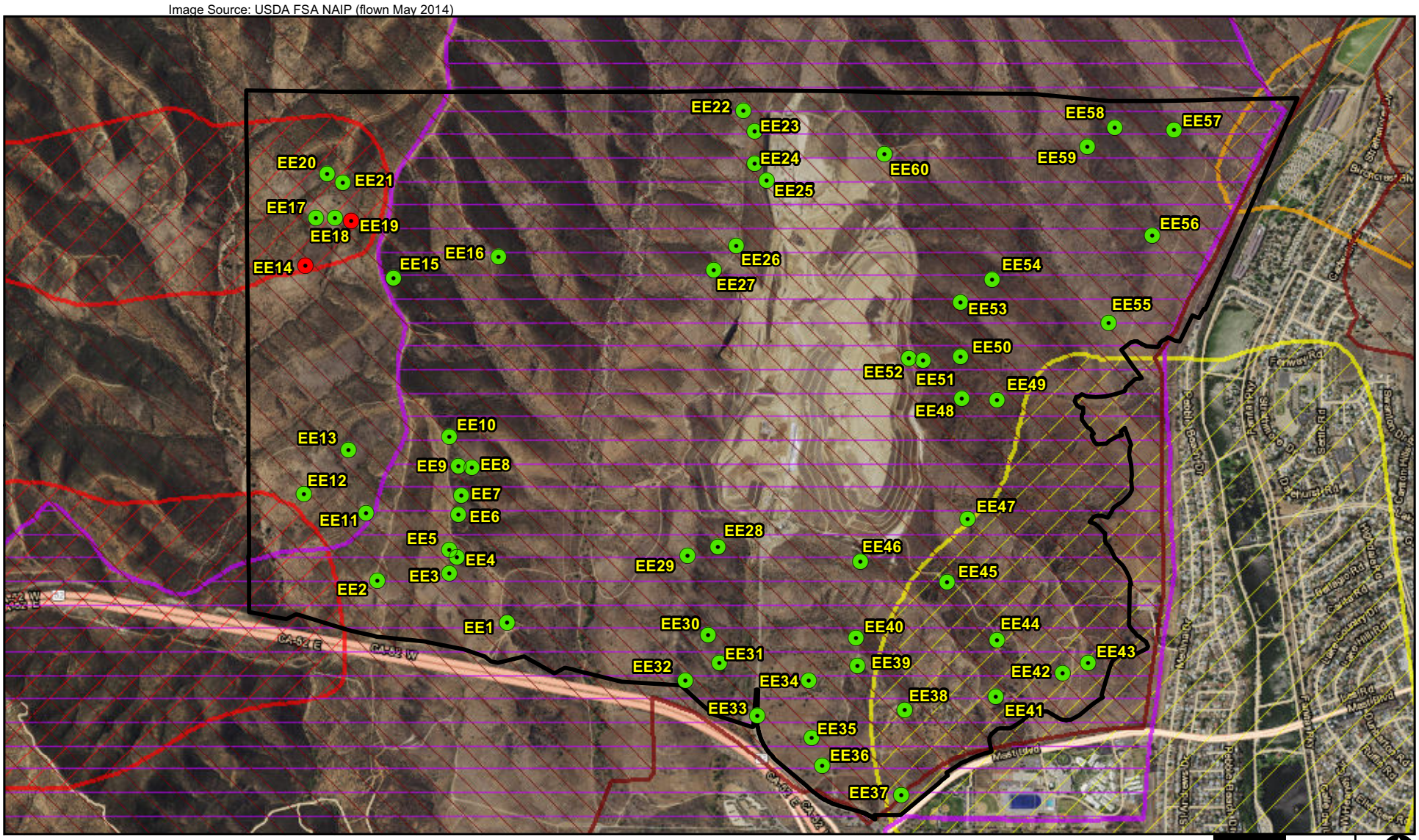


FIGURE 4-13c

Variegated Dudleya *(Dudleya variegata)*
Management Actions: East Elliott

RECON

M:\JOBS3\5286\common_gis\fig4-13c.mxd 4/14/2016

The main impact of fires to variegated dudleya is the habitat change associated with frequent wildfires. In particular, the seral species colonization (exotic grasses, forbs, and burrowing mammals) of variegated dudleya habitat following disturbance by fires can significantly impact habitat availability and quality of existing populations. The wildfires in 2003 and subsequent wet winter have provided ample opportunities for exotic annual weeds to colonize many of the variegated dudleya populations at MTRP. High population numbers at some of the sampling sites in 2004 are likely a result of the increased growth and higher detectability associated with a high rainfall year and the lack of competitive vegetative cover following a wildfire. Subsequent years show a general trend of decline at some of the sampled sites, though the sample size (n=6) is too small to detect change for all populations of variegated dudleya at MTRP.

4.4.3.4 Management Goals and Objectives

Goal: Maintain known populations of variegated dudleya at MTRP (Figure 4-14).

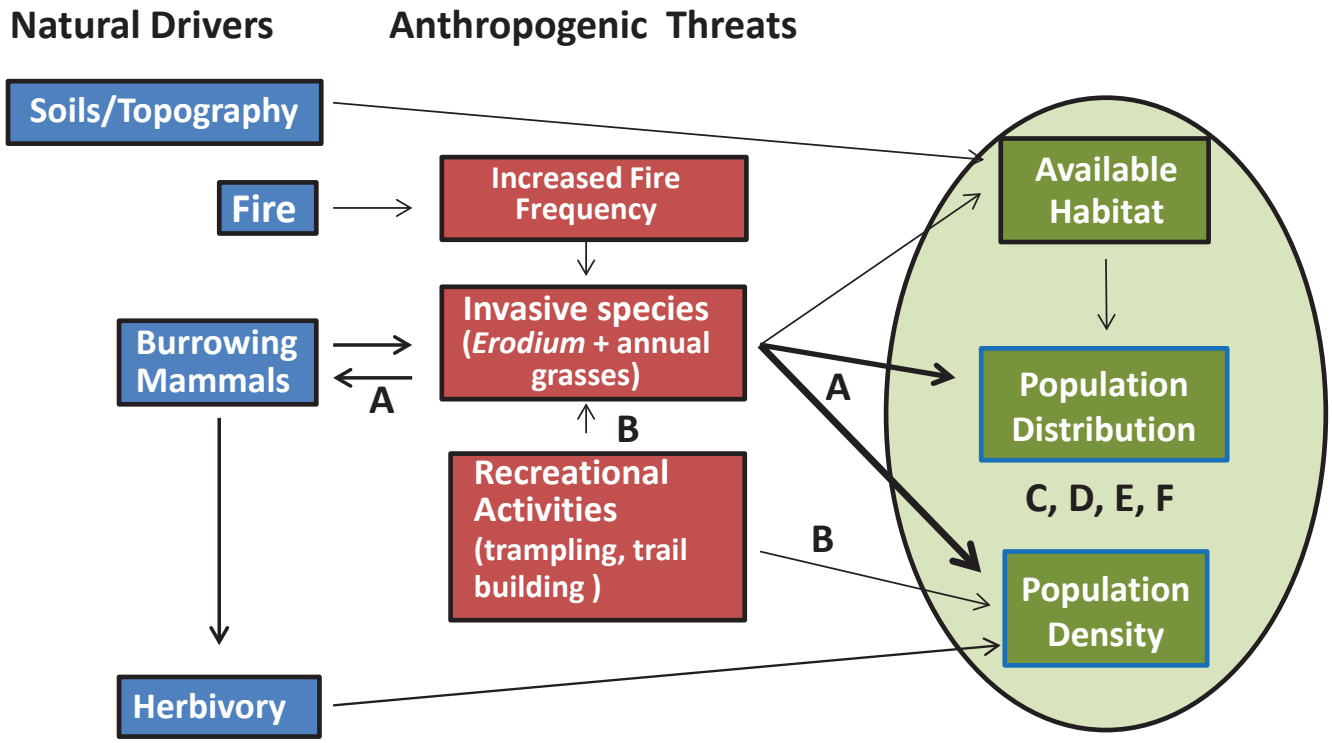
Objective 1: Update Baseline Surveys

- Update baseline survey data for all conserved populations of variegated dudleya at MTRP which have not been monitored in the five years previous to NRMP adoption to assess persistence following large-scale fires and evaluate current threats. It is recommended that these surveys be conducted when plants are visible at the monitored sites. Known reference sites within MTRP shall be used to calibrate survey timing to confirm estimated plant phenologies. According to baseline data, many populations of variegated dudleya (EE1-13, EE15-17, EE20, EE22-57, FM4-27, and LM1) have not been surveyed or monitored since McMillan's MSCP rare plant surveys in 2001 (see Figure 4-13c). As new sites are acquired, surveys shall be conducted at sites identified in the baseline surveys using the above methodology or similar.

- If negative results are observed at historic variegated dudleya subpopulations during baseline update surveys, repeat surveys on target subpopulations for two seasons (calibrated with reference sites). If a population is not observed after two surveys under good conditions, the site shall be considered abandoned and revisited approximately once per decade during an above normal rainfall year.

Variegated dudleya (*Dudleya variegata*)
Goal: Maintain known populations of variegated dudleya at MTRP

Monitor responses of populations to threat management actions



Management:
A. Weed control
B. Access control (signage, trail master plan update)
C. Baseline survey update

Critical Uncertainties:
D. Spatial boundaries of known population localities
E. Current size of observed populations
F. Specific threats at each population (exotic weeds, herbivory)
G. Prioritization of treatment between threatened populations

RECON

M:\JOBS3\5286\env\graphics\NRMP\fig4-14.ai 07/13/17 vem

FIGURE 4-14

Conceptual Model for Variegated Dudleya at MTRP

- **<u>Objective 2:</u> Threats Assessment and Prioritization**

- Data from updated baseline surveys shall be used to prioritize management actions and locations. Management prioritization shall evaluate each population separately based on manageable threats. The following qualitative threats analysis framework can be used to prioritize MTRP populations for management.

i) Exotic species cover

0-1 % = Trace
1-5 % = Low
5-25% = Moderate
25-50% = High
50-100% = Dense

ii) Mammal Burrows and Soil Tailings

+ Presence vs. absence
+ Intensity (percentage of ground surface affected)
  1-5 % = Low
  5-25% = Moderate
  25-50% = High
  50-100% = Dense
+ Burrowing species (if known)

iii) Evidence of unauthorized recreation (bike tracks, bootprints, hoofprints, trash)

Presence vs. absence

iv) Proximity to Unauthorized Recreation

Trail through population = Extreme
Trail adjacent to population = High
Trail within 50 feet of population = Moderate
Trail within 250 feet of population = Low
Trail >250 away from population = Trace

v) Fire History

<u>Objective 3:</u> Manage threatened variegated dudleya populations

- Using the results of Objective 2 (above), implement a subpopulation specific management program to address discrete threats of individual populations. Highly threatened subpopulations shall be treated first.

- Management tools for variegated dudleya populations at MTRP include:
  + Invasive species control
  + Exclusion fencing and signage
  + Additional trail closure-reroute

4.4.3.5 Monitoring

- Monitoring shall be based on the MSCP rare plant monitoring protocols which specify both the methods and the locations for monitoring actions. A total of six target populations (three within the Fortuna Mountain area and three within the East Elliott area) of variegated Dudleya are currently monitored annually as a part of the City's rare plant monitoring effort.

- If not included in the current MSCP rare plant monitoring protocols, a subset of the population within MTRP shall be surveyed annually for presence/absence and existing/emerging threats. The population boundary shall be recorded with a submeter GPS. Ancillary data determined to be relevant to preserve-level management shall also be collected.

  Selection of the sites to be monitored shall be based on historic monitoring in order to maintain a long-term dataset, while also representing a wide spectrum of geographic variability, fire history, and topography. If quantitative data are collected, a sufficient number of sites shall be monitored to meet the sample size requirements of the appropriate statistical analysis.

- The remainder of the recorded populations shall be monitored initially in a baseline survey update (see Objective 1).

4.4.3.6 MSCP Conditions of Coverage

Area-specific management directives must include species-specific monitoring and specific measures to protect against detrimental edge effects to this species, including effects caused by recreational activities (MSCP 1998: Table 3-5).

Proposed management and monitoring goals and objectives in Sections 4.4.3.4 and 4.2.3.5 meet this condition of coverage by reducing the threat of edge effects via species-specific threat monitoring and objectives focused on adaptive management of the species.

4.4.4 Willowy Monardella (*Monardella viminea*)

4.4.4.1 Background

Willowy monardella is listed as an endangered species by the State of California (2011c) and the federal government (USFWS 1998), and is a covered species under the MSCP. This perennial herb in the mint family (Lamiaceae) has tiny silvery hairs, narrow leaves, grows up to

two feet tall, and has small, pale rose-lavender flowers from June to August (Hickman 1993, State of California 2011c; Photograph 4-6). Individual plants grow in clumps of one to four individuals, which can make accurate population estimates difficult. In MTRP, its microhabitat is the upper terraces and sandy banks of seasonal washes in open riparian scrub (Reiser 2001). At MTRP, willowy monardella is found within open riparian scrubs dominated by broom baccharis (*Baccharis sarothroides*) within the floodplains on ephemeral streams in the East Elliott and West Sycamore areas. Other habitat requirements include ephemeral stream hydrology with regular flood regimes (and associated scour), sandy alluvial terraces, and a limited herbaceous understory (USFWS 2008; Photograph 4-7). Willowy monardella is known from fewer than 11 sites in San Diego County. Per the City's Subarea Plan MSCP, all major populations of willowy monardella are assumed to be preserved within the plan area. No impacts to the major populations of the species are allowed within the MHPA. As a result, 100 percent of all populations of willow monardella within MTRP are required to be conserved.

The total population of willowy monardella is considered to be declining. Of the 26 known/historic populations of willowy monardella, eight extant populations remain, seven of which are located on reserve lands. The regional population is considered to be in decline (USFWS 2008, 2012), and the West Sycamore population has declined substantially during the 2000–2012 monitoring period (Figure 4-15; City 2000–2012 monitoring reports). Some studies suggest a lack of reproduction/recruitment as a factor in population decline (Rebman and Dossey 2006), which may be supported by the decreased number of individuals/shoots per clump over time at West Sycamore (Figure 4-16; City 2000–2016 monitoring reports). "Clumps" are defined as the number of individuals within one foot of one another. Multiple 'plants' are often found within a 'clump' and additional research is needed to determine if individuals within a clump represent a clone or distinct genetic individuals (City of San Diego 2005).

Photograph 4-6: Willowy monardella within the West Sycamore area at MTRP.

Photograph 4-7: Willowy monardella habitat within the East Elliott area of MTRP.

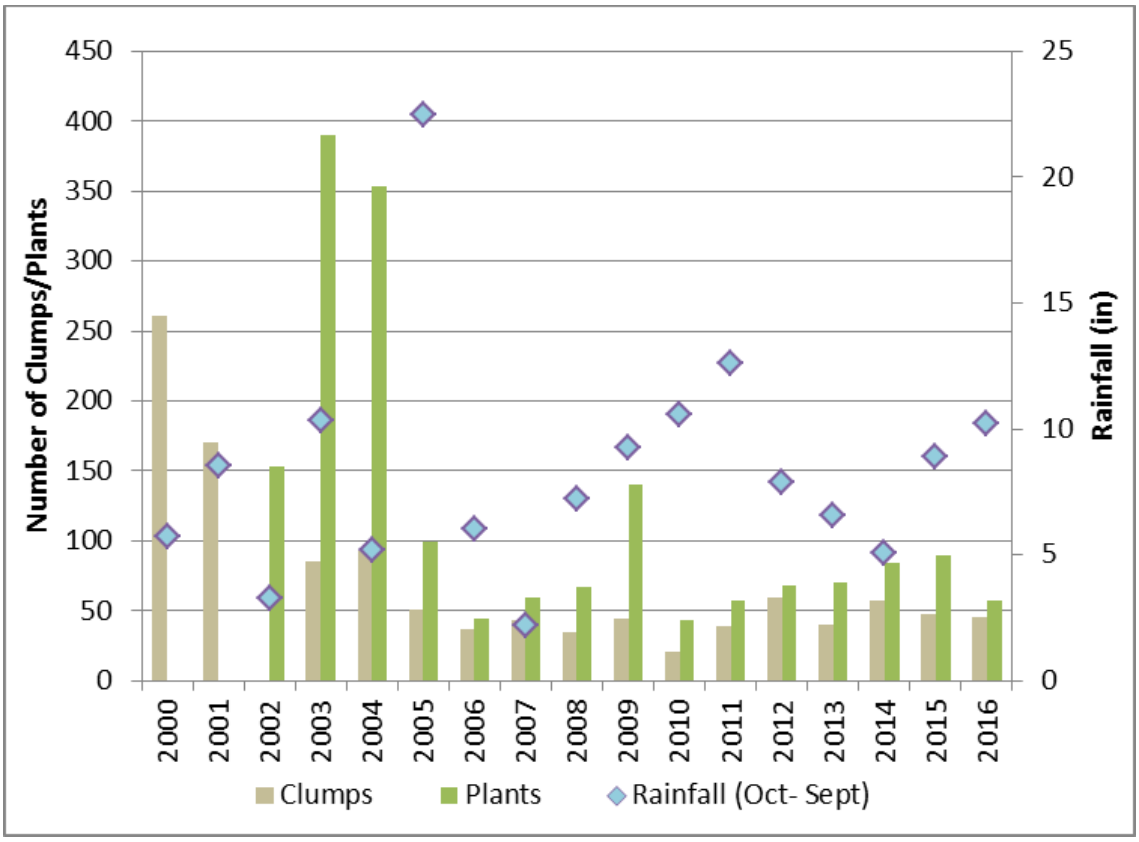


Figure 4-15: Population size (clumps vs. plants) of willowy monardella at Occurrence A within the West Sycamore Area

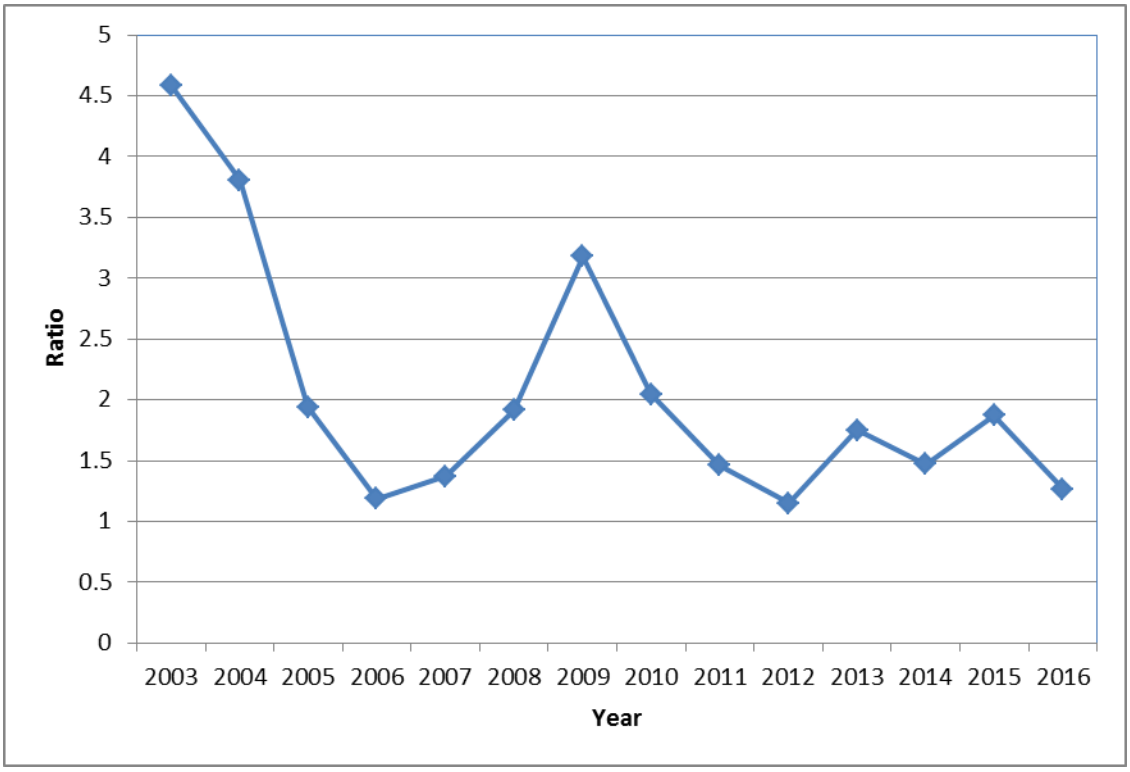


Figure 4-16: Clump to individual ratio of willowy monardella at Occurrence A within the West Sycamore Area

4.4.4.2 Presence within the MTRP

As shown in Figures 4-17a and b, several populations of willowy monardella have been observed within the East Elliott and West Sycamore areas of MTRP. A large population (Occurrence C) of willow monardella occurs in sparse riparian scrub in the Spring Canyon drainage of the East Elliott area (State of California 2011c), and is currently monitored by Mike Kelley and Cindy Burrascano of CNPS. Two populations of willowy monardella have been observed in the West Sycamore area (Occurrences A and B). Occurrence A is currently monitored by the City. From 2000 to 2016, Occurrence A has ranged from a high of 261 clumps (2000) and 390 individuals (2003), to a low in 2010 of 21 clumps and 43 individuals (see Figure 4-15) (City monitoring reports 2000–2016).

Image Source: USDA FSA NAIP (flown May 2014)

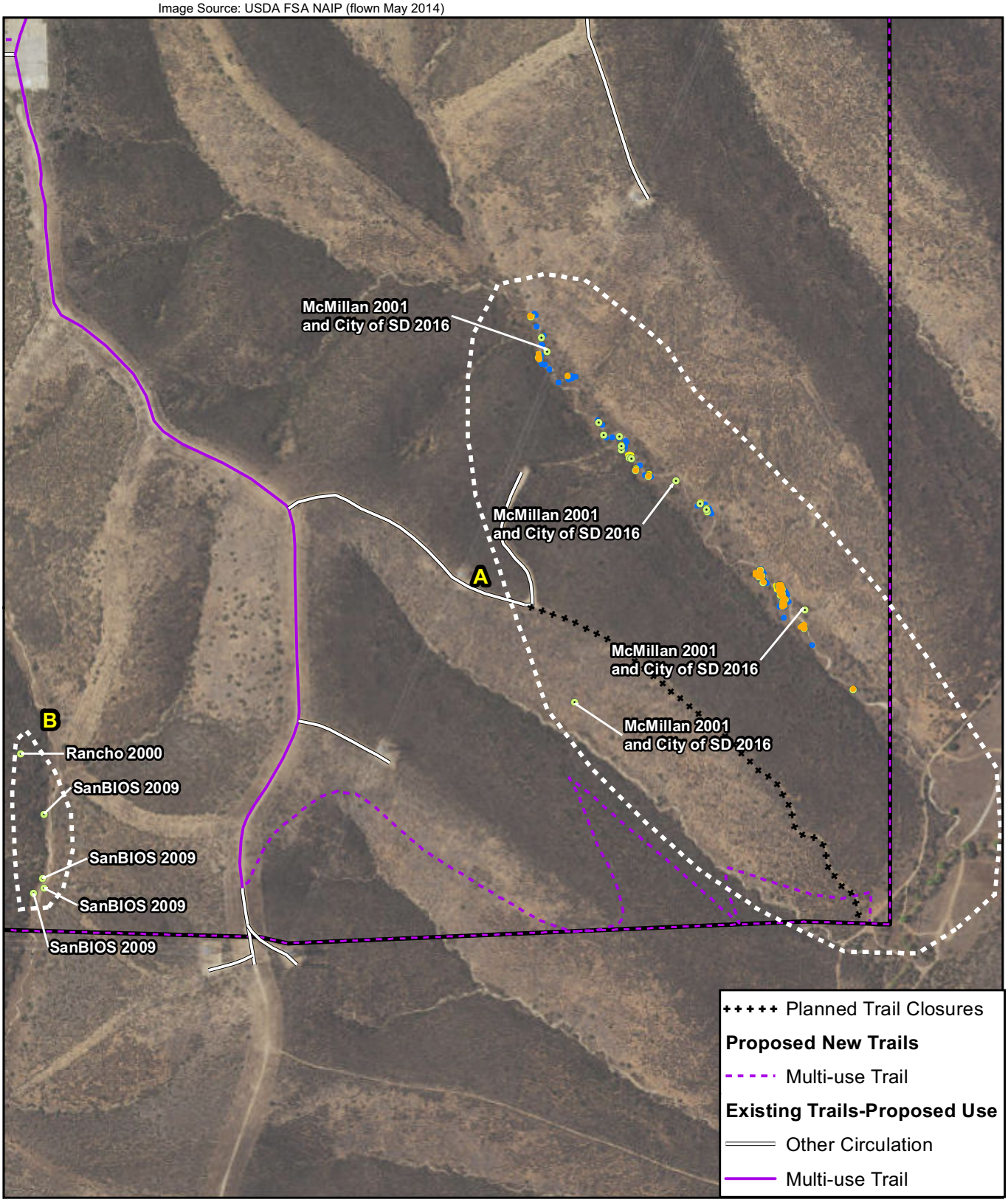


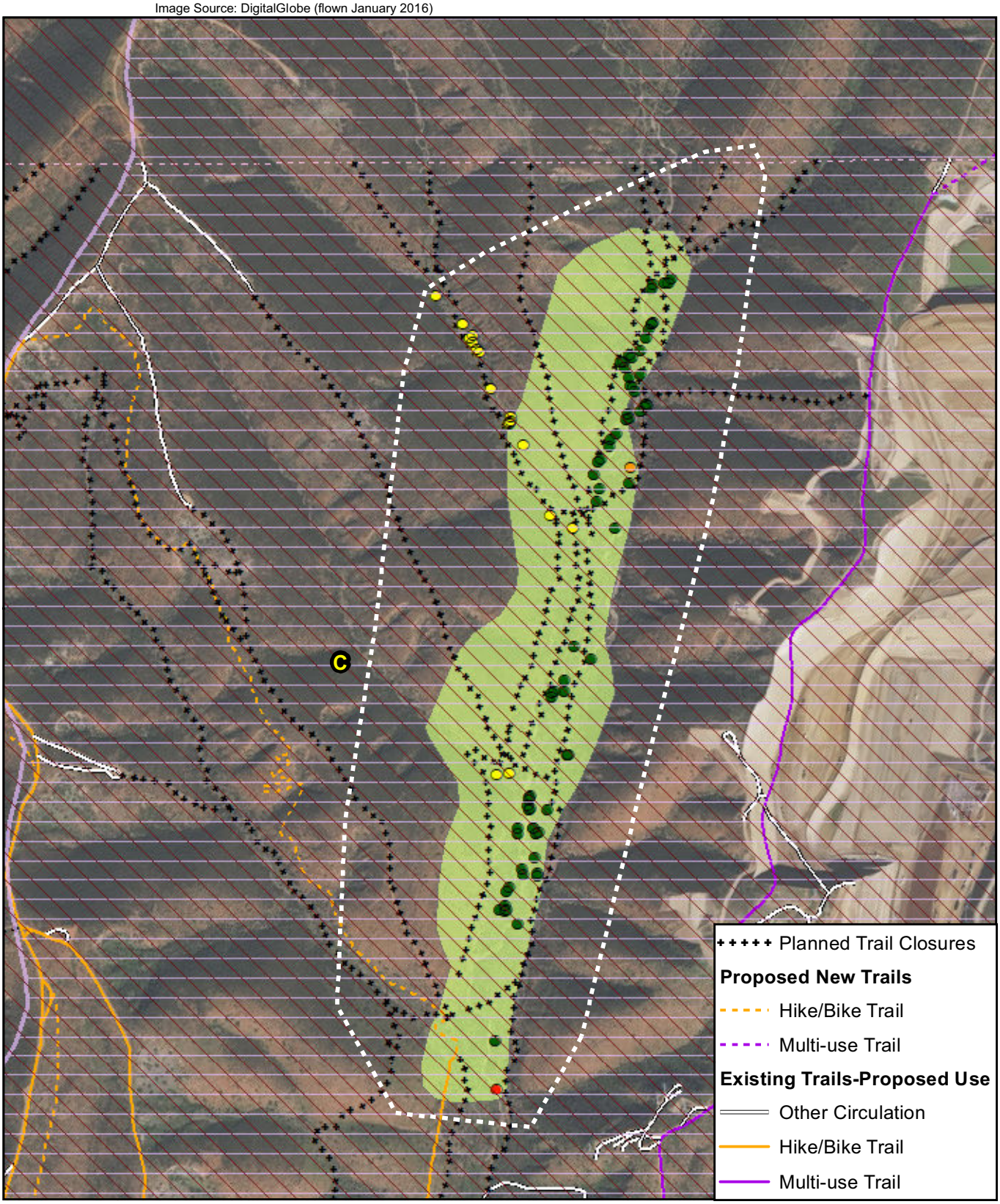
FIGURE 4-17a

Willowy Monardella *(Monardella viminea)*
Detected Occurrences: West Sycamore

RECON

M:\JOBS3\5286\common_gis\fig4-17a.mxd 8/2/2016

Image Source: DigitalGlobe (flown January 2016)



Project Boundary

East Elliott Area

Fire Burn History

1981

2003

Willowy Monardella CNDDB 2000
(Monardella viminea)

CNPS 2000

CNPS 2011

McMillan 2001

RECON 2011

0 Feet 800

RECON

M:\JOBS3\5286\common_gis\fig4-17b.mxd 10/3/2018

FIGURE 4-17b

Willowy Monardella
(Monardella viminea)
Detected Occurrences: East Elliott

4.4.4.3 Anthropogenic Threats at MTRP

a. Invasive Non-native Species

Non-natives species present a significant threat to all extant populations of willowy monardella, including all occurrences at MTRP (USFWS 2008). Non-native plants, especially non-native grasses such as ripgut and red brome grasses (*Bromus diandrus* and *Bromus madritensis* ssp. *rubens* respectively), compete directly with willowy monardella for nutrients, light, water, and space at locations within MTRP. At the West

Sycamore site, total non-native plant cover has ranged from 23 to 74 percent, with non-native grasses comprising 80 to 96 percent of the total within the 2006–2012 monitoring period (City of San Diego 2006–2012). Invasive plants have been shown to colonize disturbed areas as an indirect result of fire, road and trail building, and altered hydrology, and may partially explain (in conjunction with loss of habitat due to erosion) the willowy monardella populations at West Sycamore that maintained their levels in 2004 after the 2003 fire, followed by a crash when non-native grasses at high densities replaced the burned chaparral after the high rainfall of 2005 (B. Miller, pers. comm. 2012; see Figures 4-15 and 4-16).

At the nearby Miramar occurrence, population areas that are heavily invaded by non-native grasses have fewer adult willowy monardella plants than areas with limited non-native grasses (TierraData 2011 in USFWS 2012).

b. Erosion

Willowy monardella requires an ephemeral hydrologic regime that includes periods of flood usually less than 48 hours in duration (USFWS 2012) that cause scour and remove non-native annual plants and their seed from willowy monardella habitat. Populations of willowy monardella at MTRP are found within smaller watersheds that are isolated from the direct effects of urban runoff and large-scale flooding increases due to development seen in other willowy monardella populations in San Diego (see for example White and Greer 2006). Erosive effects caused by extreme water flows within these water sheds have been implicated in habitat degradation within MTRP, especially at Occurrence A. Anecdotal evidence and City monitoring data points to stream channels becoming increasingly characterized by degradational indicators such as undercut banks, channel entrenchment, and a floodplain which no longer carries water at high flows, especially after the sequence of fire to remove soil-stabilizing vegetation in 2003 followed by large floods in 2005. The West Sycamore monitoring data show that willowy monardella populations maintained their levels in 2004 after the 2003 fire and then decreased significantly following the high rainfall of 2005, probably due to a combination of direct habitat loss from erosion and competition from invasive species. Excessive erosion in stream channels causing channel entrenchment, bank undercutting, and reduction of flow pathways has been implicated in the degradation of willowy monardella habitat in the West Sycamore area (B. Miller, pers. comm. 2011).

c. Recreation – Trampling

Willowy monardella is sensitive to direct mortality from non-motorized recreation sources, including trampling from off trail hiking and mountain biking (USFWS 2008). In addition, recreational encroachment can provide a vector (via soil disturbance and seed transport) for aggressive non-native plant species to invade healthy willowy monardella. Currently, Occurrence C occurs within a floodplain which contains two trails frequently used by hikers and for mountain biking. The MPU associated with this document has recommended closing these hiking/biking trails and the reduction of the extent of an existing access road through the habitat at Occurrence C. Occurrence A and B are within the West Sycamore area and currently do not have authorized trail use. Proposed trail corridors within the watershed of Occurrence B will incorporate a 100-foot design buffer and appropriate exclusionary signage to avoid trampling impacts to willowy monardella (see Section 4.4.3.4: Objective 3).

d. Fire and Fire Suppression

While fire can theoretically lead to direct mortality of willowy monardella as well as reduction of the seed bank, all occurrences burned within MTRP in 2003 continue to persist. At the nearby Miramar site, studies showed the willowy monardella resprouted from their root systems after a 2003 fire that burned 98 percent of the population (Rebman and Dossey 2006 in USFWS 2012). Based on MSCP monitoring data, it appears that fires indirectly impact the species through habitat conversion from native to non-native species after fire disturbance and increased erosion and sedimentation.

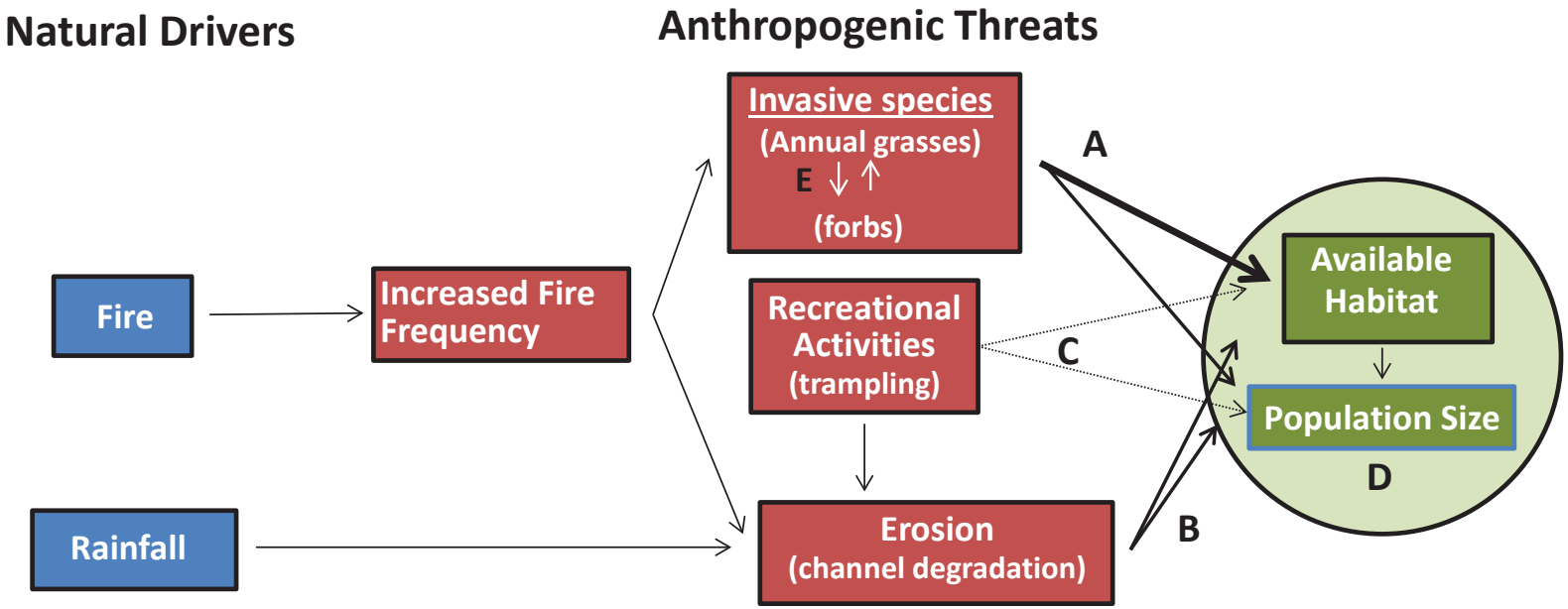
Fire suppression, especially the cutting of fire breaks within willow monardella watersheds, can lead to increased rates of erosion and hydrologic inputs into the floodplains of occupied habitat. Fire breaks were cut during the 2003 wildfires in the flood plains of all three occurrences of willowy monardella at MTRP.

4.4.4.4 Management Goals and Objectives

Goal: Stabilize and maintain known populations of willowy monardella at MTRP (Figure 4-18).

Willowy Monardella *(Monardella viminea)*
Goal: Maintain and enhance known populations of willowy monardella at MTRP

Monitor responses of populations to threat management actions



Management:
A. Weed Control (dethatching + herbicide)
B. Install erosion control within population watershed
C. Limit trail development within watersheds of known populations

Critical Uncertainties:
D. Limitations on reproduction/recruitment
E. Herbicide weed type selection

RECON

FIGURE 4-18
Conceptual Model for Willowy Monardella at MTRP

Objective 1: Erosion Control

- Perform an initial hydrological evaluation to identify erosive hydrological inputs into the watershed at Occurrence A. The hydrological evaluation shall include recommendations for appropriate erosion control. During NRMP surveys observable anthropogenic hydrologic inputs and modifications within the watershed included nuisance flows from utility access roads, drainage from concrete-lined brow ditches, and directed flows from graded construction pads.

- Adaptive management actions including erosion control and further minimization of hydrologic peak flows into the floodplains shall be initiated on entrenched (>1.4 entrenchment ratio) stream reaches (Rosgen 1997). More extensive and intrusive stream restoration actions, including stream bank excavation and/or efforts to raise channel elevation, will need to be part of a stream restoration plan and coordinated with state and federal water agencies.

- Install erosion control measures at identified anthropogenic hydrologic inputs within the watershed of Occurrence A. Many of these inputs appear to enter the watershed from a previously graded ridgeline at the northern edge of the watershed and at the terminus of utility access roads (Figures 4-19a-b). Erosion control structures may include straw wattles, gabions, and water bars.

- Coordinate with SDG&E to control erosional flows emanating from the utility access road on western slope (lat: 32.9247, long: -116.99449) of the Occurrence A watershed (see Figure 4-18a).

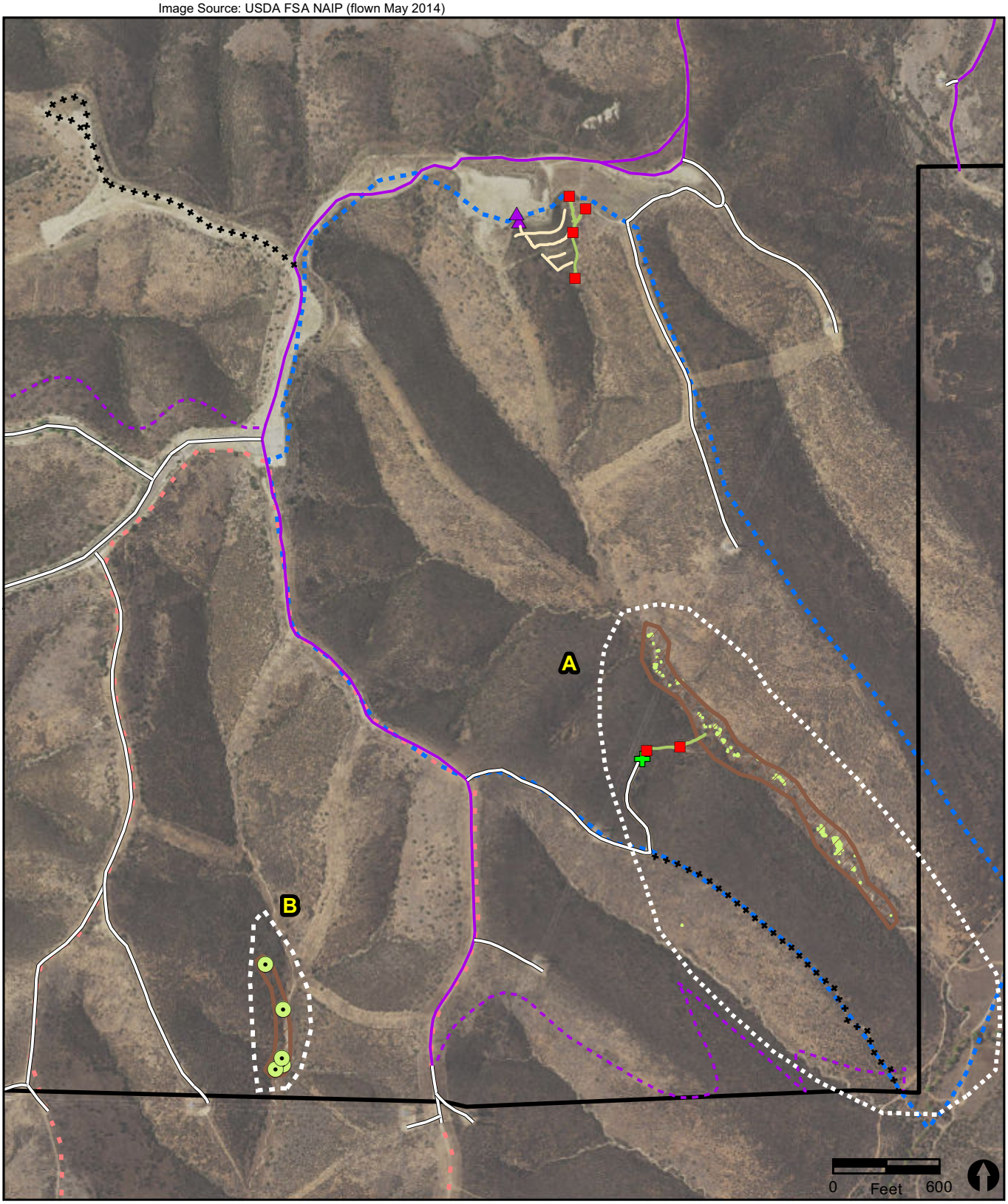
- Access to Occurrence A is from the southeast via an access road through the County of San Diego Goodan Ranch Sycamore Canyon Preserve. Work crews and monitoring staff shall coordinate with the preserve prior to entry: (858) 513-4737.

Erosion control monitoring

Entrenchment ratio monitoring shall be conducted within selected reaches of the watershed of Occurrence A to assess stream channel stability before and after the installation of erosion-control devices. A total of three cross-sections of the stream channel were selected in 2010 for monitoring by the City (see Figure 4-12a). In order achieve statistical power to detect change over time; a larger sample size will be needed and Before-After Control-Impact paired design shall be used (Smith 2002, see below).

Research Question: Does entrenchment ratio change correlate with erosion control actions?

Image Source: USDA FSA NAIP (flown May 2014)



Project Boundary
Watershed of Population A
Watershed of Population B
Weed Management Area
Willowy Monardella *(Monardella viminea)*
Anthropogenic Erosional Feature
Brow Ditch
Drain
Proposed Erosion Control
SDG&E Access Road Erosion
Planned Trail Closures
Proposed New Trails
Multi-use Trail
Existing Trails-Proposed Use
Other Circulation
Multi-use Trail

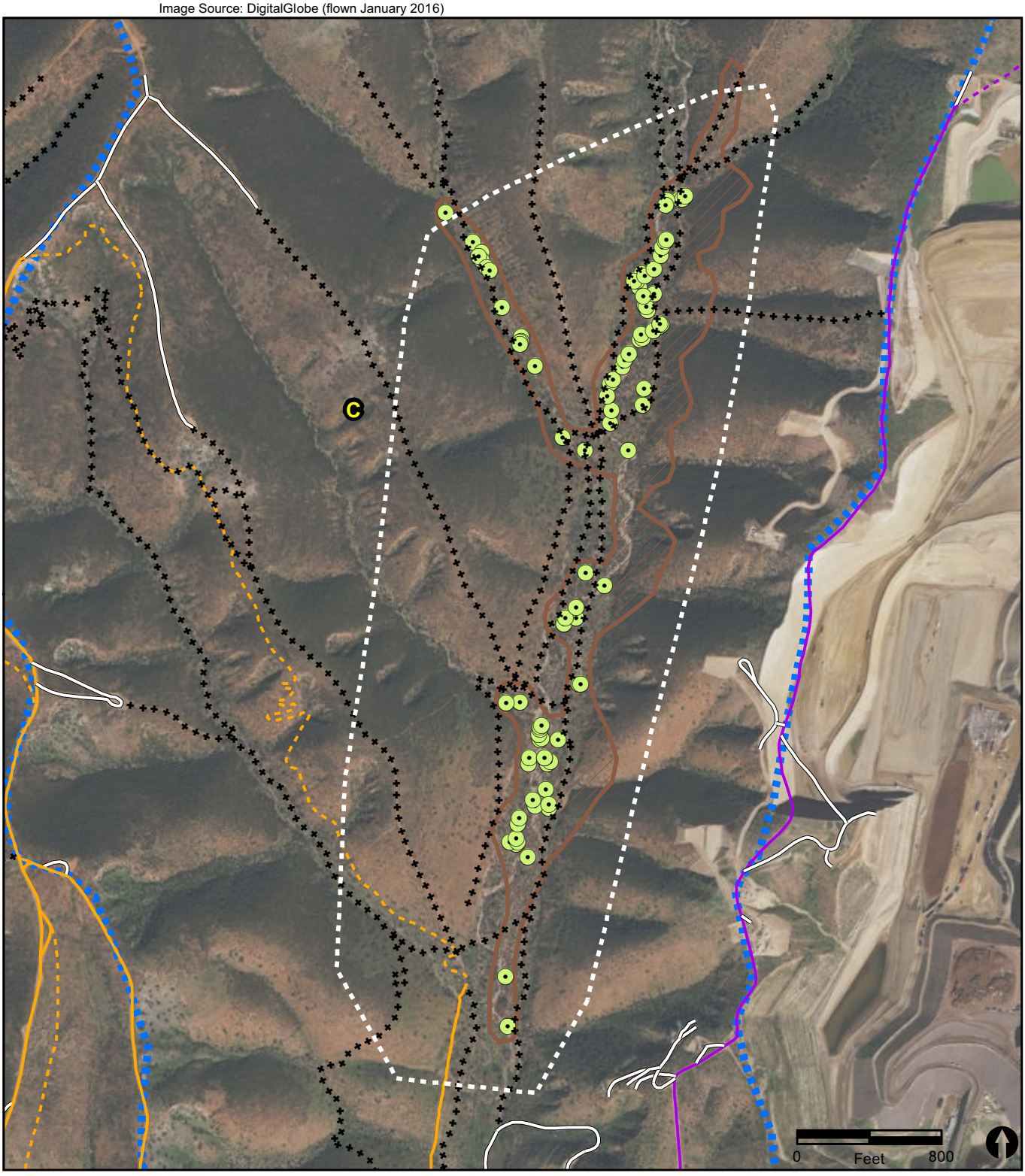
RECON

M:\JOBS3\5286\common_gis\fig4-19a.mxd 8/2/2016

FIGURE 4-19a

Willowy Monardella *(Monardella viminea)* Management Actions: West Sycamore

Image Source: DigitalGlobe (flown January 2016)



Project Boundary

Watershed of Population C

Weed Management Area C

Willowy Monardella (*Monardella viminea*)

Planned Trail Closures

Proposed New Trails

Hike/Bike Trail

Multi-use Trail

Existing Trails-Proposed Use

Other Circulation

Hike/Bike Trail

Multi-use Trail

FIGURE 4-19b
Willowy Monardella
(Monardella viminea)
Management Actions: East Elliott

RECON

M:\JOBS3\5286\common_gis\fig4-19b.mxd 10/3/2018

Data collected: Initially, a set of baseline summary statistics shall be collected for reaches within Occurrence A (treatment area) and Occurrence B (control area). These initial statistics shall include mean entrenchment ratio and standard deviation. Entrenchment ratio is calculated by the following equation:

$$\text{Entrenchment ratio} = \frac{\text{Flood-prone width}}{\text{Bankfull width}}$$

For a full discussion of flood-prone width and bankfull width, see Applied River Morphology (Rosgen and Silvey 1996). For channel entrenchment classifications, see Table 4-10 (Rosgen 1997).

TABLE 4-10
CHANNEL ENTRENCHMENT CLASSIFICATIONS

Entrenchment Classification	Entrenchment Ratio
Entrenched	< 1.4
Moderately entrenched	1.4 – 2.2
Slightly entrenched	> 2.2

Entrenchment ratios shall be sampled within both reaches before and after erosion control measures are installed.

Sample size: 30 samples per reach collected annually over three seasons

Statistical Analysis: Generalized linear model ANOVA with repeated measures as a fixed effect. A baseline distribution shall be designated after the initial round of data is collected. The following parameters for this statistical design were calculated using G*Power version 3.1.5 (Faul et. al. 2009).

P-value: 0.05
Effect Size: 0.56
Power: 0.956
Sample Size: 30
Groups: 2

Objective 2: Exotic Weed Removal from Occupied Habitat

- If needed, dethatch in a five-foot radius around selected individuals within willowy monardella WMAs (see Figures 4-19a-b). Dethatching shall occur in fall. Currently, upland exotic grasses have invaded the drainage floodplains and terraces within willowy monardella habitat. No plants with a wetland indicator status shall be removed from the flood plain as a part of dethatching. Wetland indicator status for plants can be found on the USDA website (2012). If wetland plants become a threat to willowy monardella, a separate strategy including agency coordination and permitting may need to be implemented.

- As weed density and low recruitment have been implicated in willowy monardella decline, a recruitment study tied to weed control efforts would be a cost effective way to determine the effectiveness of management actions.

  Research question: Does dethatching have an effect on willowy monardella recruitment?

  Experimental design: A paired experimental design with 46 paired samples (pair = one treated and one untreated clump in close proximity) within one watershed (Occurrence C).

  Data collected: Dethatched - (Y/N)
  Recruitment - #

  Sample Size: 46 pairs

  Statistical Analysis: T-test (calculated using G*Power 3.1.5)

p-value:	0.05
Confidence Interval:	10
Effect size:	0.5
Power:	0.954
Sample size:	46 (paired)

Objective 3: Trail Reroute & New Trail Impact Minimization

- Currently, two informal trails run through the floodplain within willowy monardella habitat at Occurrence C. These trails will be closed or rerouted as a part of the Master Plan Update associated with this document (see Figure 4-19b). In addition, the extent of an existing access road through the floodplain of Occurrence C will be reduced.

- In order to prevent unauthorized trail development within the West Sycamore area and to minimize encroachment into MCAS Miramar, a new trail corridor is proposed within the watershed of Occurrence B. Prior to final trail design and construction, the following will be required (in addition to those identified in the project specific environmental permitting process):

  1) Willowy monardella survey update within any occupied watershed potentially impacted by trail development.

  2) 100-foot minimum design buffer from observed willowy monardella individuals.

  3) Pre-construction entrenchment surveys shall be conducted within the occupied watershed.

4) Monitoring of individuals and channel stability shall be conducted for five years following construction to detect change as a result of trail design and inform adaptive management (see Objective 1 monitoring).

5) Adaptive management shall focus on limiting additional hydrologic inputs as a result of trail presence to occupied watersheds.

Objective 4: Exclusion Fencing/Signage

- Exclusion fencing and educational signage shall be installed on City property near existing trails or upon development of proposed trails near Occurrence C (see Figure 4-19b).

- Signage and access barriers shall be installed and maintained at all MTRP gates to prevent unauthorized recreational uses within areas of East Elliott that have been acquired by the City.

4.4.4.5 Monitoring

- Adaptive management monitoring shall follow recommendations in Objectives 1 and 2

- MSCP monitoring shall be based on the MSCP rare plant monitoring protocols, which specify both the methods and the locations for monitoring actions.

- If not included in the current MSCP rare plant monitoring protocols, the West Sycamore population shall be surveyed annually for presence/absence and threats, and individuals and clumps recorded with a submeter GPS. Ancillary data determined to be relevant to preserve-level management shall also be collected.

4.4.4.6 MSCP Conditions of Coverage

One hundred (100) percent of major populations of willowy monardella are to be preserved under the MSCP. In addition, no major populations within the MHPA shall be impacted. Area-specific management directives must include specific measures to protect against detrimental edge-effects (MSCP 1998: Table 3-5).

No populations of willowy monardella are impacted by the actions of the proposed MPU and NRMP objectives described in Sections 4.4.4.4 and 4.4.4.5. Furthermore, these goals and objective are species specific and designed to reduce edge effects of the trail system via rerouting, erosion control, and weed control.

4.4.5 Coastal Cactus Wren (*Campylorhynchus brunneicapillus couesi*)

4.4.5.1 Background

The coastal cactus wren is a CDFW species of concern and is a MSCP covered species (Unitt 2008). This subspecies ranges from southern Orange County through San Diego County into extreme northwestern Baja California (Proudfoot et al. 2000). The coastal cactus wren can be observed year-round within coastal sage scrub and maritime succulent scrub (MSS) vegetation communities of coastal lowlands (Photograph 4-8; Unitt 2004). Coastal cactus wrens require thickets of cholla (*Cylindropuntia* sp.) and/or prickly pear (*Opuntia oricola*) cacti in which to build their nests. Coastal cactus wrens often build secondary nests, which are used for roosting and nesting for subsequent broods (Proudfoot et al. 2000). Nesting occurs from March through July; fledglings remain in the nest until September. The cactus wren diet consists mainly of grasshoppers, beetles, ants, wasps, butterflies, moths, spiders, and occasionally vegetation, reptiles, and amphibians (Proudfoot et al. 2000).

Coastal cactus wrens have been shown to disperse from 0.6 to 1 mile on average from home territories in Orange County (Atwood et al. 2002; Bontrager and Gorospe 1995; Preston and Kamada 2011). The coastal cactus wren observed at MTRP is within the West Sycamore area and is approximately 1.2 miles southeast of a wren observed in 1990 (although this area is now developed) and 3.25 miles northwest of a wren observed near Santee Lakes in 1990. The coastal cactus wren habitat present within West Sycamore is dominated by a large expanse of thick clumps of prickly pear cactus and is located on well-drained soils near the crest of a southwestern-facing ridgeline. In order to facilitate genetic exchange and population distribution expansion, management shall include the restoration or enhancement of cactus patches (available cactus wren habitat) at distances relative to their ability to disperse.

Regionally, coastal cactus wren populations have declined precipitously in the last two decades due primarily to habitat loss and fragmentation (Rea 1990). Periodic drought when combined with regional habitat fragmentation can constitute an exacerbating factor for other threats (such as wildlife) to coastal cactus wren. Drought can weaken the vigor of resident birds and under extreme conditions can cause reproductive failure and/or population reduction through mortality (Bolger et al. 2005). Although most small birds have life spans of several years and many can survive to reproduce in more favorable years, unusual cases of consecutive years of drought may actually result in depressed populations over large areas, especially for resident species.

Photograph 4-8: Coastal cactus wren habitat within the West Sycamore area of MTRP.

4.4.5.2 Presence within the MTRP

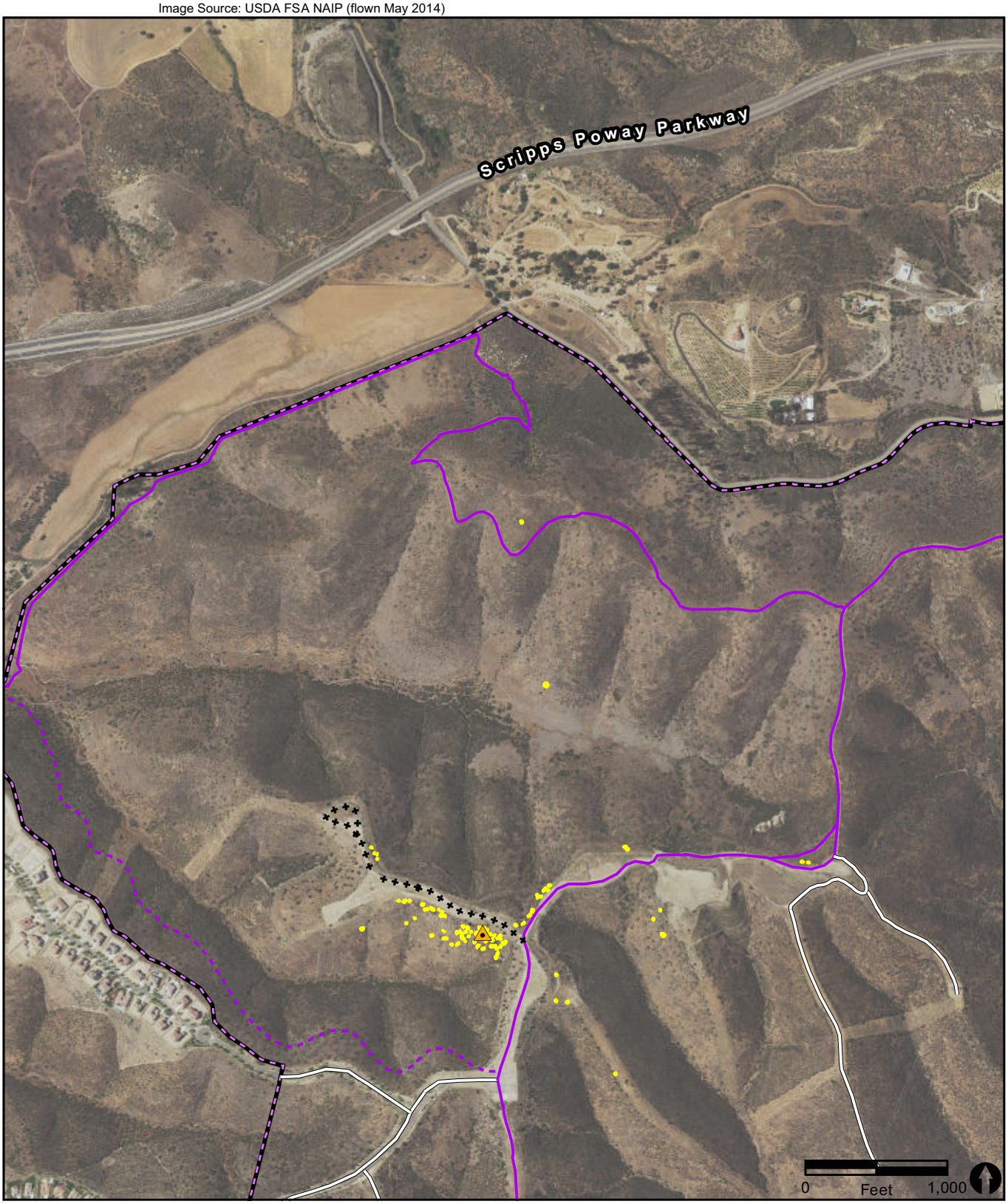
One cactus wren was observed in a large stand of prickly pear on the West Sycamore area by RECON biologists during vegetation surveys in 2011. In general, MTRP does not contain large concentrations of dense cacti, the exception being a large patch in the West Sycamore area (Figure 4-20). Regionally, coastal cactus wren has been reported to east and southeast of the MTRP (State of California 2011b, Figure 4-21).

4.4.5.3 Anthropogenic Threats at MTRP

a. Fire

Wildfire has been identified as a major threat to coastal cactus wren habitat in southern California (Rea and Weaver 1990). Large cactus stands, despite their succulent growth form, are sensitive to mortality from wildfire. Vegetation loss removes habitat shelter and productivity, rendering an area unsuitable for coastal cactus wren, which, in combination with isolation through or resulting from habitat fragmentation, can cause localized extinctions. After a wildfire, it can take many years for cactus patches to recover to a sufficient size to be used by coastal cactus wren (Proudfoot et al. 2000; Solek and Szijj 2004).

Image Source: USDA FSA NAIP (flown May 2014)



Project Boundary

West Sycamore Area

Cactus Patches

San Diego Cactus Wren (RECON 2011)
(*Campylorhynchus brunneicapillus couesi*)

+++++ Planned Trail Closures

Proposed New Trails

Multi-use Trail

Existing Trails-Proposed Use

Other Circulation

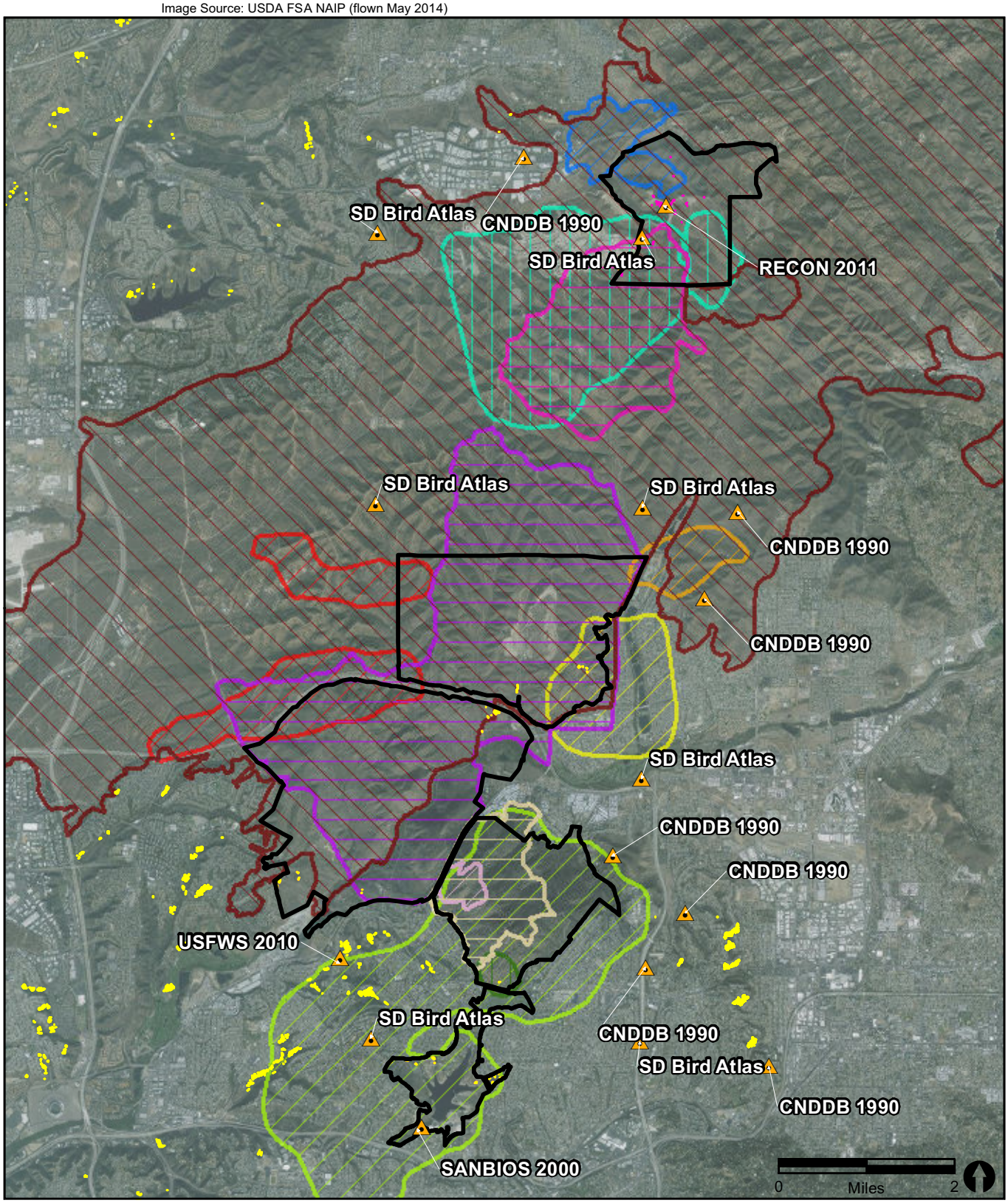
Multi-use Trail

FIGURE 4-20
San Diego Cactus Wren
(*Campylorhynchus brunneicapillus couesi*)
Detected Occurrences: West Sycamore

RECON

M:\JOBS3\5286\common_gis\fig4-20.mxd 8/2/2016

Image Source: USDA FSA NAIP (flown May 2014)



Project Boundary

Cactus Patches (RECON 2011)

Cactus Patches (MSCP Surveys 2009-2011)

San Diego Cactus Wren (*Campylorhynchus brunneicapillus couesi*)

Fire Burn History

1939
1941
1942
1944
1950
1968
1981
1983
1986
1988
1995
2003

FIGURE 4-21

San Diego Cactus Wren (*Campylorhynchus brunneicapillus couesi*) and Cacti: Regional Habitat Connectivity

RECON

M:\JOBS3\5286\common_gis\fig4-21.mxd 4/26/2016

b. Invasive Non-native Species

Cactus wren habitat within the West Sycamore area is currently invaded by a population of purple fountain grass, an exotic perennial grass. The fountain grass has invaded the ridgeline along an access road and historically developed areas. Exotic grasses pose a threat to coastal cactus wren by providing an easily ignitable fuel source, contributing to the intensity of wildfires and the destruction of cactus wren habitat. In addition, as coastal cactus wrens feed on insects in interstitial spaces between shrubs, non-native grasses in the area occupy and degrade potential foraging habitat.

4.4.5.4 Management Goals

Goal: Establish and sustain a persistent population of coastal cactus wren within the West Sycamore area at MTRP (Figure 4-22).

Objective 1: **Reduce combustible fuels within Cactus Wren Management Area**

- Woody and herbaceous vegetation shall be thinned within the cactus wren management area (CWMA) if it is determined that the density of these species is threat to the cactus patch(es) (Figure 4-23). Exotic species shall be prioritized for treatment and removal from the CWMA. Thinning of native shrubs shall be implemented only if further fuel reduction is needed after non-natives and dead biomass are removed (see below). California gnatcatcher, an MSCP covered species which uses native shrubs as habitat, has not been observed within or near the CWMA (nearest CNDDB location is 0.5 mile north). Vegetative debris from thinning can be aggregated and left on-site (if native) or removed and disposed within a landfill (exotic species). Fuel removal from within the CWMA shall be prioritized as follows:

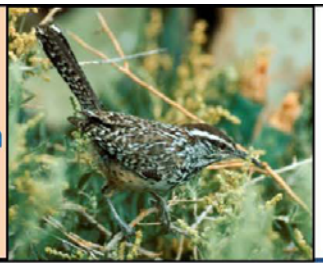
    1) Treat and remove exotic species: The CWMA is infested with purple fountain grass (*Pennisetum setaceum*). Purple fountain grass shall be cut and sprayed with an appropriate herbicide.

    2) Remove dead biomass/accumulated thatch.

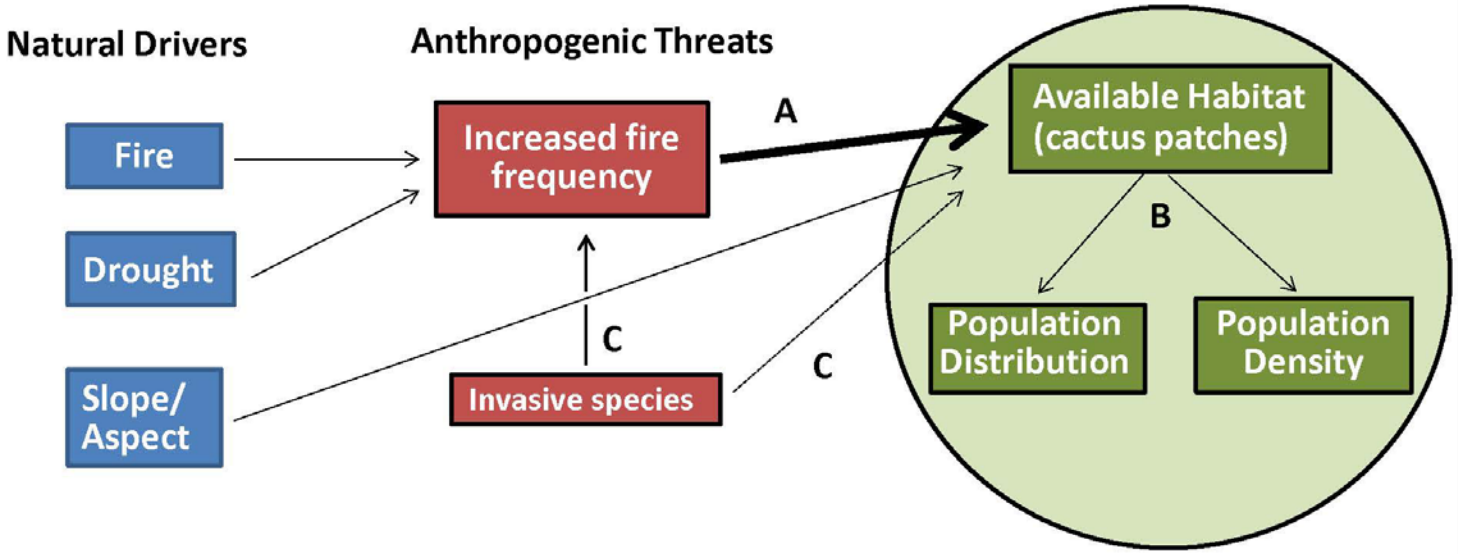
    3) Prune large, woody native shrubs: Prune large native shrubs (laurel sumac [*Malosma laurina*]) up from ground to reduce fire ladder effects and total available fuel load of individuals.

    4) Selectively thin remaining coastal sage scrub vegetation around a 15-foot perimeter of existing cactus patches: Cut sagebrush mechanically at their base, leaving roots in place. As coastal sagebrush in considered a primary component of MSCP-covered costal California gnatcatcher habitat, it shall be selectively brushed only when priorities 1–3 have been completed.

Coastal Cactus Wren (*Campylorhynchus brunneicapillus cousei)*
Goal: Establish and sustain a persistent population of coastal cactus wren within the West Sycamore area at MTRP



Monitor population responses to management actions

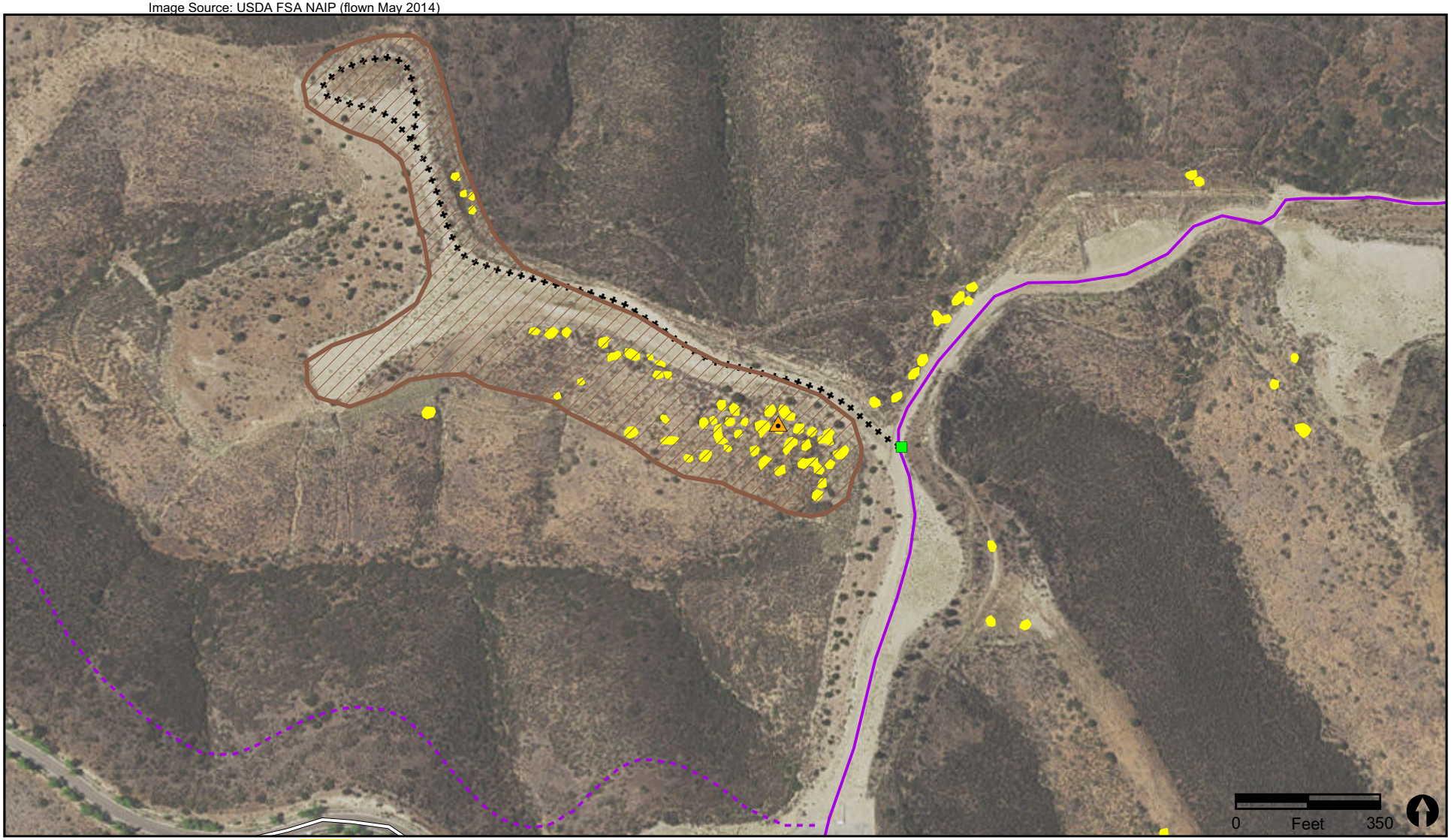


Management:
A. Brush existing large cactus patches
B. Planting (expand existing small patches)
C. Remove exotic species

Critical Uncertainties:
D. Role of west Nile virus in population dynamics
E. Population and occupancy dynamics between habitat patches

FIGURE 4-22
Conceptual Model for Coastal Cactus Wren at MTRP

Image Source: USDA FSA NAIP (flown May 2014)



San Diego Cactus Wren Management Area
- Brush Management
- Exotic Species Removal
- Cacti Transplantation

Cactus Patches

San Diego Cactus Wren (*Campylorhynchus brunneicapillus couesi*)

Proposed Exclusionary Signage

Planned Trail Closures

Proposed New Trails

Multi-use Trail

Existing Trails-Proposed Use

Other Circulation

Multi-use Trail

RECON

M:\JOBS3\5286\common_gis\fig4-23.mxd 8/2/2016

FIGURE 4-23

San Diego Cactus Wren (*Campylorhynchus brunneicapillus couesi*) Management Actions: West Sycamore

- Vegetation thinning shall occur outside of bird nesting season after the end of both the growing season and bird nesting season (August 15-February 15).

Objective 2: Enhance MSS habitat by expanding cacti distribution and density within Wren Management Area (This effort was initiated in 2015 with assistance from SDG&E)

- Cactus pads harvested from local prickly pear and cholla stock shall be planted within the coastal cactus wren management area to increase the density of cacti and the quality of cactus wren habitat (see Figure 4-23).

- Identify additional areas within the West Sycamore area within 1 mile (average juvenile dispersal distance) of the CWMA for additional cactus wren focused habitat restoration opportunities. Ideally, cactus wren habitat restoration areas should be in areas that are likely to support MSS. Potential MSS restoration areas include more xeric locations within coastal sage scrub vegetation. This includes areas located at the top of south-facing slopes and should ultimately provide 1-4 acres of restored habitat, the approximate territorial range of a coastal cactus wren (Steintz 1997).

Objective 3: Trail Closure/Reroute

- Proposed trail use in West Sycamore area will avoid the CWMA (see Figure 4-23). In addition, an existing access road along the ridgeline within the CWMA will be closed.

4.4.5.5 Monitoring/Surveys

- Conduct presence/absence coastal cactus wren surveys annually. As coastal cactus wrens are year-round residents, surveys shall be conducted twice per year (once during breeding season, once in winter).

- Establish photo points within and facing vegetation management areas using a handheld GPS. Photo monitoring shall be conducted in conjunction with vegetation monitoring every three years. Photos shall be used to qualitatively track the expansion of cactus distribution and density within the CWMA.

- Use relevé vegetation sampling to monitor vegetation within cactus wren management area. Relevé vegetation monitoring shall track the relative cover of cactus species in comparison of woody and herbaceous fuels within the CWMA. Relevé monitoring shall also be used to identify exotic species densities and inform adaptive management actions. In addition to typical relevé monitoring, cacti coverage estimates shall be grouped in to height classes to track growth and development of cacti transplantations (Table 4-11).

TABLE 4-11
CWMA CACTI HEIGHT CLASSES
(feet)

Low	>1
Intermediate	1-3
Mature	>3

4.4.5.6 MSCP Conditions of Coverage

Area-specific management directives must include restoration of maritime succulent scrub habitat, including propagation of cactus patches, active/adaptive management of cactus wren habitat, monitoring of populations within preserves, and specific measures to reduce or eliminate detrimental edge effects. No clearing of occupied habitat may occur from the period February 15 through August 15 (MSCP 1998: Table 3-5).

Area specific management directives described in the goals and objectives of Section 4.4.5.4 include the quality improvement and expansion of available habitat for coastal cactus wren. In addition, an unauthorized trail within the CWMA is proposed for closure, thereby reducing the proximity of edge effects to the species.

4.5 Priority Management Guilds at MTRP

In order to more efficiently manage natural resources at MTRP, sensitive habitats have been grouped into geographic areas based on threat type similarities. Each of these “Management Guilds” will be used to coordinate threat treatment across several sensitive species and vegetation types. Each guild has been developed according to membership rules specific to identified resources and threats within MTRP.

4.5.1 Cliffs and Rocky Outcrops

4.5.1.1 Background

MTRP contains two types of high-slope, bare rock habitats: rocky outcroppings and quarry cliff faces. The quarry cliff faces at MTRP are two sets of abandoned rock quarries and are located on the northwest side of the San Diego River, just northeast of the San Diego River crossing and access road.

a. Quarry Cliffs

The cliff faces at MTRP are associated with the abandoned quarry sites, aligned on a southeast-facing aspect, and have nearly vertical slopes and numerous fractures and crevices (Photograph 4-9). The two quarry cliff faces at MTRP are directly adjacent to mature riparian forest associated with the San Diego River and provide unique and high-quality habitat for sensitive bat species in the area (see bat discussion below).

Photograph 4-9: Visitor Center Loop quarry cliff face, MTRP, facing northwest.

b. Rocky Outcrops

In addition to the steep cliffs, the park contains eroded granite boulder outcroppings. These outcroppings are located just above and northwest of the midpoint of the San Diego River. They are quite extensive, spanning approximately 200 meters of the hillside above the river and have mainly a southeast-facing aspect. They have been formed naturally and are composed of numerous large, obelisk-shaped boulders that are vertically oriented with moderate amounts of fracturing (Photograph 4-10).

Photograph 4-10: West Kwaay Paay rocky outcropping, MTRP, facing northeast.

c. Existing Conditions

The inaccessibility of cliffs and rocky outcropping provide moderate amount of protection from predation and are used as roosting and nesting sites by sensitive species (Table 4-12). With few exceptions, bird nests are protected by federal law (Migratory Bird Treaty Act, as amended, 16 United States Code §§ 703-712 and CA Code 3503). In addition to nesting locations, cliffs and rocky outcroppings' height and wide field of view provide perching opportunities for raptors.

TABLE 4-12
SENSITIVE SPECIES OBSERVED WITHIN THE CLIFFS AND ROCKY OUTCROPPING MANAGEMENT GUILD AT MTRP

Species	MSCP Covered?
Big free-tailed bat	No
Pocketed free-tailed bat	No
Western mastiff bat	No
Western red bat	No

Focused, baseline surveys for nesting raptors were conducted on cliffs and rocky outcroppings at MTRP in 2010 (Clark 2010). Although evidence of perching (whitewash) and one instance of nesting (common raven) was observed at rocky outcropping sites, the majority of cliff nesting and bird foraging activity was observed at quarry cliff sites (Southwest Boundary Quarry and Visitor Center Loop Quarry).

Focused, baseline surveys for roosting bat species were conducted at a total of seven selected rock outcrops and abandoned quarry sites, half of which are directly within the canyon of the San Diego River (RECON 2010). Observed bat activity was greatest at the two pairs of quarries located along the San Diego River; the Southwest Boundary quarry and Visitor Center Loop Quarry (Figure 4-24). Observations of roosting pocketed free-tailed bats (*Nyctinomops femorosaccus*) were made during their post-sunset exodus at these quarries, and high levels of bat activity, including numerous social calls, were recorded and heard at these sites consistent with activity at roosts. The largest of the pocketed free-tailed bat colonies appears to be in the Visitor Center Loop Quarry. The estimated colony size here at its largest was approximately 30 bats, but there appear to be bats here year-round based on this survey and previous survey work in MTRP (RECON 2010). The pocketed free-tailed bat colony size at the Southwest Boundary Quarry appears to be about half of that roosting at the Visitor Center Loop Quarry. Several other bat species were observed at both these quarry sites, but these appeared to occur in lower numbers. The highly fractured nature of these quarries, their solar radiation-absorbing aspect, and their immediate juxtaposition to productive foraging habitats (San Diego River and scrub hillsides) apparently contribute to making them the most supportive of cliff-roosting bat populations in MTRP.

4.5.1.2 Guild Membership Rules

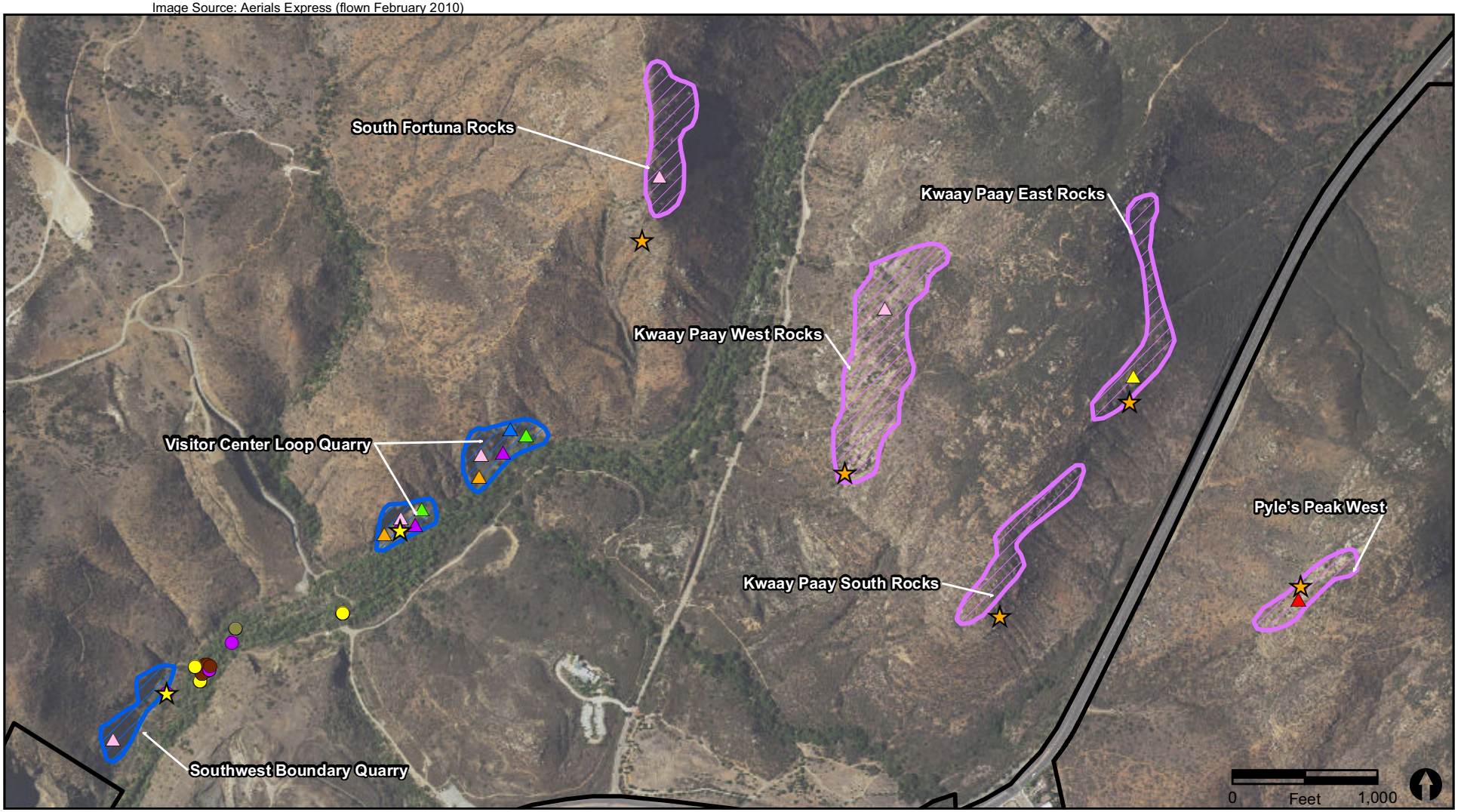
Cliffs and rocky outcrops identified by previous bat and raptor surveys (Clark 2010 and RECON 2010) at MTRP.

4.5.1.3 Threats at MTRP

a. Recreation – Rock Climbing

Rock climbing is a popular activity at MTRP and can pose threats to wildlife, especially certain sensitive bat and raptor species. Bats with a high degree of roost fidelity (such as the state-sensitive pocked free tail bat) can be significantly affected by rock climbing activities. Other bats which move from roost-to-roost may not be as directly disturbed by rock climbing activities, but may act as disease vectors if recreational activities introduce pathogens into the bat meta-population at MTRP.

Image Source: Aerials Express (flown February 2010)



Quarry Cliff Faces

Rocky Outcroppings

Pocketed Free-tailed Bat Roosts (RECON 2010)

Less Than 20 Individuals per Roost

Greater than 100 Individuals per Roost

Species (RECON 2010)

Big Brown Bat

Big Free-tailed Bat*

Brazilian Free-tailed Bat

Greater Western Mastiff Bat

Hoary Bat

Pocketed Free-tailed Bat*

Western Mastiff Bat*

Western Pipistrelle Bat

Western Red Bat*

*Sensitive Species

Species (Clark 2010)

Barn Owl

Cliff Swallow

Common Raven

House Finch

Red Tail Hawk (nest)

Rock Wren

White-throated Swift

RECON

M:\JOBS3\5286\common_gis\fig4-24.mxd 4/26/2016

FIGURE 4-24
Cliffs and Rocky Outcroppings
within Mission Trails Regional Park

b. Introduced Disease (Emerging Threat)

White-Nose Syndrome (WNS) is a devastating, rapidly spreading disease observed in bat roosts in the Midwest and East Coast of the United States. The WNS grows on infected bats and inhibits hibernation, causing uncharacteristic behavior and eventual starvation. First documented in New York in the winter of 2006–2007, WNS has spread across the eastern United States and Canada, resulting in 90 to 100 percent mortality of bats in hibernaculum where WNS occurs (USFWS 2011). While this fungus has not yet been reported in the western U.S., it is anticipated that WNS will continue spreading to surrounding states, and the potential exists for outbreaks due to human activities in states distant to the currently affected area (USFWS 2011). The mobility of bats, the rapid spread of WNS, and the potential for human-assisted transmission has resulted in guidelines that require a national effort by land owners and resource agencies to avert irreversible losses to bat populations, and associated ecological impacts, throughout North America (USFWS 2011). These guidelines, *A National Plan for Assisting States, Federal Agencies, and Tribes in Managing White-Nose Syndrome in Bats* (USFWS 2011), provide guidance on regulation or restriction of human actions that are likely to pose a risk for spreading WNS, including recreation activities that bring humans in close proximity with bats, such as caving and climbing near roosts and hibernaculum. MTRP contains several rock faces containing large bat roosts which overlap with popular recreational rock climbing activities.

4.5.1.4 Management Goals

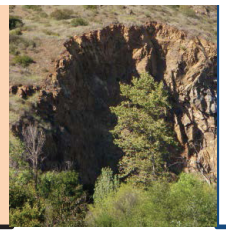
Goal: Maintain populations of cliff dwelling and rocky outcrop sensitive species while allowing for recreational activities at MTRP (Figure 4-25).

Objective 1: Trail Closure / Reroutes

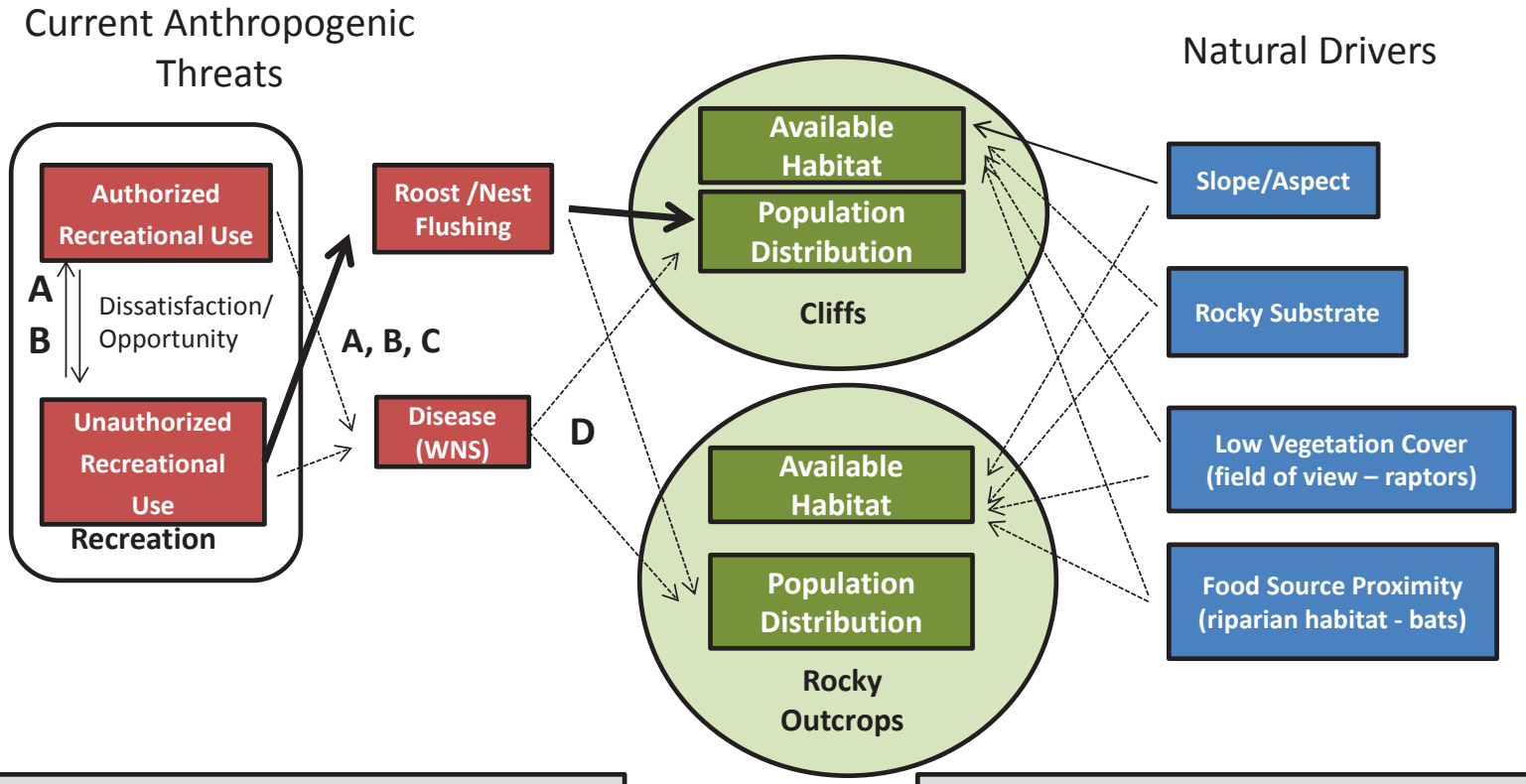
- There are currently no direct, authorized trail access routes to quarry cliff faces (which harbor the grand majority of sensitive species within the guild, see Figure 4-24). One new hiking trail is proposed as a connection north of the Visitor Center Loop Quarry (Figure 4-26). Avoidance constraints upon the development of this trail alignment (in addition to those required by project specific CEQA review to avoid and minimize recreational impacts to roosts) shall include a 200-foot buffer from cliff boundaries to reduce the potential of edge effects.

Cliffs and Rocky Outcrops Management Guild

Goal: Maintain populations of cliff dwelling and rock outcrop sensitive species while allowing for recreational activities at MTRP



Monitor recreational threats and sensitive species response to management actions



Management:

A. Trail closure/reroute
B. Exclusionary signage
C. Ranger patrols

Critical Uncertainties:

D. White-nose syndrome (WNS) lethality in mild winter climates

RECON

M:\JOBS3\5286\env\graphics\NRMP\fig4-25.ai 07/13/17 vem

FIGURE 4-25

Conceptual Model for Cliffs and Rocky Outcrops Management Guild

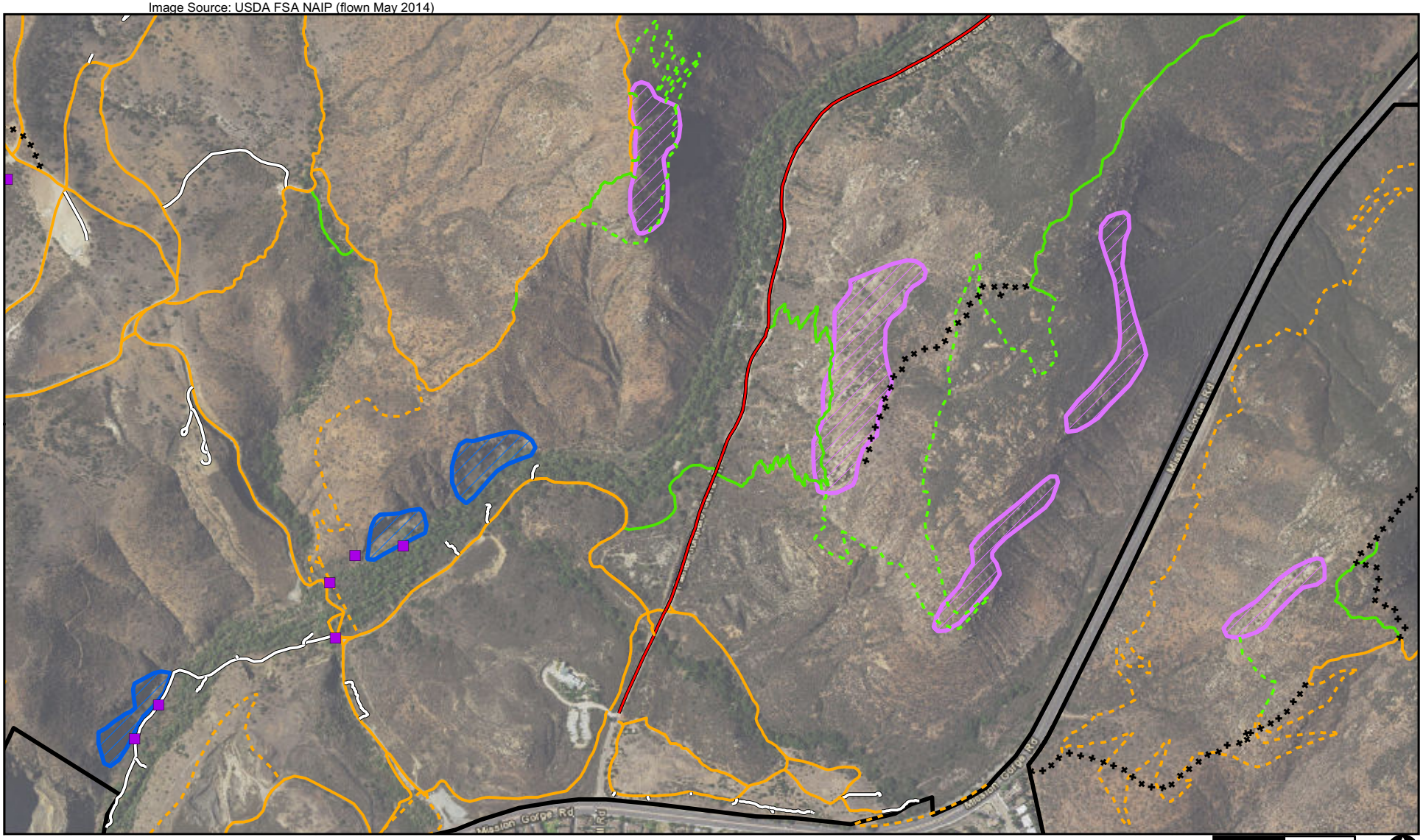


FIGURE 4-26
Cliff and Rocky Outcroppings Guilds
Management Action: Mission Trails Regional Park

Objective 2: Exclusionary Signage

- As the two quarry cliff faces (Southwest Boundary Quarry and Visitor Center Loop Quarry) contain resident, state-listed roosting bats with regional emerging threats to bat roosts, these areas are to be protected from recreational disturbance. Currently, access to the Southwest Boundary Quarry is provided via an infrequently used utility road, which is closed to recreational park users. This road shall remain closed to recreational activities. Exclusionary signage with specific reference to rock climbing restrictions and enforcement penalties shall be placed at access points and cliff bases at both quarry locations (see Figure 4-26).

Objective 3: Ranger Patrols

- Ranger patrols shall continue to target unauthorized recreational access on quarry cliff faces (Southwest Boundary Quarry and Visitor Center Loop Quarry). Patrols shall be scheduled at random intervals year round with increased frequency and intensity during peak bat breeding and roosting activity (March–September) and can be conducted via binoculars. Violation numbers and type shall be tracked and used to inform adaptive management actions (signage, user education, etc.).

4.5.1.5 Monitoring

In order to track the response of threats to recommended management actions, surveys for raptors and bats shall be conducted as follows:

- Observations and warnings/citations of unauthorized recreational activities (rock climbing) within sensitive roosting sites (Southwest Boundary Quarry and Visitor Center Loop Quarry) shall be tracked by MTRP Park Rangers and the Habitat Manager to inform management actions.

- Bat and raptor surveys as funding allows, after funding for MSCP required monitoring is allocated. Survey updates shall be compared with NRMP baseline surveys to inform adaptive management.

4.5.1.6 MSCP Conditions of Coverage for Covered Guild Species

No MSCP covered species were observed within Management Guild boundaries.

4.5.2 East Elliott Clay Ridgelines

4.5.2.1 Background

The East Elliott area is characterized by a dissected landscape of ridges and drainages over predominantly clay soils. The ridgelines within the East Elliott area were observed in the field and through aerial photography to have plant assemblages distinct from the surrounding

vegetation types, including a significant coverage of biological crusts and native grasslands (Photograph 4-11). Distinct characters observed on ridgelines within the East Elliott area include:

- Intact extensive biological soils crusts
- Sparse woody vegetation
- A high number of sensitive species
- Low densities of exotic species

Biological soil crusts, such as those observed in the East Elliott area, have been recognized as a major influence on terrestrial ecosystems (U.S. Department of the Interior 2001). Biological crusts are composed of lichens, fungal hyphae, and cyanobacteria which bind soil particles together to form a “living carpet” between vascular plants.

The open nature of the habitat within this guild provides unique niche opportunities for a variety of sensitive species. The biological crusts on the ridgelines of the East Elliott area of MTRP are correlated with a suite of sensitive species which require a relatively open habitat with an intact soil structure near coastal sage scrub and/or chaparral (Table 4-13). Managing threats to these open habitats as a single management unit should decrease long-term impacts, edge effects, and associated restoration costs to all associated sensitive species. Major threats to the biological crusts on the East Elliott ridgelines include soil disturbance through recreational uses and associated weed colonization (see Section 4.5.2.5).

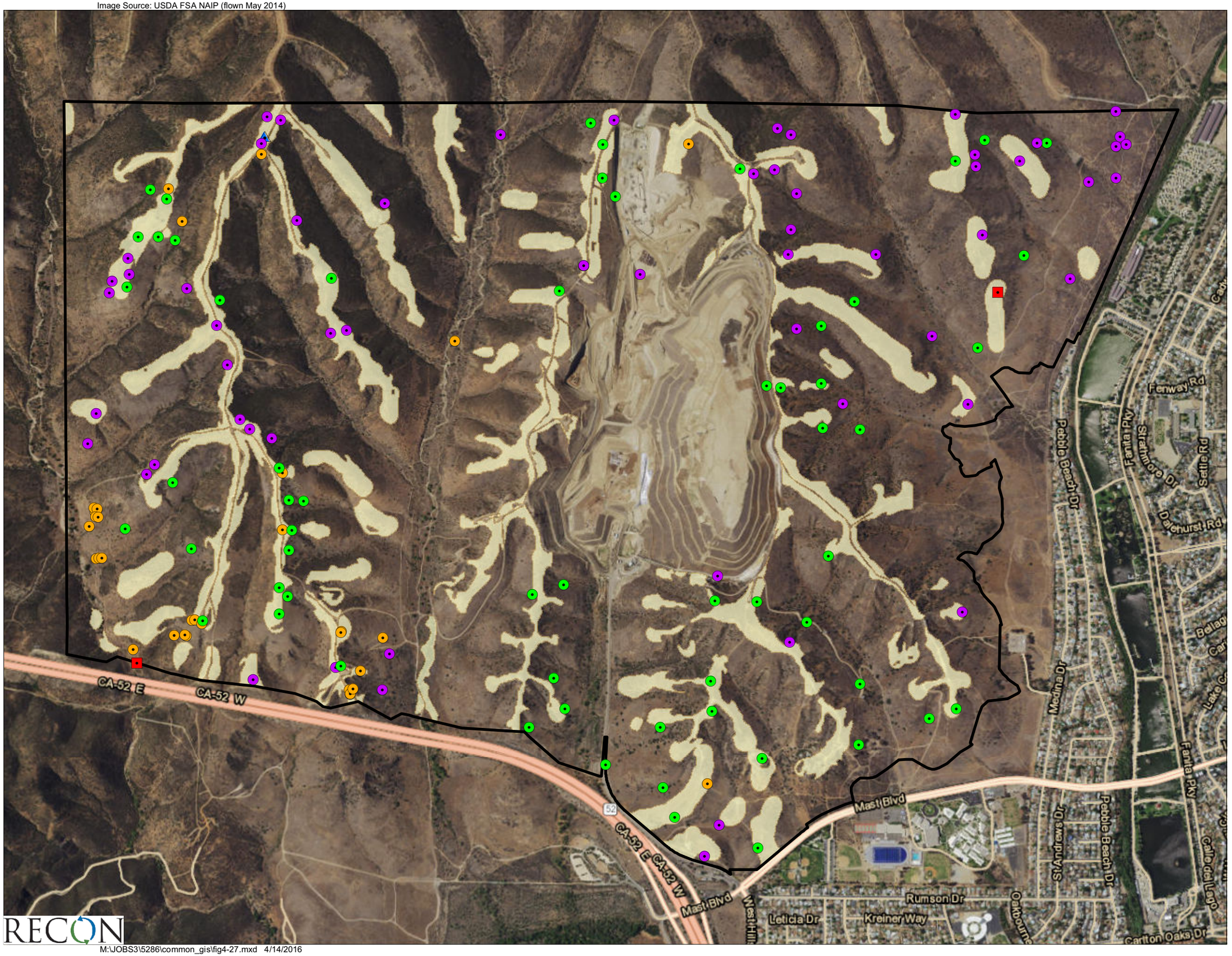
Photograph 4-11: Detail of soil crusts within East Elliott Clay Ridgeline Guild at MTRP.

TABLE 4-13
SENSITIVE SPECIES WITHIN THE
EAST ELLIOTT CLAY RIDGELINE MANAGEMENT GUILD

Species	MSCP Covered?
Rufus-crowned sparrow	Yes
San Diego Horned Lizard	Yes
San Diego barrel cactus	Yes
San Diego golden star	Yes
Variegated dudleya	Yes
Grasshopper Sparrow	No
Ashy spike-moss	No
Western dichondra	No
Quino checkerspot butterfly	No

Using the membership rules below, a geographic information system (GIS) model was created to map geographic areas for this guild (Figure 4-27).

Image Source: USDA FSA NAIP (flown May 2014)



Project Boundary

East Elliot Clay Ridgeline Guild

Sensitive Species

- San Diego Barrel Cactus
- San Diego Goldenstar
- Variegated Dudleya
- San Diego Horned Lizard, Phrynosoma blainvillii
- Southern California Rufus-crowned Sparrow

0 Feet 1,000

FIGURE 4-27

East Elliott Clay Ridgeline Guild within Mission Trails Regional Park

RECON

M:\JOBS3\5286\common_gis\fig4-27.mxd 4/14/2016

4.5.2.2 Membership Rules

- Ridgeline soil crusts at East Elliott

  Using location data taken at the edges of ridgeline soil crusts within the East Elliott area of MTRP, soil crusts appear to occur within ridge topography with slopes less than 19.2 degrees (σ = 4.2 degrees).

- Soil type = Redding cobbly loam

- Mapped as CSS, chaparral, or native grassland vegetation

4.5.2.3 Threats at MTRP

a. Recreational Activities – Trampling

Recreational activities can disturb biological crusts via soil compaction and direct shearing forces (U.S. Department of the Interior 2001). People have a natural affinity toward open vegetation types and, without proper educational and exclusionary signage, will passively recreate on biological crusts (Belnap and Lange 2001). Recreational uses can also serve as a vector for exotic plant invasion by transporting weed seeds from site to site via boots, tires, or feces.

b. Invasive Non-native Species

Invasive annual species pose a significant threat to biological crusts at MTRP. Invasion of biological crusts by annuals grasses has been linked with a sharp decrease in diversity of biological crust coverage and species diversity (Kaltenecker 1997). This is likely caused by decreased available soil surface, shading, and/or a related increased fire frequency.

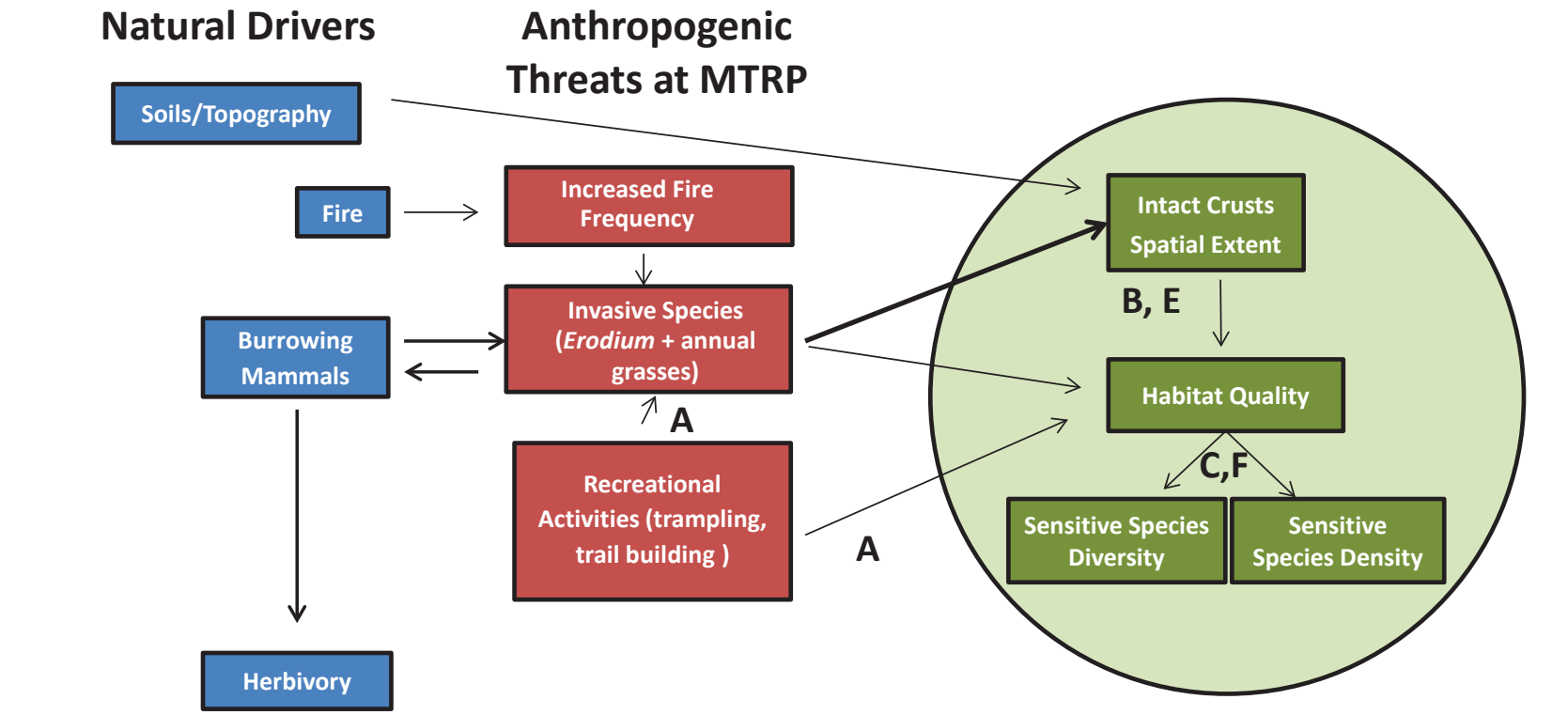
4.5.2.4 Monitoring and Management Goals

Goal: Maintain spatial distribution and biological crust diversity of East Elliott clay ridgelines at MTRP. (Figure 4-28).

East Elliot Clay Ridgelines Management Guild

Goal: Maintain spatial distribution and biological crust diversity of East Elliott clay ridgelines at MTRP

Monitor response of threats to management actions



Management:

A. Trail closure/reroute
B. Biological crust baseline survey
C. Sensitive plant species update
D. Exclusionary signage

Critical Uncertainties:

E. Total extent of biologic crusts within East Elliot area
F. Total extent of sensitive species within private parcels in East Elliot area

RECON

M:\JOBS3\5286\env\graphics\NRMP\fig4-28.ai 07/13/17 vem

FIGURE 4-28

Conceptual Model for East Elliott Ridgeline Management Guild

Objective 1: Trail Closure / Reroutes

- Widespread herbicide application and/or mechanical removal of invasive species on fragile biological crusts has the potential to cause significant unanticipated impacts. As such, this goal will be achieved through the minimization of edge effects from recreational access.

  Several trails currently exist within the management guild boundaries. As the East Elliott area has not yet been fully acquired as a part of MTRP, trails within the guild boundaries are currently a combination of utility access roads (SDG&E) and user-created recreational (hiking and mountain biking) trails. As a part of the Master plan Update associated with the document, new trail development within the guild boundaries will be avoided and trail redundancies will be eliminated or rerouted around Management Guild areas when possible (Figure 4-29). In the event that guild boundaries cannot be avoided due to other factors (slope, erosion, etc.), new trails will avoid known populations of MSCP covered species and be aligned to minimize impacts to areas observable biological crusts.

Objective 2: Biological Crusts Baseline Survey

- Map spatial extent of biologic crusts within the East Elliott Clay Ridgeline Management Area using a combination of recent aerial visual/infrared photography and ground truthing surveys with submeter GPS. As pedestrian surveys have the potential to transport weed seeds, surveys shall be planned to minimize ingress and egress within guild boundaries. This data shall be used to refine guild boundaries to accurately reflect the distribution and quality of biological crusts in East Elliott.

- Review vegetation monitoring data collected by the Deutschman Lab at SDSU for locations that fall within the East Elliott Clay Ridgeline Management Area.

- Where data has not been collected by SDSU, use a 0.5-m^2 quadrat to sample coverage of broad morphological groups of biologic crusts at representative locations throughout the guild boundary (Eldrich and Tozer 1996). Morphological groups of biological crusts may include (Belnap and Lange 2001):

Lichens – Gelatinous

Crustose
Squamulose
Fruticose/foliose

Mosses – All

Short

Image Source: DigitalGlobe (flown January 2016)

Project Boundary
East Elliott Clay Ridgeline Guild
Proposed Exclusionary Signage
Planned Trail Closures

Proposed New Trails
Hike/Bike Trail
Multi-use Trail

Existing Trails-Proposed Use
Other Circulation
Hiking Trail
Hike/Bike Trail
Multi-use Trail

0 Feet 1,000

RECON

M:\JOBS3\5286\common_gis\fig4-29.mxd 10/3/2018

FIGURE 4-29

East Elliott Clay Ridgeline Guild
Management Actions

This information shall be used as a baseline condition to track effects of management actions and the initiating of official trail use within this guild boundary.

Objective 3: Sensitive Plant Species Update

- Sensitive plant species surveys shall be conducted within and adjacent (50 foot buffer) to Guild boundaries. Complete sensitive plant surveys have not been conducted within the East Elliott area since 2001 due to the inability of the City to conduct surveys on privately owned parcels within the East Elliott area. Surveys on known populations of MSCP covered species (*Bloomeria clevelandii* and *Dudleya variagata*) are conducted annually on City-owned lands within the East Elliott area. Wildfires burned 100 percent of the area in 2003. Sensitive plant surveys shall be conducted on parcels as they are acquired to determine the current status of previously observed populations and the occurrence of new or previously unobserved populations post fire. For efficiency, these surveys can be conducted simultaneously as biological crust surveys (4.3.2.4) and dudleya variegata update surveys (4.2.2.4). Targeted species for the sensitive plant survey are listed in Table 4-14. MSCP covered species shall be given priority if funding and timing of surveys is limited. All sensitive species (MSCP covered or otherwise) data collected during surveys shall be submitted to the CNDDB.

TABLE 4-14
EAST ELLIOTT CLAY RIDGELINE SURVEY: SENSITIVE SPECIES TARGETS

Species	CNPS Rank	MSCP Covered?
San Diego Thornmint	1B.1	Yes
Del Mar Manzanita	1B.1	Yes
San Diego goldenstar	1B.1	Yes
Orcutt's brodiaea	1B.1	Yes
Wart-stemmed ceanothus	2.2	Yes
Long-spined spineflower	1B.2	No
Summer holly	1B.2	No
Variegated dudleya	1B.2	Yes
San Diego button celery	1B.1	Yes
San Diego barrel cactus	2.1	Yes
Mission canyon blue cup	3.1	No
Robinson's pepper grass	1B.2	No
Little mousetail	3.1	No

Objective 4: Exclusionary Signage

- Place educational panels and/or signage at critical access points within the Management Guild with information regarding the value and sensitivity of biotic crusts (see Figure 4-29). Signage shall be located a sufficient distance from crust areas to limit any associated impacts.

4.5.2.5 MSCP Conditions of Coverage for Covered Guild Species

a. Rufus-crowned Sparrow

ASMDs must include maintenance of dynamic processes, such as fire, to perpetuate some open phases of coastal sage with herbaceous components (MSCP 1998: Table 3-5).

The management actions leading toward the preservation of biological crusts within the East Elliott area will perpetuate sparse vegetation and open phases within coastal sage scrub and satisfy this condition.

b. San Diego Horned lizard

ASMDs must include specific measures to maintain native ant species, discourage the Argentine ant, and protect against detrimental edge effects to this species (MSCP 1998: Table 3-5).

The minimization of recreational access to guild boundaries will decrease direct and indirect impacts to San Diego Horned lizard. These include the introduction of incidental and planned recreation-related moisture sources (spills and water fountains), which are known to provide habitat for Argentine ant invasions. In addition, the preservation of biological crusts within the East Elliott will continue to provide habitat for native ant species necessary as a food source for San Diego horned lizard.

c. San Diego Barrel Cactus

ASMDs must include specific measures to protect against detrimental edge effects and unauthorized collection, and include appropriate fire management/control practices to protect against a too frequent fire cycle (MSCP 1998: Table 3-5).

The exclusion and minimization of recreational access to the East Elliott clay ridge lines (which the San Diego barrel cactus is associated with) will protect the species from recreational collecting and accidental fires.

d. San Diego Golden Star

ASMDs must include specific measures to protect against detrimental edge effects (MSCP 1998: Table 3-5).

Measures designed to exclude and minimize of recreational access to the East Elliott clay ridge lines will protect the species from the colonization and introduction of invasive species and accidental fires.

e. Variegated Dudleya

ASMDs must include species-specific monitoring and specific measures to protect against detrimental edge effects to this species, including effects caused by recreational activities (MSCP 1998: Table 3-5).

Measures designed to exclude and minimize of recreational access to the East Elliott clay ridge lines will protect the species from the colonization and introduction of invasive species and accidental fires.

4.5.3 Tierrasanta Clay Ridge

4.5.3.1 Background

The eastern portion of the Fortuna Mountain area contains a broad, dissected clay ridgeline which is vegetated with a matrix of coastal sage scrub, chaparral, and non-native grassland vegetation (Photograph 4-12). As with the East Elliott Clay Ridgelines, these areas contain patches of intact biological soils crusts and a relatively high number of sensitive species (Table 4-15 and Figure 4-30). Biological crusts are correlated with sensitive species at MTRP and provide unique open habitat with a stable soil structure. As with the East Elliott Clay Ridgeline Management Guild, the protection of biological crusts near Tierrasanta from disturbance has long-term implications to sensitive species and future management costs. The majority of this area was burned in fires in 2003. The Tierrasanta Clay Ridge Management Guild is distinct from East Elliott Clay Ridgeline Management Guild in that these areas:

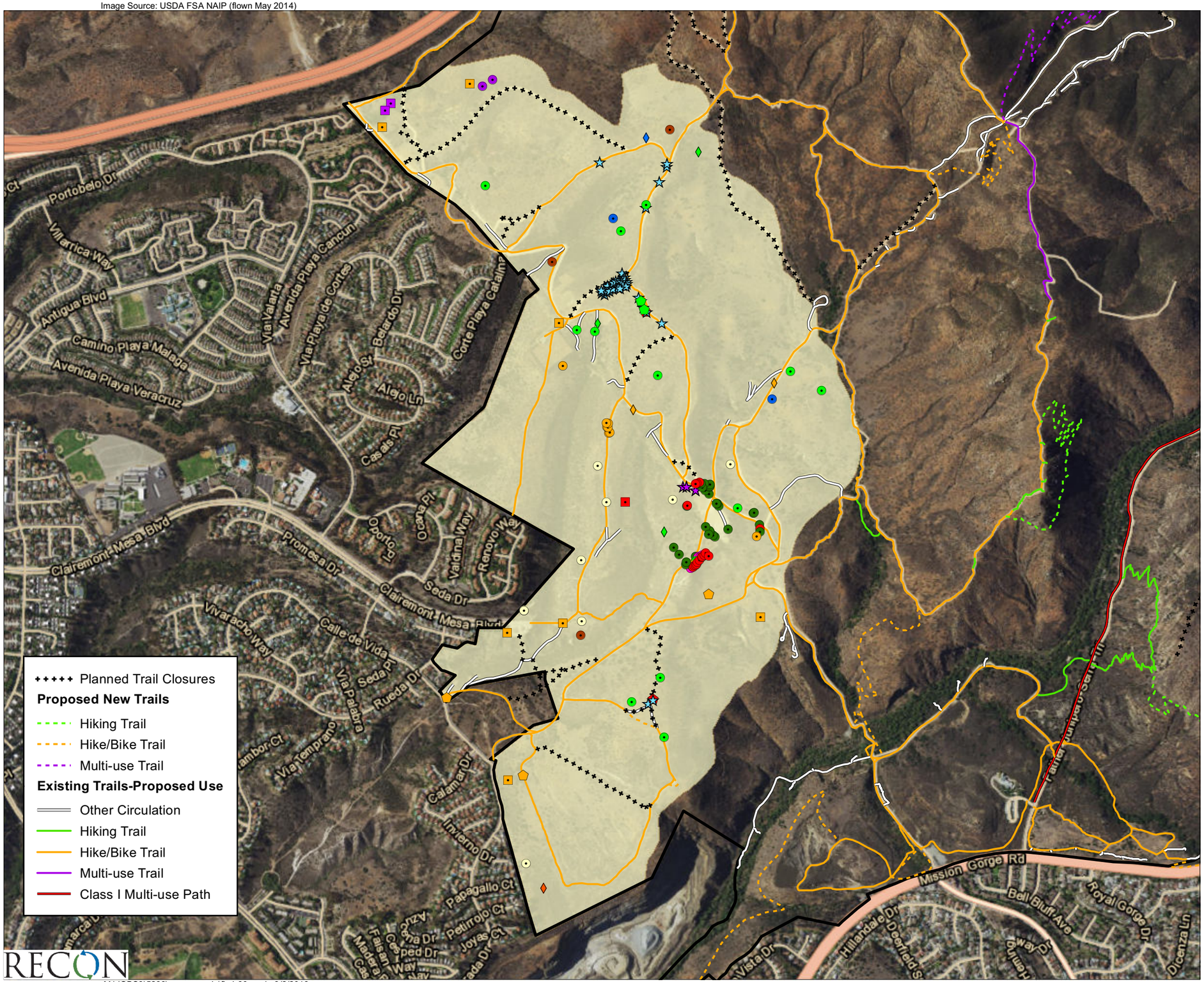
- Have topographically flat areas which contain vernal pools
- Have a variety of dominant clay soil types
- Contain several major utility corridors (SDCWA and SDG&E)
- Are adjacent to residential development
- Are invaded by false brome on a landscape scale

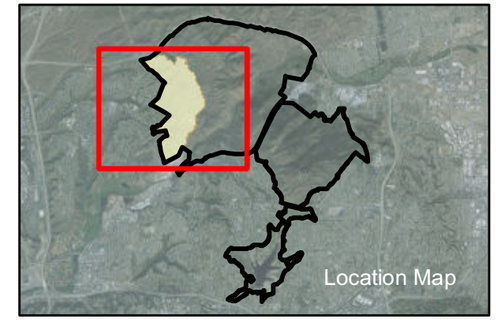
Photograph 4-12: Vegetation present within the Tierrasanta Clay Ridge Management Guild boundary.

TABLE 4-15
SENSITIVE SPECIES OBSERVED WITHIN
TIERRASANTA CLAY RIDGE MANAGEMENT GUILD AT MTRP

Species	MSCP Covered?
San Diego Barrel Cactus	Yes
San Diego Thorn-mint	Yes
Variegated Dudleya	Yes
San Diego Golden Star	Yes
Ashy Spike-moss	No
Western Spadefoot Toad	No
San Diego Fairy Shrimp	No
San Diego County Viguiera	No
Vernal Pools	No

Image Source: USDA FSA NAIP (flown May 2014)





Project Boundary
Tierrasanta Clay Guild

Sensitive Species

- Ashy Spike-moss
- Decumbent Goldenbush
- Palmer's Grappling Hook
- San Diego Barrel Cactus
- San Diego County Viguiera
- San Diego Goldenstar
- San Diego Thornmint
- Summer Holly
- Western Dichondra
- Woven-spored Lichen
- Variegated Dudleya
- San Diego Desert Woodrat
- Mule Deer
- Black-tailed Jackrabbit
- San Diego Pocket Mouse
- Coastal California Gnatcatcher
- Least Bell's Vireo
- Southern California Rufus-crowned Sparrow
- Western Spadefoot Toad
- Belding's Orange-throated Whiptail
- San Diego Fairy Shrimp
- Vernal Pool
- Quino Checkerspot Butterfly

0 Feet 1,000

RECON

M:\JOBS3\5286\common_gis\fig4-30.mxd 8/2/2016

FIGURE 4-30

Tierrasanta Clay Guild
Presence within Mission Trails Regional Park

4.5.3.2 Membership Rules

- Fortuna Mountain area
- Clay soils (all)
- Elevation < 800 feet

4.5.3.3 Threats at MTRP

a. Invasive Non-native Species

Large portions of the Tierrasanta Clay Ridge Guild contain high densities of exotic annual grasses (RECON 2009). This is likely a result of wildfires burning the area in both 1981 and 2003.

b. Recreational Activities – Trampling

The Tierrasanta Clay Ridge Guild boundary is directly adjacent to residential housing, a MTRP entrance, and associated increased levels of recreation traffic. Recreation has been associated with wildlife behavior disturbance, the introduction and spread of exotic weeds, and exotic animal introductions (pets).

c. Fire and Fire Suppression

According to fire maps, areas within the Guild boundary have burned both in 1981 and 2003. Most vegetation within the Guild boundary is within a seral successional stage and will continue to develop as long as fire is excluded from within the area.

4.5.3.4 Management Goals

Goal: Maintain habitat quality, spacial extent, and species richness of native species within Guild boundary (Figure 4-31).

Objective 1: Survey Biological Crusts

- Use techniques described in Section 4.5.2.4 to map spatial extent and composition of biologic crusts within the Tierrasanta Clay Ridgeline Guild boundary.

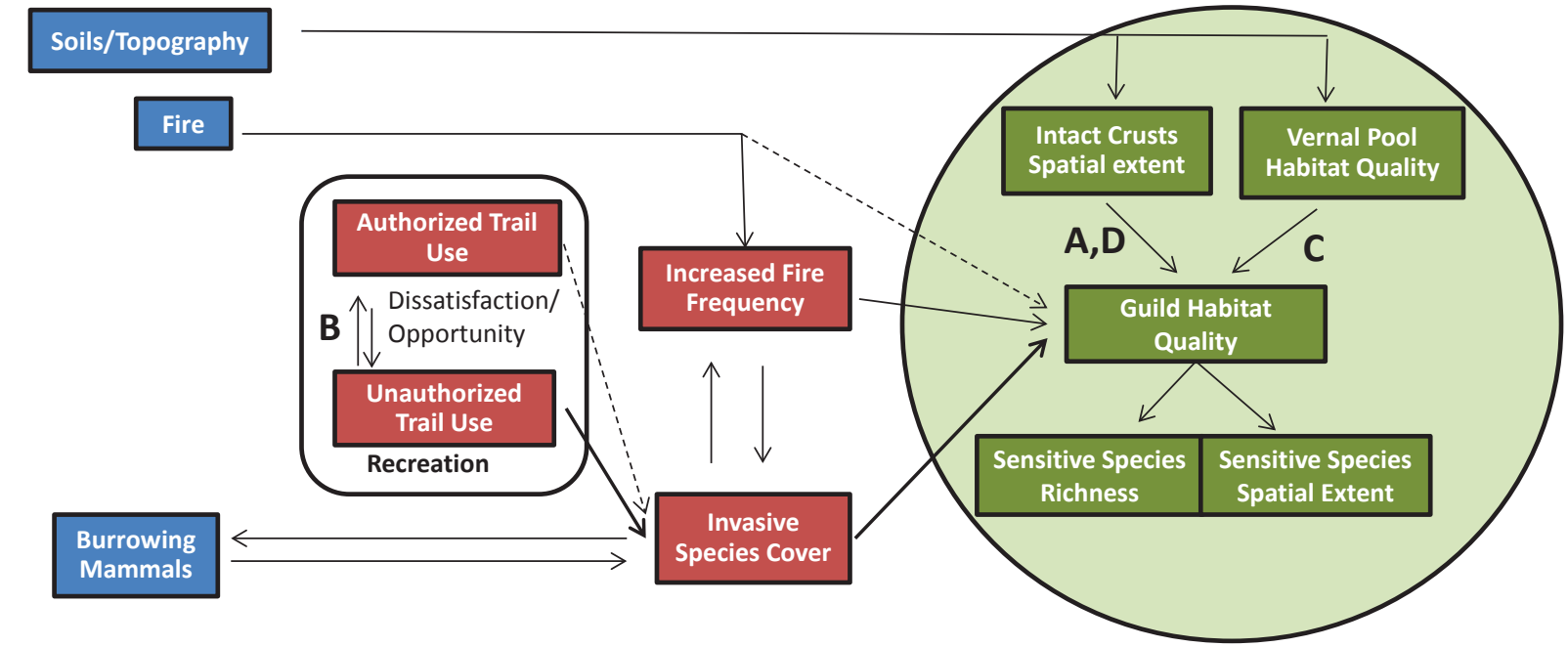
Objective 2: Trail Closure/ Reroute

- Trail redundancies within the Tierrasanta Clay Ridgeline Guild boundary Management Area shall be minimized as a part of the Master Plan Update associated with this document. In addition, an existing trail shall be rerouted outside of vernal pool watersheds within the Guild boundaries (Figure 4-32).

Tierrasanta Clay Ridge Management Guild

Goal: Maintain habitat quality, spatial extent, and species richness of native species within guild boundary

Monitor response of threats to management actions



Management:

A. Survey biological crusts

B. Trail closure/ reroute

C. Implement vernal pool HCP recommendations

Critical uncertainties:

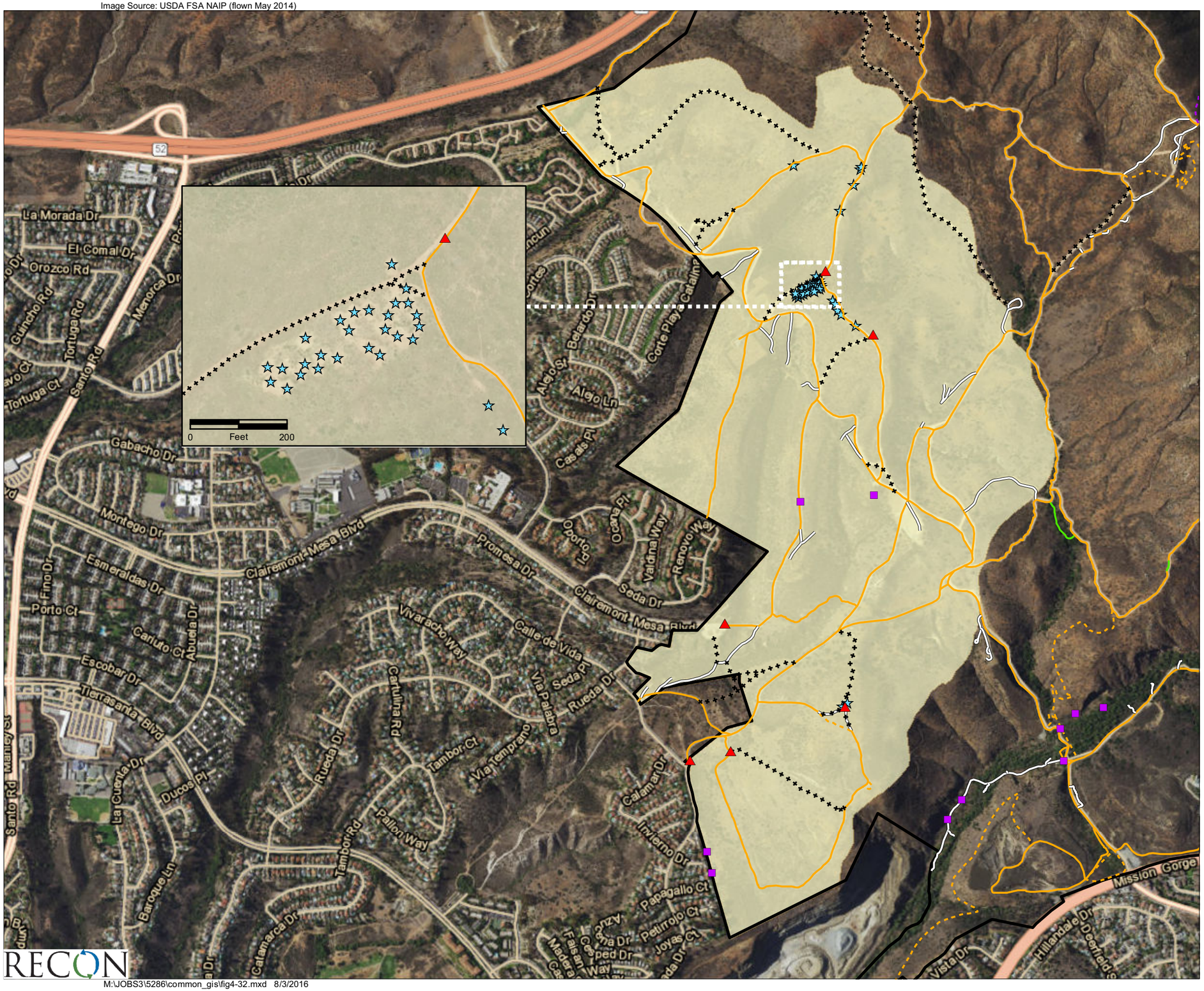
D. Total extent of biologic crusts within guild boundaries

RECON

FIGURE 4-31

Conceptual Model for Tierrasanta Clay Ridge Management Guild

Image Source: USDA FSA NAIP (flown May 2014)



- Project Boundary
- Tierrasanta Clay Guild
- Exclusionary Signage
- Proposed Exclusionary Signage

Sensitive Species

- Vernal Pool
- Planned Trail Closures

Existing Trails-Proposed Use

- Other Circulation
- Hiking Trail
- Hike/Bike Trail
- Multi-use Trail

0 Feet 1,000

RECON

M:\JOBS3\5286\common_gis\fig4-32.mxd 8/3/2016

FIGURE 4-32

Tierrasanta Clay Guild Management Actions: Mission Trails Regional Park

Objective 3: Implement Vernal Pool HCP Recommendations

- Implement site-specific management recommendations from the Draft City of San Diego Vernal Pool Mitigation and Monitoring Program for Mission Trails Regional Park crafted to stabilize the habitat conditions for sensitive vernal pool species including San Diego fairy shrimp (*Branchinecta sandiegonensis*). These recommendations shall be coordinated through restoration planning and include:

    - Create and implement an invasive species control program including weed control and dethatching
    - Where appropriate, increase populations of focal species with historical distributions within the Park, including San Diego button celery (*Eryngium aristulatum*)
    - Create and implement a seed collection/bulking program for focal vernal pool species.

4.5.3.5 MSCP Conditions of Coverage for Covered Guild Species

a. San Diego Barrel Cactus

Area-specific management directives must include specific measures to protect against detrimental edge effects and unauthorized collection and include appropriate fire management/control practices to protect against a too frequent fire cycle (MSCP 1998: Table 3-5).

The minimization of recreational access to the Tierrasanta Clay ridge (which the San Diego barrel cactus is associated with) will protect the species from recreational collecting and accidental fires.

b. San Diego Thornmint

Area-specific management directives must include specific measures to protect against detrimental edge effects from surrounding development (MSCP 1998: Table 3-5).

In addition to measures described in Section 4.4.1.4, landscape-level trail closure and rerouting will decrease new unauthorized trails (via providing authorized trail circulation) and decrease recreation-related edge effects to this species.

c. Variegated Dudleya

Area-specific management directives must include species-specific monitoring and specific measures to protect against detrimental edge effects to this species, including effects caused by recreational activities (MSCP 1998: Table 3-5).

In addition to measures described in Section 4.4.3.4, landscape-level trail closure and rerouting will decrease new unauthorized trails (via providing authorized trail circulation) and decrease recreation-related edge effects to this species.

d. San Diego Golden Star

Area-specific management directives must include specific measures to protect against detrimental edge effects (MSCP 1998: Table 3-5).

In addition to measures described in Section 4.5.2.5, landscape-level trail closure and rerouting will decrease new unauthorized trails (via providing authorized trail circulation) and decrease recreation-related edge effects to this species.

4.5.4 Riparian Woodlands

4.5.4.1 Background

Riparian woodlands at MTRP are primarily located within floodplain of the San Diego River within the Mission Gorge area of the MTRP (Figure 4-33). The Mission Trails reach of the San Diego River generally supports mature riparian forest consisting primarily of willows (*Salix* spp.), with fewer cottonwoods (*Populus fremontii*) and yet fewer sycamores (*Platanus racemosa*) (Photograph 4-13). Coast live oak (*Quercus agrifolia*) occurs as scattered individuals or small stands peripheral to the main riparian zone. A series of ephemeral drainages provide hydrologic connectivity between the multitude of micro-watersheds throughout the dissected canyon topography of the park. Although these drainages provide functional biological, habitat, and corridor value to the downstream riparian woodlands of which this guild is composed, they were not included within the guild as the vegetative cover associated with riparian woodlands is a primary component of the majority of sensitive species observed within guild boundaries.

The species composition of the riparian forest through MTRP varies little, although the structure is not uniform. The tallest, most uniformly mature forest occurs from the north side of Kumeyaay Lake to the approximate midpoint of the reach, east of South Fortuna Peak. The forest averages 50 to 70 feet tall, with the largest sycamores and cottonwoods reaching 80 feet. The canopy of riparian woodland at MTRP is generally closed and continuous.

Image Source: DigitalGlobe (flown January 2016)

Project Boundary
Riparian Woodland Guild
Least Bell's Vireo Critical Habitat

Riparian Species
- Big Brown Bat
- Big Free-tailed Bat
- Brazilian Free-tailed Bat
- Greater Western Mastiff Bat
- Hoary Bat
- Pocketed Free-tailed Bat
- Western Mastiff Bat
- Western Pipistrelle Bat
- Western Red Bat
- Cooper's Hawk
- Least Bell's Vireo
- Light-footed Clapper Rail
- Southwestern Willow Flycatcher
- Mountain Lion
- Mule Deer
- San Diego Pocket Mouse
- Belding's Orange-throated Whiptail
- Ring-necked Snake
- White-tailed Kite
- Yellow Warbler
- Delicate Clarkia
- Orcutt's Brodiaea
- Purple Stemodia
- Rayless Ragwort
- San Diego Sagewort
- Spiny Rush
- Willowy Monardella

+++++ Planned Trail Closures

Proposed New Trails
- Hiking Trail
- Hike/Bike Trail
- Multi-use Trail

Existing Trails-Proposed Use
- Other Circulation
- Hiking Trail
- Hike/Bike Trail
- Multi-use Trail
- Class I Multi-use Path

0 Feet 2,000

FIGURE 4-33

Riparian Woodland Presence within Mission Trails Regional Park

RECON

M:\JOBS3\5286\common_gis\fig4-33.mxd 10/3/2018

Photograph 4-13: Habitats present within the Riparian Woodland Guild at MTRP.

Riparian understory at MTRP is generally diverse and composed of mostly native species (RECON 2010). The riparian woodlands within MTRP contain very few invasive species due to a comprehensive long-term invasive plant removal project. One instance of giant reed (*Arundo donax*) was observed at the extreme southern (downstream) end of the river (RECON 2009). Within the region, giant reed was removed from the San Diego River directly upstream of the MTRP boundary at Carlton Oaks in 2008/2009 (Lynn and Kus 2010).

Riparian woodlands at MTRP serve as habitat to a variety of sensitive species (Table 4-16). A large, stable population of the federally endangered least Bell's vireo currently occupies habitat within the Riparian Woodland Guild boundary. This population has grown from eight territorial males in 1978 to 21 territorial males in 2010 (Lynn and Kus 2010, Kus and Beck 1998). Southwestern willow flycatcher (*Empidonax traillii extimus*) has been observed, but is not believed to nest within the Guild boundary (RECON 2010).

TABLE 4-16
SENSITIVE SPECIES OBSERVED WITHIN RIPARIAN WOODLANDS AT MTRP

Species	MSCP covered?
Mountain lion	Yes
Mule deer	Yes
Cooper's hawk	Yes
Least Bell's vireo	Yes
Southwestern willow flycatcher	Yes
Belding's orange throated whiptail	Yes
Spiny rush	No
San Diego sagewort	No
Rayless ragwort	No
Purple stemodia	No
Delicate clarkia	No
Yellow warbler	No
White-tailed kite	No
San Diego marsh elder	No
Pocked free-tail bat	No

4.5.4.2 Membership Rules

All areas containing SANDAG vegetation community group “Riparian woodlands and Forests.”

4.5.4.3 Threats at MTRP

The riparian woodlands at MTRP are relatively healthy and do not have significant unmanaged threats. Several historic threats have the potential of becoming significant if current management is discontinued or if other external factors cause a shift in threat intensity.

a. Invasive Non-native Species – Cowbird Parasitism

Brown-headed cowbird brood parasitism has been implicated as a major factor in the decline and low reproductive success of vireos and other riparian birds (Franzreb 1989). Although cowbird females, which search through vegetation for host nests in which to lay their eggs, are highly mobile and adept at locating hosts, it is well documented that local occurrence of cowbirds is enhanced by proximity of agricultural land and grazing livestock, which provide ready food resources in the form of seeds and insects associated with or exposed by the movements of large animals. The East Fortuna Staging Area (which has an equestrian staging component) has been built approximately 300 feet north of the San Diego River Flood plain and may act as a source for cowbird invasion, and an associated cowbird trapping mitigation program is in place in the vicinity of the staging area. Additional non-mitigation cowbird trapping has been conducted by both the City and U.S. Geological Survey (USGS).

b. Invasive Non-native Species – Giant Reed

Giant reed displaces native plants and associated wildlife species because of the massive stands it forms, and is also suspected of altering hydrological regimes and reducing groundwater availability by transpiring large amounts of water from semi-arid aquifers (Bell 1997). As giant reed replaces riparian vegetation it reduces habitat and food supply, particularly insect populations for avian species (Frandsen and Jackson 1994), and reduces shade cover to the in-stream habitat leading to increased water temperatures and reduced habitat quality for aquatic wildlife (Franklin 1996).

A comprehensive, long-term arundo removal project within the San Diego River has limited the extent of giant reed within MTRP. Two small populations of giant reed were observed by RECON vegetation surveys in 2010 (RECON 2010). One population was observed within the southwestern end of the San Diego River near the MTRP boundary. The second population was observed on a mesa top south of the Riparian Woodland Guild Management Area, outside of the floodplain of the San Diego River.

4.5.4.4 Monitoring and Management Goals

Goal: Maintain high-quality habitat within riparian woodlands at MTRP (Figure 4-34).

Objective 1: Continue Cowbird Control Programs

- Coordinate with regional efforts (USGS Western Ecological Research Center) to refine and implement a cowbird trapping program that optimizes benefits to least Bell's vireo both short and long term.

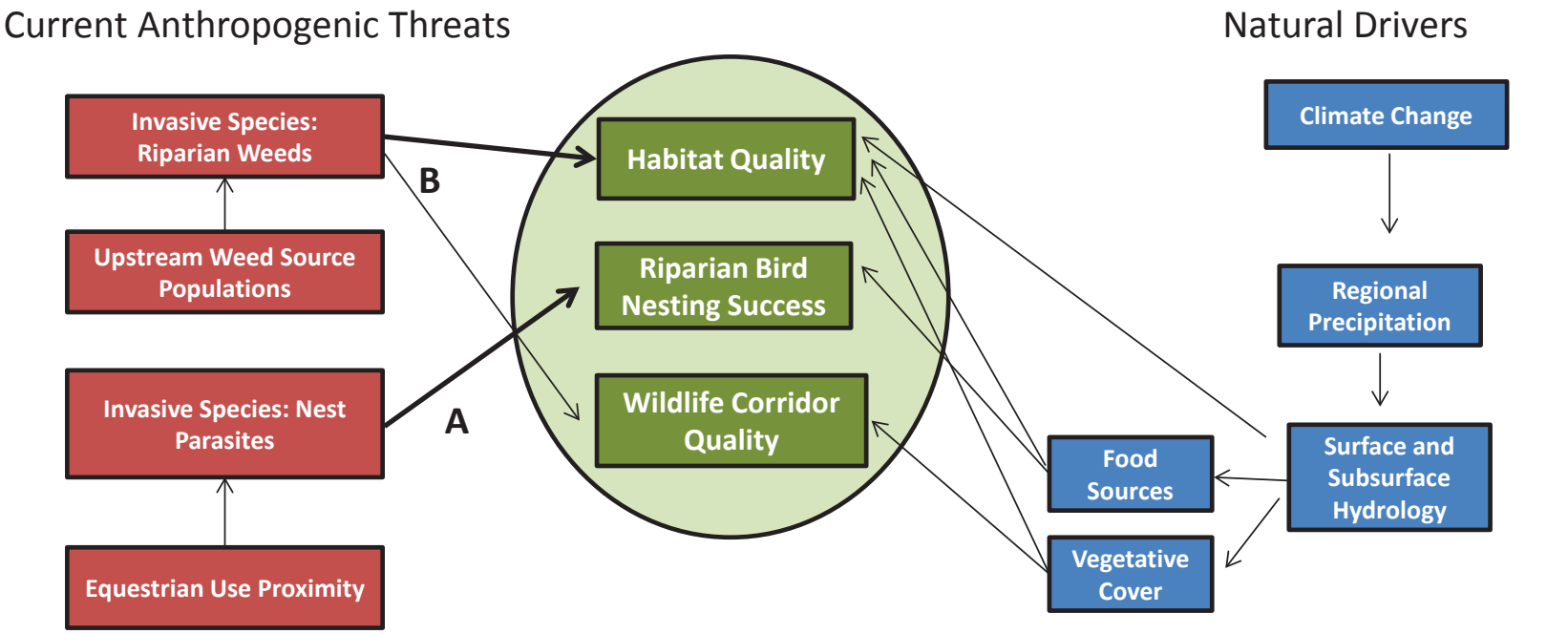
Objective 2: "Search and Destroy" Riparian Weed Surveys

- Continue the on-going, long-term invasive plant removal project within the San Diego River riparian area. This objective is consistent with recommendations for invasive species control in regional efforts such as the San Diego River Watershed Management Plan (Anchor 2005). Invasive riparian weed species have a potential to enter the Riparian Woodland Management Guild boundaries from upstream sources. Targeted riparian weeds include giant reed (*Arundo donax*), tamarisk (*Tamarix ramossisma*), pampas grass (*Cortaderia selloana*), and perennial pepperweed (*Lepidium latifolium*).

Riparian Woodlands Management Guild

Goal: Maintain high-quality habitat within riparian woodlands at MTRP

Monitor response of threats to management actions



Management:

A. Cowbird trapping

B. "Search and destroy" riparian weed surveys

RECON

FIGURE 4-34

Conceptual Model for Riparian Woodlands Management Guild

"Search and destroy" surveys shall be conducted within the Guild Boundary bi-annually or six months after major flood events to identify, map, and remove small targeted riparian weed infestations. Information collected at each identified population shall include:

- GPS location of infestation
- Size of infestation (square feet)
- Control method
- Adjacent vegetation community

4.5.4.5 MSCP Conditions of Coverage for Covered Guild Species

a. Coopers Hawk

Area-specific management directives must include 300-foot impact avoidance areas around active nests and minimization of disturbance in oak woodlands and oak riparian forests (MSCP 1998: Table 3-5).

The avoidance of new trail construction and the control of invasive species within guild boundaries minimize disturbance within oak woodlands and, thereby, satisfy this condition.

b. Least Bell's Vireo

Area-specific management directives must include measures to provide appropriate successional habitat, upland buffers for all known populations, cowbird control, and specific measures to protect against detrimental edge effects to this species. Any clearing of occupied habitat must occur between September 15 and March 15 (MSCP 1998: Table 3-5).

Breeding populations of least Bell's vireo have grown from 1978 to 2010 (Lynn and Kus 2010). A total of 16 breeding pairs of least Bell's vireo were observed during surveys in 2010 (RECON 2010). The avoidance of new trail construction within or near (within 300 feet) guild boundaries, proposed continuance of cowbird control, and weed control actions will serve to protect this species against detrimental edge effects.

c. Southwestern Willow Flycatcher

Area-specific management plans must include measures to provide appropriate successional habitat, upland buffers for all known populations, cowbird control, and specific measures to protect against detrimental edge effects to this species. Any clearing of occupied habitat must occur between September 1 and May 1 (i.e., outside the nesting period) (MSCP 1998: Table 3-5).

The avoidance of new trail construction within or near (within 300 feet) guild boundaries, proposed continuance of cowbird control, and weed control actions will serve to protect this species against detrimental edge effects.

d. Belding's Orange-Throated Whiptail

Area-specific management directives must address edge effects (MSCP 1998: Table 3-5).

The avoidance of new trail construction within or near guild boundaries, proposed and weed control actions will serve to protect this species against detrimental edge effects.

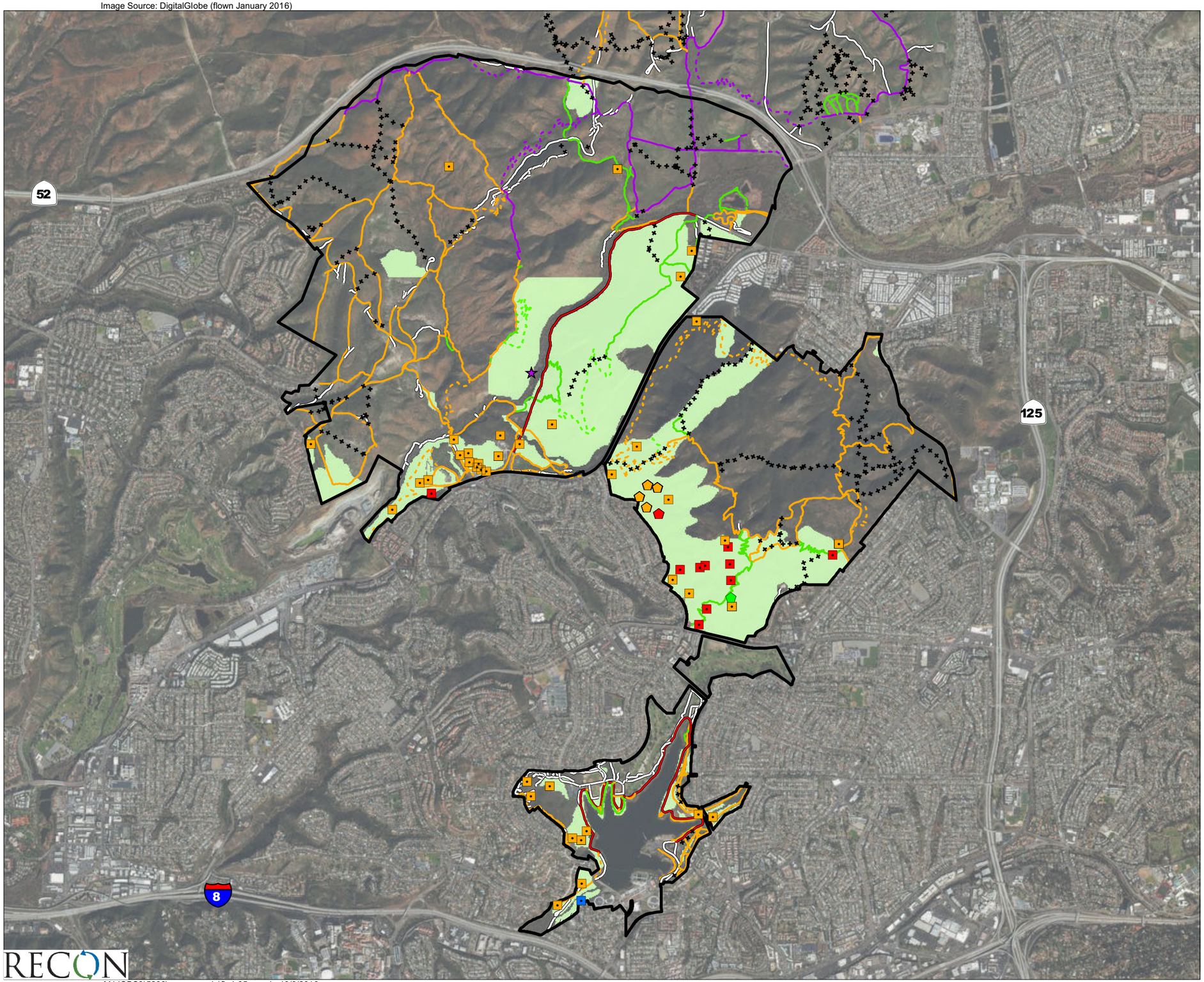
4.5.5 Coastal Sage Scrub – *Artemisia/Eriogonum*

4.5.5.1 Background

The Coastal Sage Scrub – Artemisia/Eriogonum Management Guild is a subset of Diegan Coastal Sage Scrub, a vegetation community comprised low-growing, aromatic, drought-deciduous, soft-woody shrubs that have an average height of three to four feet. California sagebrush (*Artemisia californica*) and flat-topped buckwheat (*Eriogonum fasciculatum*) are found on xeric sites with steep slopes or on clay-rich soils that are slow to release stored water. Coastal sage scrub often occurs on south- or west-facing slopes, but can occasionally occur on north-facing slopes, where the community can act as a successional phase of chaparral development (Figures 4-35a-f and Photograph 4-14). California sagebrush and flat-top buckwheat are a primary habitat component for several sensitive species including the California gnatcatcher (Unit 2004; Atwood and Bontrager 2001). Several sensitive species have been observed utilizing habitat within the management guild boundary (Table 4-17).

A GIS model was developed by TAIC in 2002 to identify quality habitat for California gnatcatcher within San Diego County. Primary elements of the model include vegetation community type (sage vs. non-sage), core size (>25 acres), and slope (<40 percent). This model was run for MTRP on vegetation data collected by USDA Forest Service in 2002 and for this NRMP (RECON 2010) (Figures 4-36a-b, 4-37a-b, and 4-38a-b).

Image Source: DigitalGlobe (flown January 2016)



Project Boundary

Coastal Sage Scrub (*Artemisia/Eriogonum*) Guild

Sensitive Species

- San Diego Cactus wren
- Southern California Rufus-crowned Sparrow
- Coastal California Gnatcatcher
- Belding's Orange-throated Whiptail
- Coast Patch-nosed Snake
- Red Diamond Rattlesnake
- Quino Checkerspot Butterfly

Planned Trail Closures

Proposed New Trails

- Hiking Trail
- Hike/Bike Trail
- Multi-use Trail

Existing Trails-Proposed Use

- Other Circulation
- Hiking Trail
- Hike/Bike Trail
- Multi-use Trail
- Class I Multi-use Path

0 Miles 0.5

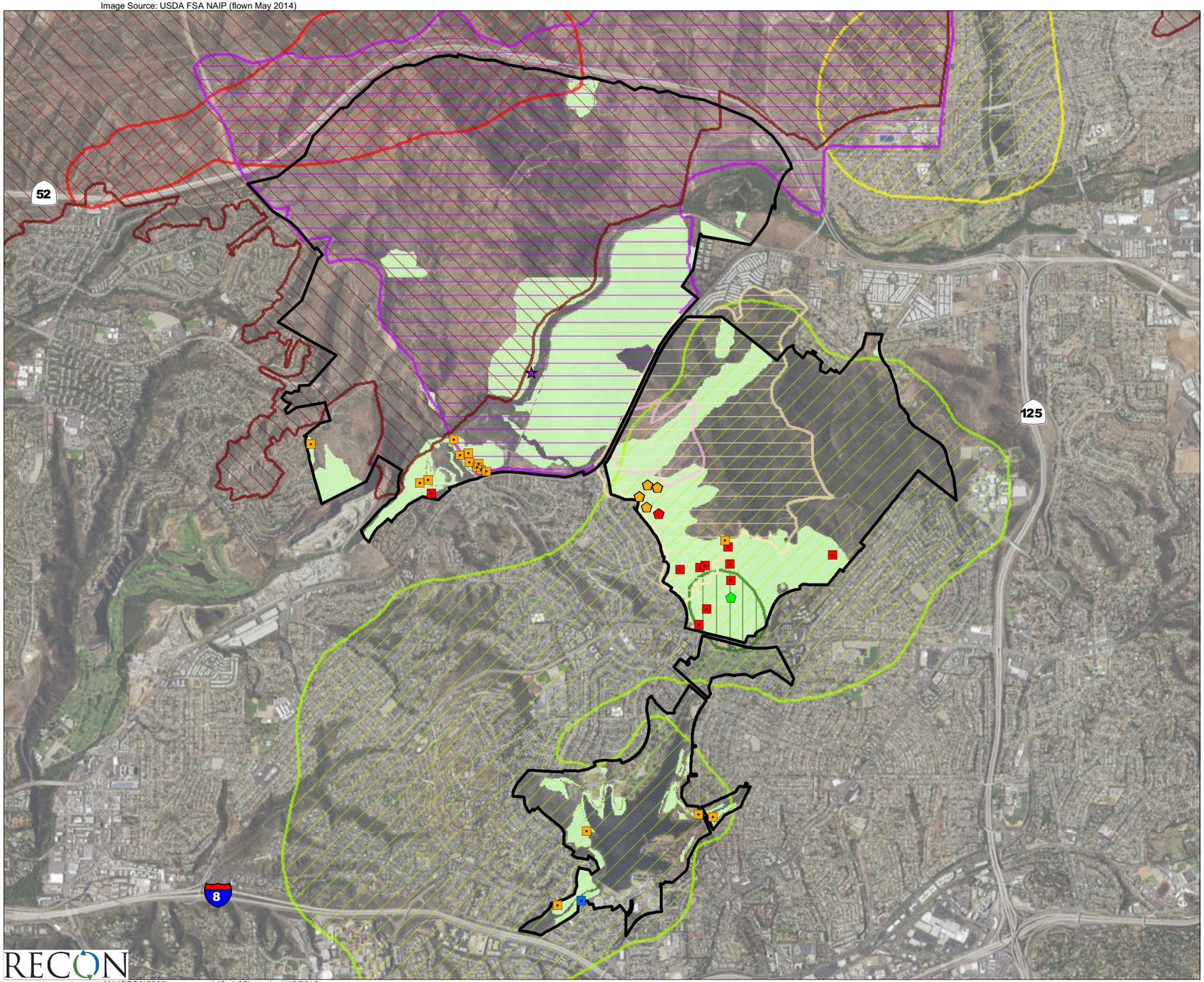
FIGURE 4-35a

Coastal Sage Scrub (*Artemisia/Eriogonum*) Guild within Mission Trails Regional Park

RECON

M:\JOBS3\5286\common_gis\fig4-35a.mxd 10/3/2018

Image Source: USDA FSA NAIP (flown May 2014)



Project Boundary

Coastal Sage Scrub (*Artemisia/Eriogonum*) Guild

Sensitive Species

- San Diego Cactus wren
- Southern California Rufus-crowned Sparrow
- Coastal California Gnatcatcher
- Belding's Orange-throated Whiptail
- Coast Patch-nosed Snake
- Red Diamond Rattlesnake
- Quino Checkerspot Butterfly

Fire Burn History

- 1939
- 1942
- 1944
- 1981
- 1983
- 1986
- 1988
- 2003

0 Miles 0.5

FIGURE 4-35b

Coastal Sage Scrub (*Artemisia/Eriogonum*) Guild within Mission Trails Regional Park

RECON

M:\JOBS3\5286\common_gis\fig4-35b.mxd 4/15/2016

Image Source: DigitalGlobe (flown January 2016)

Project Boundary

Coastal Sage Scrub (*Artemisia/Eriogonum*) Guild

Sensitive Species

- San Diego Barrel Cactus
- Southern California Rufus-crowned Sparrow
- Coastal California Gnatcatcher

Planned Trail Closures

Proposed New Trails

- Hike/Bike Trail
- Multi-use Trail

Existing Trails-Proposed Use

- Other Circulation
- Hiking Trail
- Hike/Bike Trail
- Multi-use Trail

0 Feet 1,000

FIGURE 4-35c

Coastal Sage Scrub (*Artemisia/Eriogonum*) Guild within East Elliott

RECON

M:\JOBS3\5286\common_gis\fig4-35c.mxd 10/3/2018

Image Source: USDA FSA NAIP (flown May 2014)

Project Boundary

Coastal Sage Scrub (*Artemisia/Eriogonum*) Guild

Sensitive Species

- San Diego Barrel Cactus
- Southern California Rufus-crowned Sparrow
- Coastal California Gnatcatcher

Fire Burn History

- 1939
- 1941
- 1942
- 1981
- 2003

0 Feet 1,000

FIGURE 4-35d

Coastal Sage Scrub (*Artemisia/Eriogonum*) Guild within East Elliott

RECON

M:\JOBS3\5286\common_gis\fig4-35d.mxd 4/15/2016

Image Source: DigitalGlobe (flown January 2016)

Project Boundary

Coastal Sage Scrub (*Artemisia/Eriogonum*) Guild

Sensitive Species

- San Diego Barrel Cactus
- San Diego Cactus wren
- Southern California Rufus-crowned Sparrow
- Coastal California Gnatcatcher
- Coast Patch-nosed Snake

+++++ Planned Trail Closures

Proposed New Trails

Multi-use Trail

Existing Trails-Proposed Use

Other Circulation

Multi-use Trail

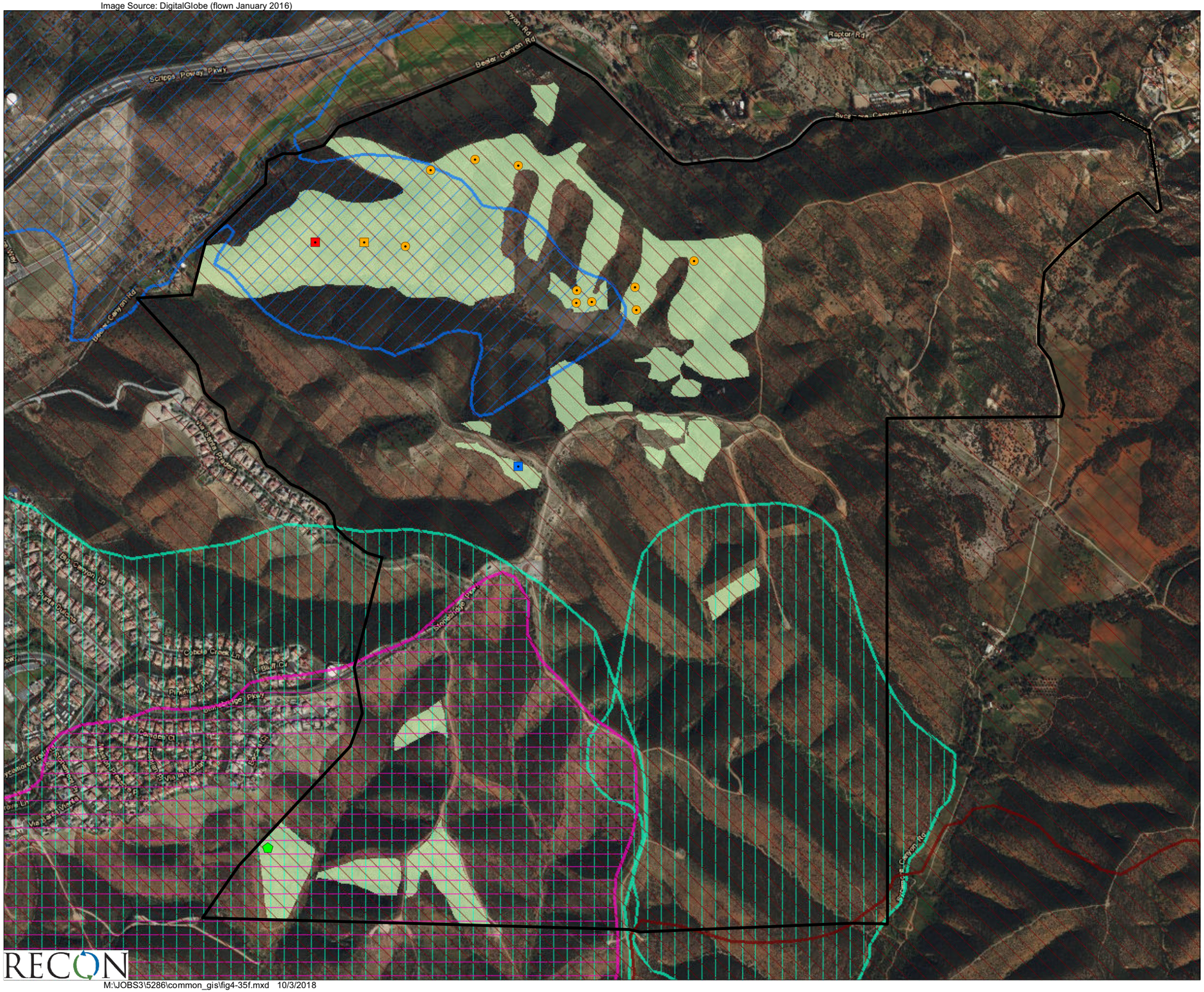
0 Feet 1,000

FIGURE 4-35e

Coastal Sage Scrub (*Artemisia/Eriogonum*) Guild within West Sycamore

M:\JOBS3\5286\common_gis\fig4-35e.mxd 10/3/2018

Image Source: DigitalGlobe (flown January 2016)



Project Boundary

Coastal Sage Scrub (*Artemisia/Eriogonum*) Guild

Sensitive Species

- San Diego Barrel Cactus
- San Diego Cactus wren
- Southern California Rufus-crowned Sparrow
- Coastal California Gnatcatcher
- Coast Patch-nosed Snake

Fire Burn History

- 1950
- 1968
- 1995
- 2003

0 Feet 1,000

FIGURE 4-35f

Coastal Sage Scrub (*Artemisia/Eriogonum*) Guild within West Sycamore

RECON

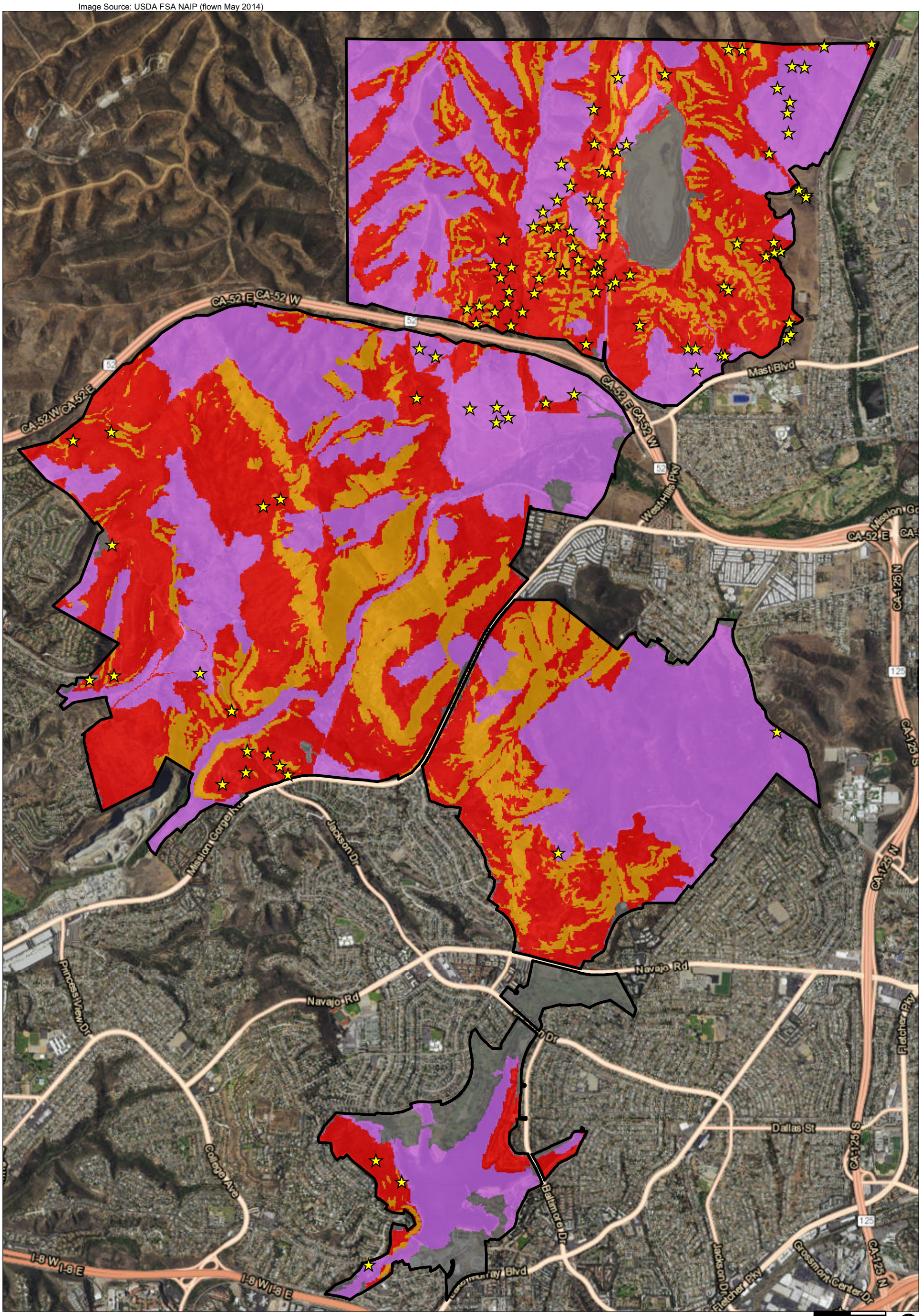
M:\JOBS3\5286\common_gis\fig4-35f.mxd 10/3/2018

Photograph 4-14: *Artemisia californica*-dominated scrub at MTRP.

TABLE 4-17
SENSITIVE SPECIES OBSERVED WITHIN THE COASTAL SAGE SCRUB – ARTEMISIA/ERIOGONUM GUILD AT MTRP

Sensitive Species	MSCP Covered?
San Diego barrel cactus	Yes
San Diego golden star	Yes
Variegated dudleya	Yes
California gnatcatcher	Yes
Southern California rufous-crowned sparrow	Yes
Belding's Orange-throated whiptail	Yes
San Diego horned lizard	Yes
San Diego pocket mouse	No
Ashy spike-moss	No
Long-spined spineflower	No
San Diego County viguiera	No
Long-spined spineflower	No
Grasshopper sparrow	No
Coast Patch-nosed snake	No
Coronado Skink	No
Red diamond rattle snake	No
Ring-necked Snake	No
Western Whiptail	No
Quino checkerspot butterfly	No

Image Source: USDA FSA NAIP (flown May 2014)



Project Boundary

Coastal California Gnatcatcher (1990-2003)

California Gnatcatcher Habitat Evaluation Model Spring 2003 (pre-fire)

- High
- Very High
- Other
- Developed

0 Feet 2,000

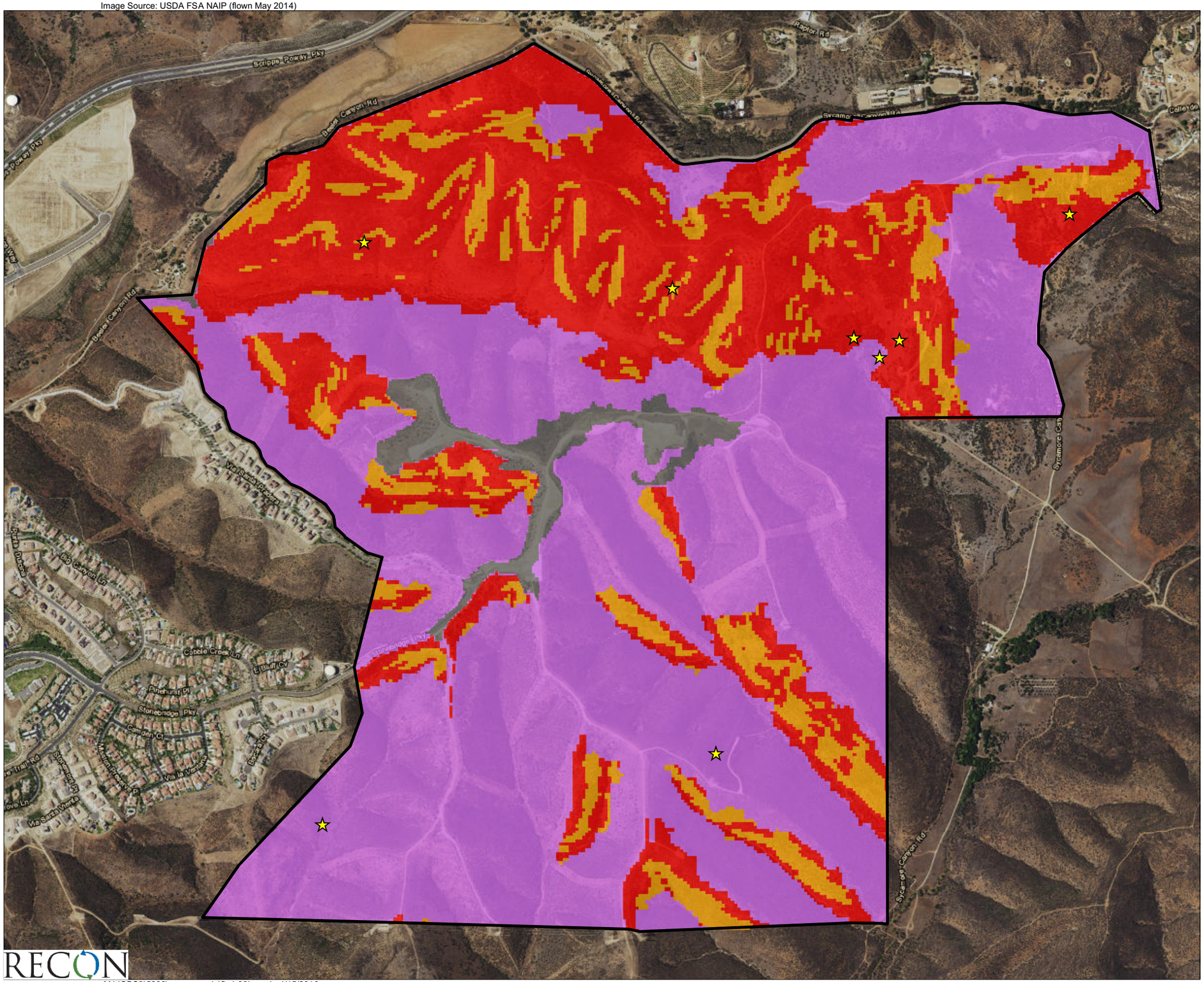
RECON

M:\JOBS3\5286\common_gis\fig4-36a.mxd 4/15/2016

FIGURE 4-36a

California Gnatcatcher Habitat
Evaluation Model Spring 2003 (pre-fire)

Image Source: USDA FSA NAIP (flown May 2014)



Project Boundary

Coastal California Gnatcatcher (1990-2003)

California Gnatcatcher Habitat Evaluation Model Spring 2003 (pre-fire)

- High
- Very High
- Other
- Developed

0 Feet 1,000

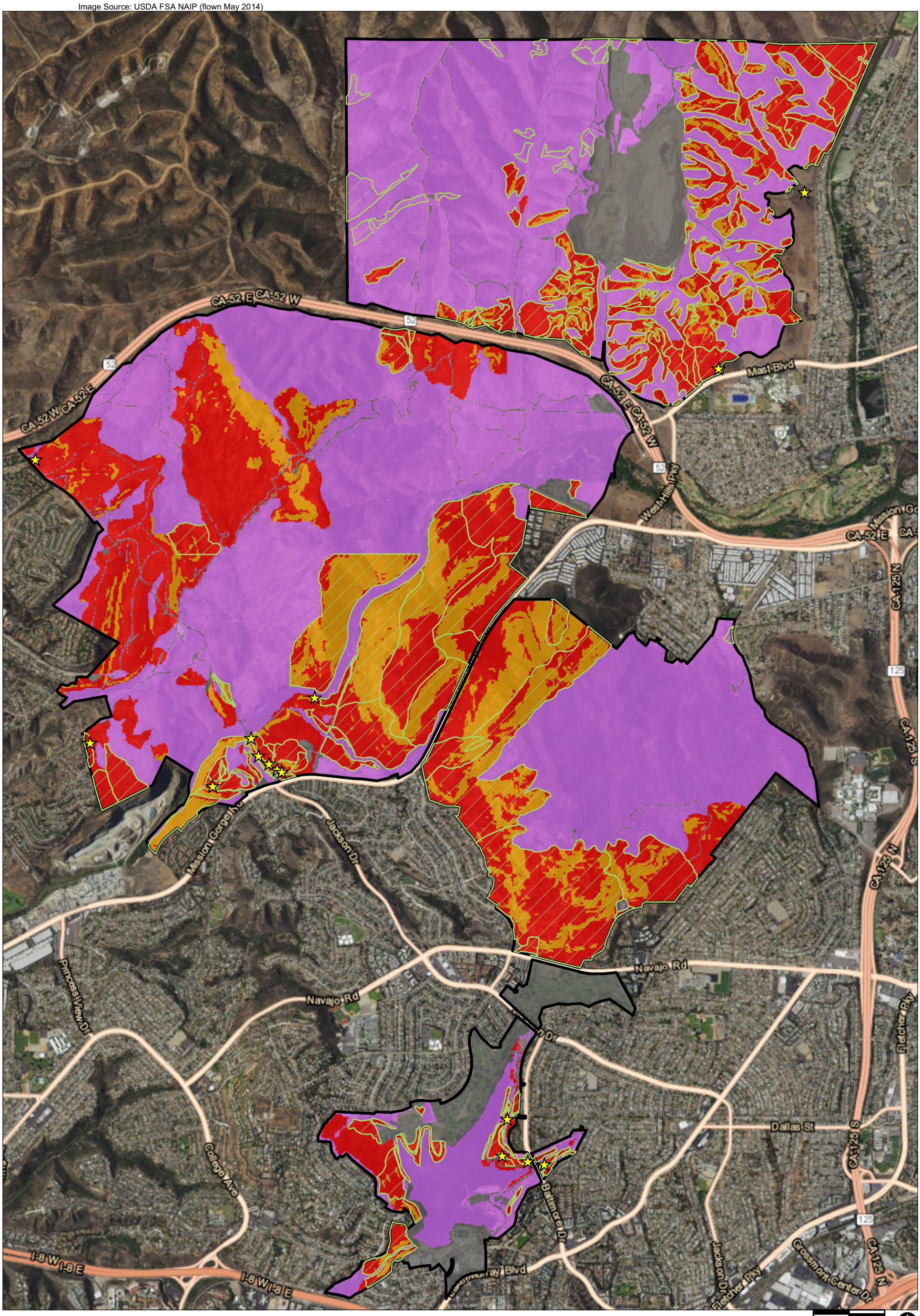
RECON

M:\JOBS3\5286\common_gis\fig4-36b.mxd 4/15/2016

FIGURE 4-36b

California Gnatcatcher Habitat Evaluation Model Spring 2003 (pre-fire)

Image Source: USDA FSA NAIP (flown May 2014)



Project Boundary

Coastal Sage Scrub (Artemisia/Eriogonum) Guild

Coastal California Gnatcatcher (2004-2010)

California Gnatcatcher Habitat Evaluation Model 2010 (post-fire)

- High
- Very High
- Other
- Developed

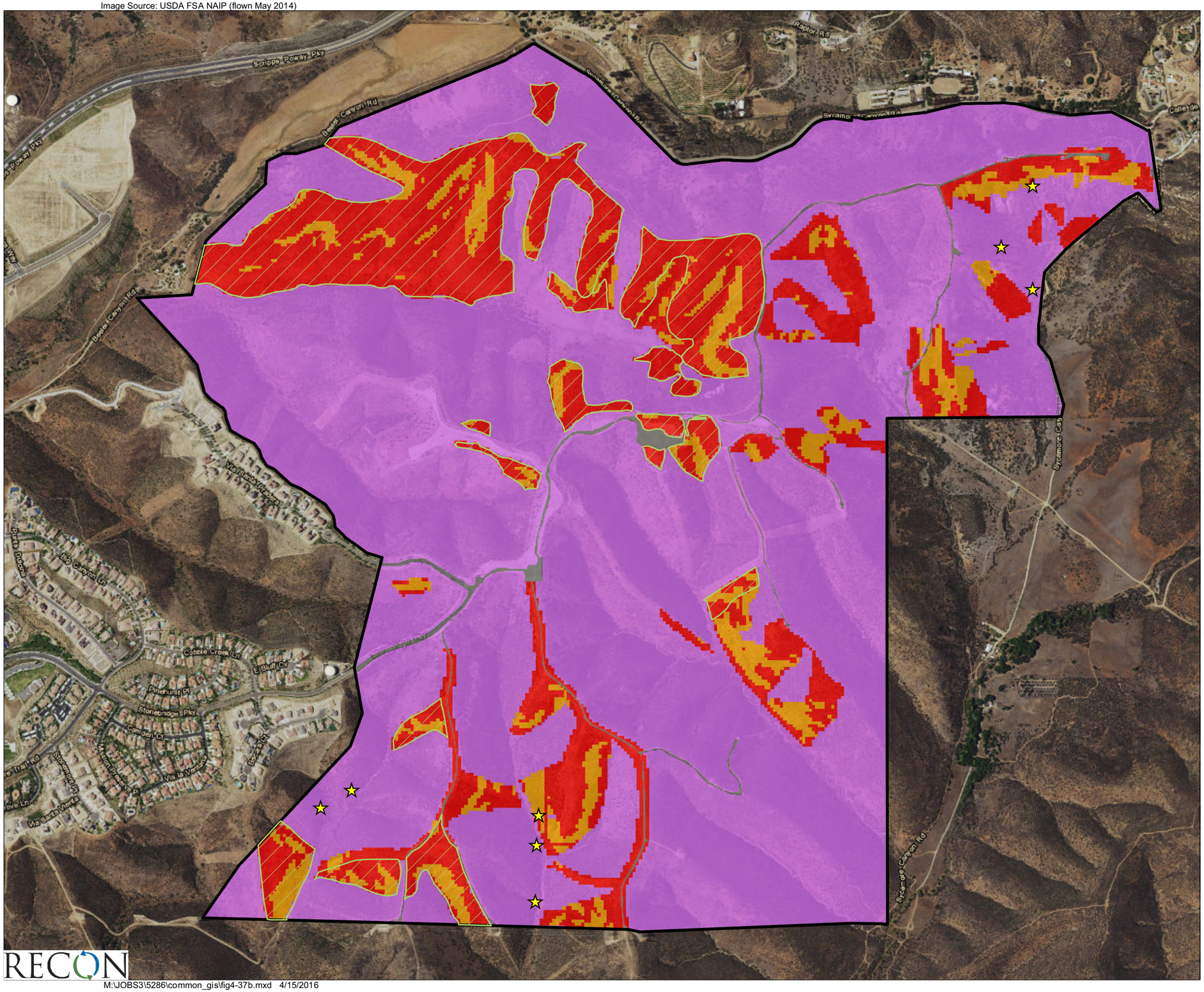
RECON

M:\JOBS3\5286\common_gis\fig4-37a.mxd 4/15/2016

FIGURE 4-37a

California Gnatcatcher Habitat Evaluation Model 2010 (post-fire)

Image Source: USDA FSA NAIP (flown May 2014)



Project Boundary

Coastal Sage Scrub (Artemisia/Eriogonum) Guild

Coastal California Gnatcatcher (2004-2010)

California Gnatcatcher Habitat Evaluation Model 2010 (post-fire)

- High
- Very High
- Other
- Developed

0 Feet 1,000

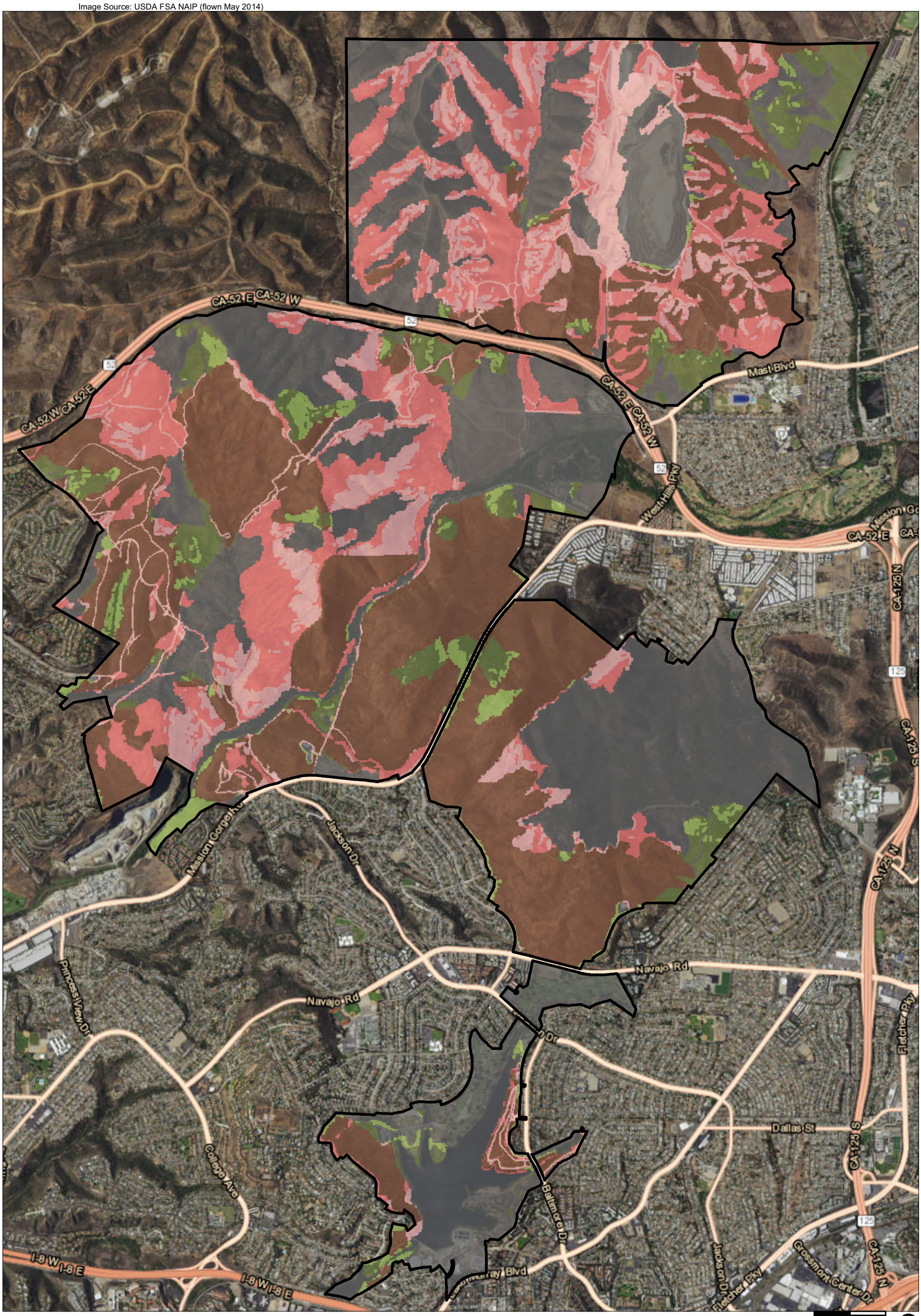
FIGURE 4-37b

California Gnatcatcher Habitat Evaluation Model 2010 (post-fire)

RECON

M:\JOBS3\5286\common_gis\fig4-37b.mxd 4/15/2016

Image Source: USDA FSA NAIP (flown May 2014)



Project Boundary

Moderate Increase in Habitat Quality

Large Increase in Habitat Quality

Moderate Decrease in Habitat Quality

Large Decrease in Habitat Quality

No Change

Not California Gnatcatcher Habitat

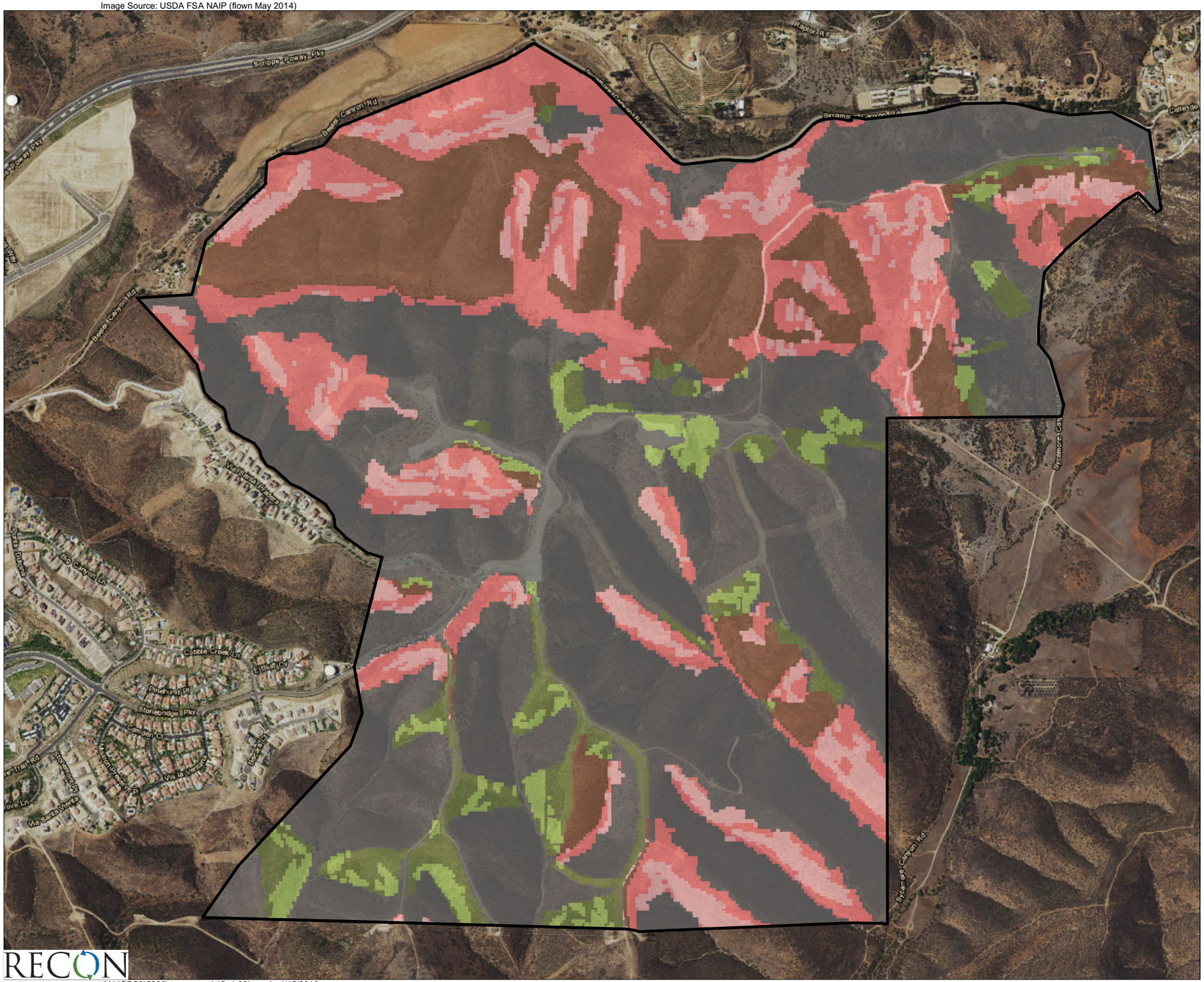
FIGURE 4-38a

Change in California Gnatcatcher
Habitat Evaluation Model 2003-2010

RECON

M:\JOBS3\5286\common_gis\fig4-38a.mxd 4/15/2016

Image Source: USDA FSA NAIP (flown May 2014)



- Project Boundary
- Moderate Increase in Habitat Quality
- Large Increase in Habitat Quality
- Moderate Decrease in Habitat Quality
- Large Decrease in Habitat Quality
- No Change
- Not California Gnatcatcher Habitat

0 Feet 1,000

FIGURE 4-38b

Change in California Gnatcatcher Habitat Evaluation Model 2003-2010

RECON

M:\JOBS3\5286\common_gis\fig4-38b.mxd 4/15/2016

One should be cautious in directly comparing habitat model results from the 2002 and 2010 vegetation datasets, as there are differences in both precision and accuracy between mapping efforts. USDA mapping was created using remote sensing at regionwide at a scale of 1:24,000, while in 2010 vegetation mapping was conducted with a large amount of ground truthing at the preserve level. Preserve-level mapping at smaller scales more precisely captures vegetation edges and is less likely to "lump" large stands of vegetation. In addition, as higher precision, detailed mapping can create a multitude of small polygons, vegetation core size (>25 acres) parameters of the model may be less likely to be met. The result of vegetation lumping at large scales on the TAIC habitat model may be an overestimate of "high" and "very high" quality acres within an area. This may falsely give the appearance of an absolute decrease in habitat acres when, in reality, the change may be a result of differences in overall mapping methods (and associated precision and accuracy). A previous study using the California gnatcatcher habitat model also found that errors within vegetation datasets affected model performance (Winchell and Doherty 2006). At MTRP for example, eastern East Elliott was initially modeled as having "high" and "very high" California gnatcatcher based on USDA 2002 remote sensing data (see Figure 4-37a). When the area was ground truthed in 2010, large expanses of what appeared as coastal sage scrub in aerial photographs were determined to be sparse, short statured chamise chaparral with developed biological crusts and did not qualify for primary model parameters (see Figure 4-37b). It is unlikely that scrub in this area would type change into chaparral over 15 years with wildfire (2003). As mature vegetation systems are present in this area and no California gnatcatchers have been recorded before or after 2003, we can cautiously assume that little "high" or "very high" quality habitat for gnatcatcher occurs or has occurred in eastern East Elliott. Recent work by Dr. Kus at USGS pertaining to range-wide occupancy modelling of California gnatcatcher showed that areas with appropriate geographic features (nearness to coast, elevation, slope, aspect) but lacking appropriate habitat (due to repeat fires) no longer support California gnatcatcher. MTRP is an excellent example that supports these findings.

Despite precision and accuracy caveats, some trends can be observed when comparing the two iterations of the model. In general, areas burned in the 2003 wildfire (West Sycamore, East Elliott, and Fortuna Mountain) lost suitable habitat for California gnatcatcher while unburned areas (Mission Gorge, Cowles Mountain, and Lake Murray) remained relatively unchanged (Table 4-18).

TABLE 4-18
ACREAGE OF HIGH AND VERY HIGH CALIFORNIA GNATCATCHER AT MTRP

Area	2002	2010	Change
West Sycamore	530	323	- 207
East Elliott	1,443	653	- 709
Fortuna Mountain	1,666	1,025	- 641
Mission Gorge	599	664	+ 65
Cowles Mountain	714	736	+ 22
Lake Murray	127	113	- 14
TOTAL	5,079	3,514	-1,565

The Coastal Sage Scrub – *Artemisia/Eriogonum* Management Guild boundaries closely follow "high" and "very high" suitable gnatcatcher habitat predicted by the model with a few exceptions (see Figure 4-37a-b).

4.5.5.2 Membership Rules

All mapped SANDAG shrub vegetation alliances and associations at MTRP which contain *Artemisia californica* and/or *Eriogonum fasciculatum*.

4.5.5.3 Threats at MTRP

a. Fire and Fire Suppression

MTRP is a matrix of burned and recovering vegetation. Over the last 50 years, seven wildfires have burned through the boundaries of the Coastal Sage Scrub – *Artemisia*/ *Eriogonum* Guild at MTRP (Table 4-19).

TABLE 4-19
MAJOR WILDFIRES WITHIN COASTAL SAGE SCRUB - *ARTEMISIA*/*ERIOGONUM* GUILD BOUNDARIES AT MTRP

Area	1963	1981	1983	1986	1988	1995	2003
West Sycamore	X					X	X
East Elliott		X					X
Fortuna Mountain		X					X
Cowles Mountain			X	X	X		
Lake Murray							

Although wildfires are a natural part of the vegetation ecosytems at MTRP, an elevated frequency of fires has the potential of locally extirpating species with weak abilities to resprout, such as *Artemisia californica,* from recovering coastal sage scrub vegetation (Malanson and O'Leary 1982). Type conversion from coastal sage scrub to non-native grassland via successive burning may also reduce the spatial area of Coastal Sage Scrub – *Artemisia*/*Eriogonum* (Zedler et al. 1983).

b. Invasive Weeds

- Exotic annual grasses have colonized many areas within the Guild boundary following the fires of 1981, 1995, and 2003. Over time, if initial fire damage is not too severe and disturbance frequencies are kept low, successional processes at a landscape scale should favor the reformation of coastal sage scrub vegetation on invaded sites (Zedler et al. 1983). Over the long term, climate change may potentially affect seral processes to the point where a more permanent type change in vegetation occurs (Bachelet et al. 2001).

- Exotic perennial weed species pose a major threat to the CSS-*Artemisia*/*Eriogonum* Guild at MTRP. A large population (5 acres of coverage) of artichoke thistle (*Cynara*

cardunculus) was observed in the West Sycamore area during vegetation surveys (RECON 2011; Figure 4-39 and Photograph 4-15). Artichoke thistle, also called cardoon, is a perennial herb that may grow up to six feet high and six feet wide with a cluster of large, purple flower heads. The plant reproduces from seed and may colonize riparian woodlands, natural openings in chaparral and sage scrub, or native grasslands (Pepper and Kelly 1994). Artichoke thistle is native to the Mediterranean and has become widespread over California. Artichoke thistle is found in disturbed areas and has also been observed colonizing coastal sage scrub habitat, riparian areas, and native grasslands (Pepper and Kelly 1994).

- According to a brief review of past aerial photography, the spatial area of the population appears to have grown significantly since the first observable image in 2002.

4.5.5.4 Monitoring and Management Goals

Goal: Monitor and control emerging threats to size and health of Coastal Sage Scrub – *Artemisia*/*Eriogonum* at MTRP (Figure 4-40).

Objective 1: Trail Closure / Reroutes

- Trail redundancies within the Guild boundary shall be minimized as a part of the Master Plan Update associated with this document.

Objective 2 : Control Artichoke Thistle at the West Sycamore Area

- Continue to implement the Artichoke Thistle restoration plan (developed 2014-2015) to control artichoke thistle at the West Sycamore area. Treatment started in 2016 with follow up work completed in Spring of 2017. Care shall be taken to control emergent weed threats within the treatment area as artichoke thistle cover is reduced. A restoration plan incorporates the following:

  Herbicide treatment: Glyphosate has been shown as effective to use in cut stumps applications and as foliar spray in controlling artichoke thistle. Cut stump applications involve cutting and bagging the basal rosette of plants and applying glyphosate to the exposed root. Cut stump applications are recommended in pre-bolting plants. In cases where artichoke thistle has bolted, a glyphosate (2 percent) foliar spray has been shown effective as a control (Kelly 2000).

  Treatment Schedule:
  Spring: remove basal rosettes and apply herbicide to cut stumps.
  Summer: bag seed heads and apply foliar spray to bolted individuals.

  Success Criteria:
  Reduce cover of artichoke thistle 5 percent per year of treatment

Image Source: USDA FSA NAIP (flown May 2014)

Project Boundary
Coastal Sage Scrub (*Artemisia/Eriogonum*) Guild
Artichoke Thistle (*Cynara cardunculus*)

0 Feet 600

FIGURE 4-39

Coastal Sage Scrub (*Artemisia/Eriogonum*) Guild Management Actions

RECON

M:\JOBS3\5286\common_gis\fig4-39.mxd 4/15/2016

Photograph 4-15: Artichoke thistle infestation within the West Sycamore area.

4.5.5.5 MSCP Conditions of Coverage for Covered Guild Species

a. San Diego Barrel Cactus

Area-specific management directives must include specific measures to protect against detrimental edge effects and unauthorized collection, and include appropriate fire management/control practices to protect against a too-frequent fire cycle (MSCP 1998: Table 3-5).

In addition to measures described in Sections 4.5.2.4, 4.5.3.3, and 4.5.3.4, the minimization of recreational access to this guild boundary (which the San Diego barrel cactus is associated with) will protect the species from recreational collecting and accidental fires.

b. San Diego Golden Star

Area-specific management directives must include specific measures to protect against detrimental edge-effects (MSCP 1998: Table 3-5).

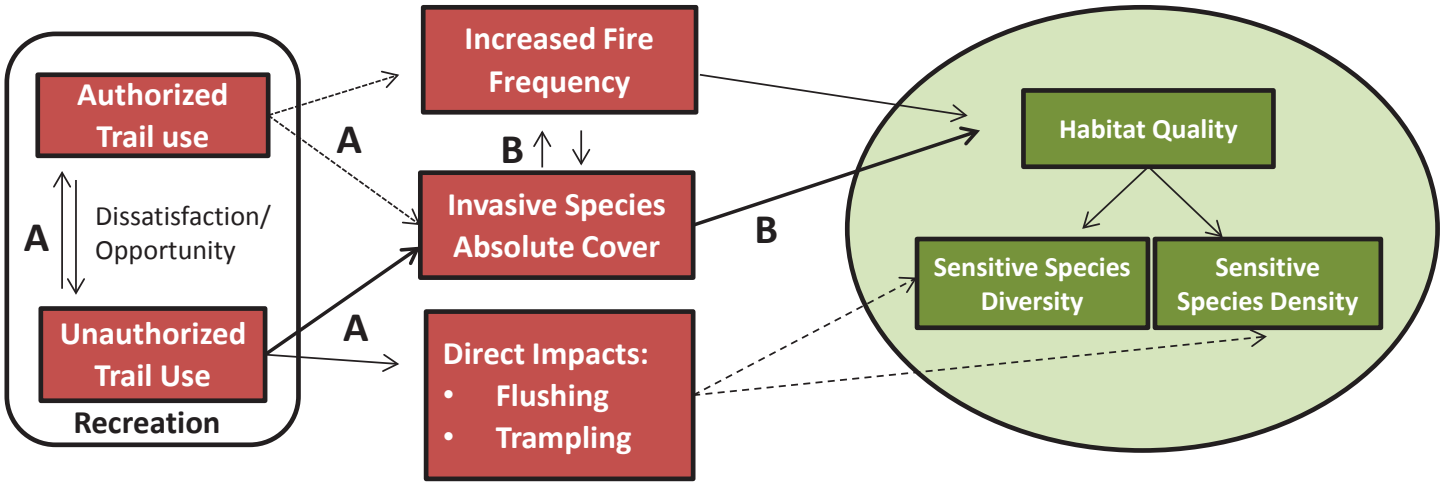
In addition to measures described in Sections 4.5.2.5 and 4.5.3.5, landscape level trail closure and rerouting of trails will decrease recreation-related edge effects to this species.

Coastal Sage Scrub - Artemisia/Eriogonum Management Guild

Goal: Monitor and control emerging threats to size and health of Coastal Sage Scrub – *Artemisia/Eriogonum* at MTRP

Monitor response of threats to management actions

Current Anthropogenic Threats



Management:

A. Trail closure/ reroute

B. Weed control

RECON

FIGURE 4-40

Conceptual Model for Coastal Sage Scrub Management Guild

c. Variegated Dudleya

Area-specific management directives must include species-specific monitoring and specific measures to protect against detrimental edge effects to this species, including effects caused by recreational activities (MSCP 1998: Table 3-5).

In addition to measures described in Sections 4.4.3.4 and 4.5.2.5, landscape level trail closure and rerouting of trails will decrease recreation-related edge effects to this species.

d. California Gnatcatcher

Area-specific management directives must include measures to reduce edge effects and minimize disturbance during the nesting period, fire protection measures to reduce the potential for habitat degradation due to unplanned fire, and management measures to maintain or improve habitat quality including vegetation structure. No clearing of occupied habitat within the Cities' MHPAs or County's biological core areas may occur between March 1 and August 15 (MSCP 1998: Table 3-5).

Trail closure and minimization via rerouting within guild boundaries will reduce edge effects and disturbance in California gnatcatcher habitat. In addition, the control of artichoke thistle, an aggressive weed within coastal sage scrub, will expand available habitat for the species.

5.0 Budget and Schedule

The following is a projected budget and schedule for recommended tasks in Sections 4.4 and 4.5 (Table 5-1).

TABLE 5-1
BUDGET AND SCHEDULE

Management Area	Task	Cost (per year)	Cost (5-year)	Schedule
San Diego Thornmint	Remove exotic weeds within existing populations: hand weeding	$20,000	$100,000	Early winter–late summer (4x/year)
	Remove exotic weeds within occupied clay lenses: dethatch and herbicide	$9,500	$47,500	Early winter–late summer (4x/year)
	Continue MSCP monitoring	$0		
San Diego Ambrosia	Continue adaptive management weeding program	$0		
	Transplantation	$5,100-first year $3,000-additional years	$17,100	Early winter
	Continue MSCP monitoring	$0		
Variegated Dudleya	Update baseline population surveys	$25,000	$50,000	Winter: two seasons
	Threats assessment and prioritization	$5,000	$10,000	Concurrent with update
	Monitoring: Continue MSCP Monitoring	0		
Willowy Monardella	Hydrological evaluation	$6,500	$6,500	
	Erosion control (installation)	$2,000	$2,000	Install before winter rains
	Remove exotic weeds from occupied habitat	$7,000	$35,000	Fall: annual
	Continue CNPS and MSCP monitoring	$0		
	Monitoring: Recruitment study	$12,000	$60,000	Early spring: annual
	Monitoring: Entrenchment study	$5,500	$27,500	Summer: annual
Coastal Cactus Wren	Reduce combustible fuels around cacti	$20,000-first year $10,000-additional years	$60,000	8/15-3/15
	Cacti transplantation	$13,000	$13,000	
	Cactus wren presence absence surveys	$3,500	$14,000	2x/year: winter and breeding season
	Monitoring: photo points	$0		Concurrent with relevé
	Monitoring: relevé	$2,500	$12,500	Spring: annual
East Elliott Clay Ridgelines Management Guild	Survey: biological crusts	$25,000	$25,000	Spring: 5-year interval
	Survey: sensitive plant update	$0		Concurrent with biological crust surveys
Tierrasanta Clay Ridge Management Guild	Survey: biological crusts	$10,000	$10,000	Spring: 5-year interval

TABLE 5-1
BUDGET AND SCHEDULE
(continued)

Management Area	Task	Cost (per year)	Cost (5-year)	Schedule
Riparian Woodlands Management Guild	Continue MSCP monitoring	$0		
	Continue cowbird trapping and regional coordination	$0		
	"Search and Destroy" giant reed surveys	$4,000/3 years	$4,000	3-year interval and/or 6 months after major flood
Coastal Sage Scrub – *Artemisia/ Eriogonum* Management Guild	West Sycamore restoration plan	$4,000	$4,000	
	Artichoke thistle control	$85,000	$425,000	4x/year
	Continue MSCP monitoring	$0		

6.0 References

Anchor Environmental, Everest International Consultants, KTU+A, Merkel and Associates, TRAC, and Michael Welch

2005 San Diego River Watershed Management Plan: Final Watershed Management Plan. Prepared for San Diego River Watershed Work Group. March 2005.

Atwood, J. L., and D. R. Bontrager

2001 California Gnatcatcher (*Polioptila californica*). In *The Birds of North America,* no. 574, edited by A. Poole, P. Stettenheim, and F. Gill, pp. 1-31. The Birds of North America, Inc., Philadelphia.

Atwood, J. L., D. R. Bontrager, M. Fugagli, R. Hirsch, D. Kamada, M. Madden, C. Reynolds, S. Tsai, and P. Bowler

2002 *Population Dynamics, Dispersal and Demography of California Gnatcatchers and Cactus Wrens in Coastal Southern California (1997 Progress Report)*. 42 pp + Appendices.

Bachelet, D., R. P. Nielson, J. M. Lenihan, and R. J. Drapek

2001 Climate change effects on vegetation distribution and carbon budget in the United States. Ecosystems 4: 164-185.

Bauder, E. T., and J. Sakrison

1997 Autecology of San Diego thornmint (*Acanthomintha ilicifolia*). FG 5637 R5. Department of Fish and Game, Borrego Springs, California, 43pp.

Bauder, E. T., and J. Sakrison

1999 Mechanisms of persistence of San Diego thornmint (*Acanthomintha ilicifolia*). FG7634R5. California Department of Fish and Game, Borrego Springs, California, 46 pp.

Bell, Gary P.

1997 Ecology and Management of Arundo Donax, and Approaches to Riparian Habitat Restoration in Southern California. In Brock, J., Wade, M., Pysek, P., Green, D. (eds.) *Plant invasions: Studies from No. America and Europe*. pp. 103-113.

Belnap J., and O. Lange (eds.)

2001 Ecological Studies, Volume 150 Biological Soil Crusts: Structure, Function and Management. Springer-Verlag Berlin.

Bolger, D. T., M. A. Patten, and D. C. Bostock
2005 Avian reproductive failure in response to an extreme climatic event. *Oecologia* 142: 398-406.

Bontrager, D. R., and A. L. Gorospe
1995 Movement and Dispersal of California Gnatcatchers and Cactus Wrens in the San Joaquin Hills, Orange County, California. Prepared for Ed Almanza and Associates. January. 14 pp + Appendices.

Brossard, C., J. M. Randall, and M. C. Hoshovsky (eds.)
2000 Invasive Plants of California's Wildlands. University of California Press. Berkeley, CA.

Bureau of Land Management
2012 Weed Free Hay FAQs
http://www.blm.gov/or/resources/recreation/weedfreehayfaq.php.

California Invasive Plant Council (Cal-IPC)
2012 Invasive Plant Inventory. Accessed August 15, 2012 at http://www.cal-ipc.org/ip/inventory/index.php.

California Native Plant Society (CNPS)
2001 *Inventory of Rare and Endangered Plants of California.* 6th ed. Edited by D. P. Tibor. Rare Plant Scientific Advisory Committee.

California, State of
2011a Special Vascular Plants, Bryophytes, and Lichens List. California Natural Diversity Database. Wildlife & Habitat Data Analysis Branch, Department of Fish and Game. Quarterly Publication.

2011b California Natural Diversity Database: Electronic Database with Annual Updates. Wildlife & Habitat Data Analysis Branch, Department of Fish and Game.

2011c State and Federally Listed Endangered, Threatened, and Rare Plants of California. Natural Diversity Database. Department of Fish and Game. January.

Center for Disease Control (CDC)
2012 West Nile virus disease and other arboviral disease. United States. MMWR 2012; 61(27):510-514.

Center for Natural Lands Management
2009 *A Comparison of Vegetation Management Techniques to Support Recovery of the Federally Endangered* Ambrosia pumila by Center for Natural Lands Management. December 2009.

County of San Diego
2014 West Nile Virus Activity in San Diego County. http://www.sdcounty.ca.gov/deh/pests/wnv/wnv_activity_update/chd_wnv_casesbyzip.html. Accessed July 2014.

Dodero, Mark
2011 Personal Communication with Botanist at RECON Environmental Inc., San Diego, California. Subject: Threats to Variegated Dudleya

Dudek & Associates (Dudek)
2000 San Diego Ambrosia Management Plan, City of San Diego Mission Trails Regional Park. Prepared for the City of San Diego Multiple Species Conservation Program. May 15, 2000.

Eldridge D. J., and M. E. Tozer
1996 Distribution and floristics of bryophytes in soil crusts and semiarid and arid Australia. Australian Journal of Botany 44:223-247.

Faul, F., E. Erdfelder, A. Uchner, and A. G. Lang
2009. Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods, 41*, 1149-1160.

Frandsen, P., and N. Jackson
1994 The Impact of Arundo Donax on Flood Control and Endangered Species. In: Jackson, N. et al. *Arundo donax* Workshop, California Exotic Pest Plant Council, San Diego, CA. Pp. 13-16.

Franklin, B. B.
1996 Eradication/Control of the Exotic Pest Plants Tamarisk and Arundo in the Santa Ynez River Drainage. USDA-FS-PSW, Washington , DC.

Franzreb, K. E.
1989 Ecology and Conservation of the Endangered Least Bell's Vireo. U.S. Fish and Wildlife Service, Biological Report 89(1). 17 pp.

Hickman, J. C., ed.
1993 *The Jepson Manual: Higher Plants of California.* University of California Press, Berkeley and Los Angeles.

Hogan, D. M., and M. R. Walbridge
2007 Urbanization and Nutrient Retention in Freshwater Riparian Wetlands. *Ecological Applications* 17(4): 1142-1155.

Holland, R. F.
1986 Preliminary Descriptions of the Terrestrial Natural Communities of California. Nongame Heritage Program, California Department of Fish and Game, Sacramento. October.

Kaltenecker, J. H.
1997 The Recovery of Microbiotic Crusts Following Post-Fire Rehabilitation on Rangelands of the Western Snake River Plain. Unpublished thesis, Boise State University, ID. 99 Pp.

Keeley, J. E., T. Brennan, A. H. Pfaff
2008 Fire Severity and Ecosystem Responses Following Crown Fires in California Shrublands. *Ecological Applications* 18(6): 1530-1546

Kelly, M.
1998 Flooding: brought to you by the City of San Diego, A telling history of a north county watershed. San Diego Earth Times. http://www.sdearthtimes.com/et0298/et0298s1.html.

2000 *Cynara cardunculus*. In *Invasive Plants of California's Wildlands,* edited by C. C. Bossard, J. M. Randall, and M. C. Hoshovsky. University of California Press, Berkeley.

Kelly, M., C. Burrascano, and M. Johnson-Rocks
2008 Spraying Over the Top of *Ambrosia pumila*, a Federally Listed Species, to Control Invasive Weeds. Power Point Presentation, Cal-IPC Symposium.

Klein, M. W.
2009 Pollinator Study on Lakeside Ceanothus (*Ceanothus cyaneus*) and San Diego Thorn-mint (*Acanthomintha ilicifolia*). Contract No. PO650018. California Department of Fish and Game, Sacramento, CA.

Kus, B. E., and P. P. Beck
1998 Distribution and abundance of the Least Bell's Vireo (*Vireo bellii pusillus*) and the Southwestern Willow Flycatcher (*Empidonax traillii extimus*) at selected southern California sites in 1997. Unpublished report for the California Department of Fish and Game, Sacramento, California.

Johnson, J., D. Bainbridge, J. Janssen, and D. Truesdale
1999 *Ambrosia pumila* – Monitoring Outplanting, and Salvage. A section of the progress report 1998-1999; for the California Department of Transportation.

Lynn S., and B. E. Kus
2010 Distribution, abundance, and breeding activities of the least Bell's vireo along the San Diego River, California: 2010 Annual Data Summary. Prepared for San Diego River Conservancy.

Malanson, G.P. and J.F. O'Leary
1982 Post-fire regeneration strategies in California coastal sage shrubs. Oecologia 53:355-358.

McDowell, Nate., William T. Pockman, Craig D. Allen, David D. Breshears, Neil Cobb, Thomas Kolb, Jennifer Plaut, John Sperry, Adam West, David G. Williams[1], Enrico A. Yepez
2008 Mechanisms of Plant Survival and Mortality during Drought: Why Do Some Plants Survive while Others Succumb to Drought? *New Phytologist* 178 (4): 719-739.

McGlaughlin, M. E., and E. A. Friar
2007 Clonality in the endangered *Ambrosia pumila* (Asteraceae) inferred from RAPD markers; implications for conservation and management. Cons. Genetics 8:319-330.

McMillan Biological Consulting and Conservation Biology Institute
2002 2001 MSCP Rare Plant Survey and Monitoring Report. Prepared for the City of San Diego.

Miller, B.
2011 Personal Communication, San Diego, California. Subject: Threats to Willowy Monardella at Mission Trails Regional Park.

National Academy of Sciences (NAS)
1969 Eutrophication: Causes, Consequences, Correctives: Proceedings of A Symposium, California. National Academy of Sciences, Washington D.C.

Oberbauer, T.
2005 Terrestrial Vegetation Communities in San Diego County Based on Holland's Descriptions. San Diego Association of Governments, San Diego, CA. March.

Ogden Environmental and Energy Services
1998 Final Multiple Species Conservation Program: MSCP Plan.

Pepper, A., and M. Kelly
1994 The Ecology and Management of the Wild Artichoke *Cynara cardunculus*. *CalEPPC News* 94 (Winter):4-6.

Poff, N. L., J. D. Allan, M. B. Bain, J. R. Karr, K. L. Prestegaard, B. D. Ritcher, R. E. Sparks, and J. C. Stromberg

1997 The Natural Flow Regime: A Paradigm for River Conservation and Restoration. *BioScience* 47(11): 769-784.

Preston, K. L., and D. Kamada

2011 Nature Reserve of Orange County: Monitoring Coastal Cactus Wren Reproduction, Dispersal and Survival in 2010. Annual Report Prepared for California Department of Fish and Game LAG#PO982013. March 17, 2011. 45 pp + Appendices.

Proudfoot, G. A., D. A. Sherry, and S. Johnson.

2000 Cactus Wren (*Campylorhynchus brunneicapillus*). In *The Birds of North America*, No. 558 (edited by A. Poole and F. Gill). The Birds of North America, Inc., Philadelphia, PA.

Rea, A. M., and K. L. Weaver

1990 The Taxonomy, Distribution, and Status of Coastal California Cactus Wrens. W. Birds 21:82-126

Rebman, J., and R. Dossey

2006 Long-Term Monitoring Plan and Baseline Survey of Willowy Monardella (*Monardella viminea*) at Marine Corps Air Station Miramar San Diego, California. N68711-01-LT-01030. San Diego Nat. Hist. Mus., Dept. of Botany, San Diego, CA.

RECON Environmental, Inc.

2000 Final variegated dudleya translocation plan for the Trails project, City of San Diego, California. February 25.

2008 The Trails Project (Variegated Dudleya Translocation Portion) – Year 5 monitoring letter. City of San Diego, California. May 28.

2009 Report for Phase I of the Resource Management Plan for Mission Trails Regional Park, San Diego, California. January.

2010 Natural Resource Management Plan, Phase II: Biological Inventory and Survey of Portions of Mission Trails Regional Park, San Diego, California. September.

Regan, H. M., L. A. Hierl, J. Franklin, and D. H. Deutschman

2006 San Diego Multiple Species Conservation Program Covered Species Prioritization. California Department of Fish and Game. January.

Reiser, C. H.

2001 *Rare Plants of San Diego County.* Aquifir Press, Imperial Beach, CA.

Rosgen, D.
1997 A Geomorphological Approach to Restoration of Incised Rivers. Proceedings of the conference on Management of Landscapes Disturbed by Channel Incision, S.S.Y. Wang, E.J. Langendoen and F.D. Shields, Jr. (eds.).

Rosgen, D., and H. L. Silvey
1996 Applied River Morphology. Wildland Hydrology. Pagosa Springs, Colorado.

San Diego Association of Governments (SANDAG)
2011 *Vegetation Classification Manual for Western San Diego County.* First Edition. Prepared by AECOM, California Department of Fish and Game Vegetation Classification and Mapping Program, and Conservation Biology Institute.

San Diego, City of
1997 City of San Diego MSCP Subarea Plan. March

2004 City of San Diego Vernal Pool Inventory. Planning Department, San Diego, California.

2005 MSCP Rare Plant Monitoring: Field Monitoring Methods http://www.sandiego.gov/planning/mscp/pdf/methodsmanual.pdf.

2009 City of San Diego MSCP Rare Plant Monitoring: 2009 Summary Results.

2012a City of San Diego Biology Guidelines for the Environmentally Sensitive Lands Regulations (ESL), the Open Space Residential (OR-1-2) Zone, and the California Environmental Quality Act (CEQA).

2012b Sycamore Landfill Master Development Plans, Revised EIR. SCH Number. 2003041057, Project Number 5617. August.

San Diego County Water Authority and United States Fish and Wildlife Service
2010 Final Environmental Impact Report/Environmental Impact Statement (EIR/EIS) for the San Diego County Water Authority and Subregional Natural Community Conservation/Habitat Conservation Plan (NCCP/HCP). October.

San Diego Gas & Electric Company (SDG&E)
1995 Subregional Natural Community Conservation Plan. December.

San Diego Management and Monitoring Plan [SDMMP]
2010 Connectivity Monitoring Strategic Plan for the San Diego Preserve System.

San Diego Natural History Museum
2009 2009 BioBlitz at Mission Trails Regional Park.

Skinner, M. W., and B. M. Pavlik, eds.
1994 *Inventory of Rare and Endangered Vascular Plants of California.* Special Publication No. 1 (5th ed.). California Native Plant Society, Sacramento.

Smith, E. P.
2002 BACI design. Encyclopedia of Environmetrics Vol. 1: pp 141-148. El-Shaarawi A. H. and W. W. Piergorsch (eds.).

Smythe, W. E.
1908 History of San Diego, 1542-1908: An Account of the Rise and Progress of Pioneer Settlement on the Pacific Coast of the United states. San Diego History Co.

Solek, C., and L. Szijj
2004 Cactus Wren (*Campylorhynchus brunneicapillus*). *In* The Coastal Scrub and Chaparral Bird Conservation Plan: a strategy for protecting and managing coastal scrub and chaparral habitats and associated birds in California. California Partners in Flight. http://www.prbo.org/calpif/htmldocs/scrub.html

Steintz, C
1997 Biodiversity and Landscape Planning: An Alternative Future for the Region of Camp Pendleton, California. Alexander and Victoria Wiley Professor of Landscape Architecture and Planning. Harvard University, Graduate School of Design, Cambridge, MA.

Technology Associates International Corporation (TAIC)
2002 California gnatcatcher habitat evaluation model for USFWS. Digital Data. USFWS Office. Carlsbad CA.

Unitt, P. A.
2004 *San Diego County Bird Atlas.* Proceedings of the San Diego Society of Natural History, No. 39. San Diego Natural History Museum.

2008 San Diego Cactus Wren. *In California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct populations of Birds of Immediate Conservation Concern in California.* W.D. Shuford and T. Gardali, Editors. Studies of Western Birds No.1. Published by Western Ornithologists and California Department of Fish and Game.

University of California Integrated Pest Management
2013 Goldspotted Oak Borer: Integrated Pest Management for Land Managers and Landscape Professionals. Pest Notes Publication 74163. January.

U.S. Department of Agriculture (USDA)
1973 *Soil Survey, San Diego Area, California.* Edited by R. H. Bowman. Soil Conservation Service and Forest Service. December.

2012 Wetland Indicator Status. Accessed in July 2012 at: http://plants.usda.gov/wetland.html

U.S. Department of the Interior
2001 Biological Soil Crusts: Ecology and Management. Technical Reference 1730-2.

U.S. Fish and Wildlife Service (USFWS)
1998 Determination of Endangered or Threatened Status for Four Plants from Southwestern California and Baja California, Mexico. *Federal Register* 63 (197): 54938-54956. October 13.

2002 Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for *Ambrosia pumila* (San Diego Ambrosia) from Southern California; Final Rule. *Federal Register* 67(127): 44372-44382. July 2.

2008 *Monardella linioides* subsp. *vimnea* (Willowy Monardella) 5-year Review: Summary and Evaluation. March 2008.

2009 *Acanthomintha ilicifolia* (San Diego thornmint) 5-year Review: Summary and Evaluation. August 12, 2009.

2010 *Ambrosia pumila* (San Diego ambrosia) 5-Year Review: Summary and Evaluation. July 15, 2010.

2011 A National Plan for Assisting States, Federal Agencies, and Tribes in Managing White-Nose Syndrome in Bats. May.

2012 *Monardella vimne*a (Willowy Monardella) 5-year Review: Summary and Evaluation. August 3, 2012.

U.S. Fish and Wildlife Service and California Department of Fish and Wildlife (USFWS and CDFW)

1996 Multiple Species Conservation Program (MSCP) 1995 and 1996 Species Evaluations. September.

Western Tracking Institute (WTI)

2010 City of San Diego, Mission Trails Regional Park Open Space Mammal Monitoring and Habitat Assessment Project Comprehensive Final Report. May.

Weston Solutions Inc.

2007 San Diego County Municipal Copermittees 2005-2006 Urban Runoff Monitoring, Volume I - Final Report. January

Winchell, C., and P. Doherty

2006 Estimation of California gnatcatcher pair abundance and occupancy rates. Prepared for California Department of Fish and Game. January.

Zeiner, David C., William F. Laudenslayer, Jr., and Kenneth E. Mayer, eds.

1990 *California's Wildlife,* vols. 1-3. California Statewide Wildlife Habitat Relationships System, California Department of Fish and Game, Sacramento.

Zeiner, D. C., W. F. Laudenslayer, Jr., K. E. Mayer, and M. White, eds.

1988 *Amphibians and Reptiles.* California's Wildlife, vol. 1. California Department of Fish and Game, Sacramento.

Zedler, P. H., C. R. Gautier, and G. S. McMaster

1983 Vegetation change in response to extreme events: the effects of a short interval between fires in California chaparral and coastal sage scrub. *Ecology* 64: 809-818.

APPENDICES

APPENDIX A-A

Plant Species Observed within MTRP

APPENDIX A-A
PLANT SPECIES OBSERVED WITHIN MTRP

Scientific Name	Common Name	Origin	Cal-IPC
SELAGINELLACEAE	**SPIKE-MOSS FAMILY**		
Selaginella bigelovii L. Underw.	Bigelow spike-moss	N	-
Selaginella cinerascens A.A. Eaton	ashy spike-moss	N	-
POLYPODIACEAE	**POLYPODY FAMILY**		
Polypodium californicum Kaulf.	California polypody	N	-
PTERIDACEAE	**BRAKE FAMILY**		
Adiantum capillus-veneris L.	southern maiden-hair	N	-
Adiantum jordanii Mull. Hal.	California maiden-hair	N	-
Cheilanthes newberryi (D.C. Eaton) Domin	California cottonfern	N	-
Pellaea mucronata (D.C. Eaton) D.C. Eaton var. *mucronata*	bird's-foot fern	N	-
Pentagramma triangularis (Kaulf.) Yatsk. Windham & E. Wollenw.	goldback fern	N	-
SAURURACEAE	**LIZARD'S TAIL FAMILY**		
Anemopsis californica (Nutt.) Hook. & Arn.	yerba mansa	N	-
AGAVACEAE	**AGAVE FAMILY**		
Chlorogalum parviflorum S. Watson	smallflower soap plant	N	-
Yucca whipplei Torr.	our Lord's candle	N	-
ASPARAGACEAE	**ASPARAGUS FAMILY**		
Asparagus asparagoides (L.) Druce	smilax	I	Moderate
CYPERACEAE	**SEDGE FAMILY**		
Carex sp.	sedge	N/I	-
Carex triquetra Boott	triangular-fruited sedge	N	-
Cyperus involucratus [=*alternifolius*] Rottb.	umbrella plant	I	-
Cyperus niger Ruiz & Pav.	brown cyperus	N	-
Eleocharis sp.	spike-rush	N	-
Schoenoplectus [=*Scirpus*] *americanus* (Pers.) Volkart ex Schinz & R. Keller	three-square	N	-
IRIDACEAE	**IRIS FAMILY**		
Sisyrinchium bellum S. Watson	blue-eyed-grass	N	-

APPENDIX A-A
PLANT SPECIES OBSERVED WITHIN MTRP
(continued)

Scientific Name	Common Name	Origin	Cal-IPC
JUNCACEAE	**RUSH FAMILY**		
Juncus acutus L. ssp. *leopoldii* (Parl.) Snogerup	spiny rush	N	-
Juncus bufonius L. var. *bufonius*	toad rush	N	-
Juncus effusus L.	common rush	N	-
LILIACEAE	**LILY FAMILY**		
Calochortus sp.	Mariposa lily, fairy lantern, globe lily	N	-
Calochortus splendens Benth.	lilac mariposa	N	-
Calochortus weedii A.W. Wood var. *weedii*	weed mariposa	N	-
POACEAE (GRAMINEAE)	**GRASS FAMILY**		
Stipa [=*Achnatherum*] *coronatum* (Thurb.) Barkworth	giant stipa	N	-
Stipa [=*Achnatherum*] *diegoense* (Swallen) Barkworth	San Diego County needle grass	N	-
Agrostis microphylla Steud.	small-leaf bent	N	-
Avena barbata Link	slender wild oat	I	Moderate
Avena fatua L.	wild oat	I	Moderate
Bothriochloa barbinodis (Lag.) Herter	cane bluestem	N	-
Brachypodium distachyon (L.) P. Beauv.	purple falsebrome	I	Moderate
Briza minor L.	quaking grass	I	-
Bromus diandrus Roth	ripgut grass	I	Moderate
Bromus hordeaceus L.	soft chess	I	Limited
Bromus madritensis L. ssp. *rubens* (L.) Husnot	red brome	I	High
Cynodon dactylon (L.) Pers.	Bermuda grass	I	Moderate
Gastridium ventricosum (Gouan) Schinz & Thell.	nit grass	I	-
Lamarckia aurea (L.) Moench	goldentop	I	-
Leymus triticoides (Buckley) Pilg.	beardless wild rye	N	-
Lolium multiflorum Lam.	Italian ryegrass	I	Moderate
Melica frutescens Scribn.	melic grass	N	-
Melica imperfecta Trin.	California melic	N	-
Muhlenbergia microsperma (DC.) Kunth	littleseed muhly	N	-
Muhlenbergia rigens (Benth.) Hitchc.	deergrass	N	-
Nassella sp.	needlegrass	N	-
Nassella lepida (Hitchc.) Barkworth	foothill needlegrass	N	-
Nassella pulchra (Hitchc.) Barkworth	purple needlegrass	N	-
Paspalum dilatatum Poir.	dallis grass	I	-
Pennisetum setaceum (Forssk.) Chiov.	fountain grass	I	Moderate

APPENDIX A-A
PLANT SPECIES OBSERVED WITHIN MTRP
(continued)

Scientific Name	Common Name	Origin	Cal-IPC
Phalaris minor Retz.	Mediterranean canary grass	I	-
Piptatherum [=*Oryzopsis*] *miliaceum* (L.) Coss.	smilo grass	I	Limited
Poa secunda J. Presl ssp. *secunda*	one-sided bluegrass	N	-
Polypogon monspeliensis (L.) Desf.	annual beard grass	I	Limited
Schismus barbatus (L.) Thell.	Mediterranean schismus	I	Limited
Vulpia myuros (L.) C.C. Gmel var. *hirsuta* Hack.	hairy rattail fescue	I	Moderate
THEMIDACEAE	**BRODIAEA FAMILY**		
Dichelostemma capitatum (Benth.) A.W. Wood	blue dicks	N	-
TYPHACEAE	**CATTAIL FAMILY**		
Typha sp.	cattail	N	-
ADOXACEAE	**ADOXA FAMILY**		
Sambucus nigra [=*mexicana*] L. ssp. *caerulea* (Raf.) Bolli	blue elderberry	N	-
ANACARDIACEAE	**SUMAC OR CASHEW FAMILY**		
Malosma laurina Nutt. ex Abrams	laurel sumac	N	-
Rhus integrifolia (Nutt.) Benth. & Hook. f. ex Rothr.	lemonadeberry	N	-
Toxicodendron diversilobum (Torr. & A. Gray) Greene	western poison oak	N	-
APIACEAE (UMBELLIFERAE)	**CARROT FAMILY**		
Apiastrum angustifolium Nutt.	wild-celery	N	-
Conium maculatum L.	poison hemlock	I	Moderate
Daucus pusillus Michx.	rattlesnake weed	N	-
Foeniculum vulgare Mill.	fennel	I	High
Lomatium dasycarpum (Torr. & A. Gray) J.M. Coult. & Rose ssp. *dasycarpum*	lace parsnip	N	-
Sanicula bipinnatifida Hook.	purple sanicle, shoe buttons	N	-
APOCYNACEAE	**DOGBANE FAMILY**		
Asclepias fascicularis Decne.	narrow-leaf milkweed	N	-
ASTERACEAE	**SUNFLOWER FAMILY**		
Acourtia microcephala DC.	purple-head, sacapellote	N	-
Ambrosia psilostachya DC.	western ragweed	N	-
Artemisia californica Less.	California sagebrush	N	-
Artemisia douglasiana Besser	mugwort	N	-
Artemisia dracunculus L.	tarragon	N	-
Artemisia palmeri A. Gray	San Diego sagewort, Palmer sagewort	N	-

APPENDIX A-A
PLANT SPECIES OBSERVED WITHIN MTRP
(continued)

Scientific Name	Common Name	Origin	Cal-IPC
Baccharis salicifolia (Ruiz & Pav.) Pers.	mule fat, seep-willow	N	-
Baccharis sarothroides A. Gray	broom baccharis	N	-
Bahiopsis [=*Viguiera*] *laciniata* (A. Gray) E.E. Schilling & Panero	San Diego County viguiera	N	-
Brickellia californica (Torr. & A. Gray) A. Gray	California brickellbush	N	-
*Carduus pycnocephalu*s L.	Italian thistle	I	Moderate
Centaurea melitensis L.	tecalote, star-thistle	I	Moderate
Chaenactis artemisiifolia (Harv. & A. Gray) A. Gray	white pincushion	N	-
Chaenactis glabriuscula DC.	yellow pincushion	N	-
Cirsium occidentale (Nutt.) Jeps. var. *californicum* (A. Gray) D.J. Keil & C.E. Turner	California thistle	N	-
Conyza bonariensis (L.) Cronquist	flax-leaf fleabane	I	-
Corethrogyne filaginifolia [= all previously known *Lessingia filaginifolia* varieties in California] (Hook. & Arn.) Nutt.	California-aster	N	-
Deinandra [=*Hemizonia*] *fasciculata* (DC.) Greene	golden tarplant	N	-
Encelia californica Nutt.	common encelia	N	-
Erigeron foliosus Nutt.	leafy fleabane	N	-
Eriophyllum confertiflorum (DC.) A. Gray var. *confertiflorum*	golden-yarrow	N	-
Gnaphalium californicum DC.	green everlasting	N	-
Gnaphalium luteoalbum L.	everlasting	I	-
Gutierrezia californica (DC.) Torr. & A. Gray	California matchweed	N	-
Gutierrezia sarothrae (Pursh) Britton & Rusby	broom snakeweed, matchweed	N	-
Hazardia squarrosa (Hook. & Arn.) Greene	saw-toothed goldenbush	N	-
Hedypnois cretica (L.) Dum. Cours.	crete weed	I	-
Helminthotheca [=*Picris*] *echioides* (L.) Holub	bristly ox-tongue	I	Limited
Holocarpha virgata (A. Gray) D.D. Keck ssp. *elongata* D.D. Keck	graceful tarplant	N	-
Hypochaeris glabra L.	smooth cat's-ear	I	-
Isocoma menziesii (Hook. & Arn.) G.L. Nesom var. *decumbens* (Greene) G.L. Nesom	decumbent goldenbush	N	-
Lactuca serriola L.	prickly lettuce	I	-
Lasthenia californica DC. ex Lindl.	goldfields	N	-
Layia platyglossa (Fisch. & C.A. Mey.) A. Gray	tidy-tips	N	-
Logfia filaginoides [=*Filago californica*] (Hook. & Arn.) Morefield	California herba impia, fluffweed	N	-
Logfia [=*Filago*] *gallica* (L.) Cross. & Germ.	narrow-leaf herba impia	I	-
Microseris elegans Greene ex A. Gray	elegant microseris	N	-
Osmadenia tenella Nutt.	osmadenia	N	-

APPENDIX A-A
PLANT SPECIES OBSERVED WITHIN MTRP
(continued)

Scientific Name	Common Name	Origin	Cal-IPC
Pluchea sericea (Nutt.) Coville	arrow weed	N	-
Porophyllum gracile Benth.	odora	N	-
Pseudognaphalium biolettii Anderb.	bicolor cudweed	N	-
Senecio vulgaris L.	common groundsel	I	-
Silybum marianum (L.) Gaertn.	milk thistle	I	Limited
Solidago velutina DC. ssp. *californica* (Nutt.) Semple	California goldenrod	N	-
Sonchus asper (L.) Hill ssp. *asper*	prickly sow thistle	I	-
Sonchus oleraceus L.	common sow thistle	I	-
Stylocline gnaphaloides Nutt.	everlasting nest straw	N	-
Xanthisma junceum [=*Machaeranthera juncea*] (Greene) D.R. Morgan & R.L. Hartm.	rush-like bristleweed	N	-
Xanthium strumarium L.	cocklebur	N	-
BORAGINACEAE	**BORAGE FAMILY**		
Amsinckia menziesii (Lehm.) A. Nelson & J.F. Macbr.	rancher's fireweed	N	-
Cryptantha sp.	cryptantha	N	-
Eriodictyon crassifolium Benth.	felt-leaved yerba santa	N	-
Eucrypta chrysanthemifolia (Benth.) Greene	eucrypta	N	-
Pectocarya linearis (Ruiz & Pav.) DC. ssp. *ferocula* (I.M. Johnst.) Thorne	comb-bur	N	-
Phacelia sp.	phacelia	N	-
Phacelia cicutaria Greene var. *hispida* (A. Gray) J.T. Howell	caterpillar phacelia	N	-
Phacelia distans Benth.	wild-heliotrope	N	-
Phacelia minor (Harvey) Thell. ex F. Zimm.	wild canterbury-bell	N	-
Pholistoma auritum (Lindl.) Lilja var. *auritum*	fiesta flower	N	-
Plagiobothrys sp.	popcornflower	N	-
BRASSICACEAE (CRUCIFERAE)	**MUSTARD FAMILY**		
Brassica nigra (L.) W.D.J. Koch	black mustard	I	Moderate
Cardamine californica (Nutt.) Greene	milk maids, tooth wort	N	-
Hirschfeldia incana (L.) Lagr.-Fossat	short-pod mustard	I	Moderate
Lepidium nitidum Nutt. var. *nitidum*	shining peppergrass	N	-
Raphanus sativus L.	radish	I	Limited
Thysanocarpus curvipes Hook.	lacepod, fringepod	N	-
CACTACEAE	**CACTUS FAMILY**		
Ferocactus viridescens (Torr. & A. Gray) Britton & Rose	San Diego barrel cactus	N	-

APPENDIX A-A
PLANT SPECIES OBSERVED WITHIN MTRP
(continued)

Scientific Name	Common Name	Origin	Cal-IPC
Opuntia ficus-indica (L.) Mill.	Indian fig	I	-
Opuntia littoralis (Engelm.) Cockerell.	shore cactus	N	-
CAPRIFOLIACEAE	**HONEYSUCKLE FAMILY**		
Lonicera subspicata Hook. & Arn.	southern honeysuckle	N	-
CARYOPHYLLACEAE	**PINK FAMILY**		
Silene gallica L.	windmill pink	I	-
Silene laciniata Cav. ssp. *laciniata* [=ssp. *major*]	Indian pink	N	-
CISTACEAE	**ROCK-ROSE FAMILY**		
Helianthemum scoparium Nutt.	peak rush-rose	N	-
CONVOLVULACEAE	**MORNING-GLORY FAMILY**		
Calystegia macrostegia (Greene) Brummitt ssp. *intermedia* (Abrams) Brummitt	chaparral morning-glory	N	-
Dichondra occidentalis House	western dichondra	N	-
CRASSULACEAE	**STONECROP FAMILY**		
Crassula connata (Ruiz & Pav.) A. Berger	pygmy-weed	N	-
Dudleya edulis (Nutt.) Moran	lady fingers	N	-
Dudleya pulverulenta (Nutt.) Britton & Rose	chalk lettuce, chalk dudleya	N	-
Dudleya variegata (S. Watson) Moran	variegated dudleya	N	-
CUCURBITACEAE	**GOURD FAMILY**		
Marah macrocarpus (Greene) Greene	wild cucumber	N	-
ERICACEAE	**HEATH FAMILY**		
Arctostaphylos glandulosa Eastw. ssp. *glandulosa*	Eastwood manzanita	N	-
Xylococcus bicolor Nutt.	mission manzanita	N	-
EUPHORBIACEAE	**SPURGE FAMILY**		
Chamaesyce sp.	prostrate spurge	N/I	-
Croton [=*Eremocarpus*] *setigerus* Hook.	dove weed	N	-
FABACEAE (LEGUMINOSAE)	**LEGUME FAMILY**		
Acmispon americanus (Nutt.) Rydb. var. *americanus* [=*Lotus purshianus* var. *purshianus*]	Spanish-clover	N	-
Acmispon glaber (Vogel) Brouillet var. *glaber* [=*Lotus scoparius* var. *scoparius*]	coastal deerweed	N	-
Acmispon maritimus (Torr. & A. Gray) D.D. Sokoloff var. *brevivexillus* (Ottley) Brouillet [=*Lotus salsuginosus* var. *brevivexillus*]	humble lotus	N	-

APPENDIX A-A
PLANT SPECIES OBSERVED WITHIN MTRP
(continued)

Scientific Name	Common Name	Origin	Cal-IPC
Acmispon maritimus (Torr. & A. Gray) D.D. Sokoloff var. *maritimus* [=*Lotus salsuginosus* var. *salsuginosus*]	alkali lotus	N	-
Lathyrus vestitus Nutt. var. *alefeldii* (T.G. White) Isely	wild sweet pea	N	-
Lupinus bicolor Lindl.	miniature lupine	N	-
Lupinus concinnus J. Agardh	bajada lupine	N	-
Lupinus succulentus K. Koch	arroyo lupine	N	-
Melilotus indicus (L.) All.	sourclover	I	-
Trifolium hirtum All.	rose clover	I	-
Trifolium willdenovii Spreng.	tomcat clover	N	-
Vicia americana Willd. var. *americana*	American vetch	N	-
FAGACEAE	**OAK FAMILY**		
Quercus agrifolia Née var. *agrifolia*	coast live oak, encina	N	-
Quercus berberidifolia Liebm.	scrub oak	N	-
GENTIANACEAE	**GENTIAN FAMILY**		
Zeltnera [=*Centaurium*] *venusta* (A. Gray) G. Mans.	canchalagua	N	-
GERANIACEAE	**GERANIUM FAMILY**		
Erodium cicutarium (L.) L'Hér. ex Aiton	red stemmed filaree	I	Limited
Erodium moschatum (L.) L'Hér. ex Aiton	white stemmed filaree	I	-
Geranium carolinianum L.	Carolina geranium	N	-
GROSSULARIACEAE	**GOOSEBERRY FAMILY**		
Ribes indecorum Eastw.	white flowering currant	N	-
Ribes speciosum Pursh	fuchsia-flowered gooseberry	N	-
LAMIACEAE	**MINT FAMILY**		
Salvia apiana Jeps.	white sage	N	-
Salvia clevelandii (A. Gray) Greene	Cleveland sage, fragrant sage	N	-
Salvia columbariae Benth.	chia	N	-
Salvia leucophylla Greene	purple sage	N	-
Salvia mellifera Greene	black sage	N	-
Scutellaria tuberosa Benth.	Dannie's skullcap	N	-
Stachys ajugoides Benth. var. *rigida* (Nutt. ex Benth.) Jeps. & Hoover	hedge nettle	N	-
Trichostema lanatum Benth.	woolly bluecurls	N	-
LYTHRACEAE	**LOOSESTRIFE FAMILY**		
Lythrum californicum Torr. & A. Gray	California loose-strife	N	-

APPENDIX A-A
PLANT SPECIES OBSERVED WITHIN MTRP
(continued)

Scientific Name	Common Name	Origin	Cal-IPC
Lythrum hyssopifolia L.	grass poly, hyssop loosestrife	I	Moderate
MALVACEAE	**MALLOW FAMILY**		
Malacothamnus fasciculatus (Nutt. ex Torr. & A. Gray) Greene	chaparral mallow	N	-
Sidalcea sparsifolia (C.L. Hitchc.) S.R. Hill	checker-bloom	N	-
MONTIACEAE	**MONTIA FAMILY**		
Calandrinia ciliata (Ruiz & Pav.) DC.	red maids	N	-
MYRSINACEAE			
Anagallis arvensis L.	scarlet pimpernel, poor-man's weatherglass	I	-
NYCTAGINACEAE	**FOUR O'CLOCK FAMILY**		
Mirabilis laevis [=*californica*] (Benth.) Curran var. *crassifolia* (Choisy) Spellenb.	wishbone bush	N	-
OLEACEAE	**OLIVE FAMILY**		
Fraxinus uhdei (Wenz.) Lingelsh.	shamel ash	I	-
ONAGRACEAE	**EVENING-PRIMROSE FAMILY**		
Camissonia bistorta (Torr. & A. Gray) P.H. Raven	California sun cup	N	-
Camissonia californica (Torr.& A. Gray) P.H. Raven	false-mustard	N	-
Camissonia hirtella (Greene) P.H. Raven	field sun cup	N	-
Clarkia purpurea (Curtis) A. Nelson & J.F. Macbr. ssp. *quadrivulnera* (Douglas ex Lindl.) H. Lewis & M. Lewis	four-spot	N	-
Epilobium canum (Greene) P.H. Raven ssp. *canum*	California fuchsia, zauschneria	N	-
OROBANCHACEAE	**BROOM-RAPE FAMILY**		
Orobanche bulbosa G. Beck	broom-rape	N	-
OXALIDACEAE	**OXALIS FAMILY**		
Oxalis californica (Abrams) R. Knuth [=*Oxalis albicans* ssp. *californica*]	California oxalis	N	-
Oxalis pes-caprae L.	Bermuda buttercup	I	Moderate
PAEONIACEAE	**PEONY FAMILY**		
Paeonia californica Nutt.	California peony	N	-
PAPAVERACEAE	**POPPY FAMILY**		
Ehrendorferia [=*Dicentra*] *chrysantha* (Hook. & Arn.) Rylander	golden ear-drops	N	-
Eschscholzia californica Cham.	California poppy	N	-

APPENDIX A-A
PLANT SPECIES OBSERVED WITHIN MTRP
(continued)

Scientific Name	Common Name	Origin	Cal-IPC
Papaver californicum A. Gray	fire poppy	N	-
PHRYMACEAE [=SCROPHULARIACEAE]	**HOPSEED FAMILY**		
Mimulus aurantiacus Curtis	low bush monkey-flower	N	-
Mimulus guttatus DC.	common monkey-flower	N	-
PLANTAGINACEAE	**PLANTAIN FAMILY**		
Antirrhinum kelloggii Greene	climbing snapdragon	N	-
Antirrhinum nuttallianum Benth. ex A. DC.	Nuttall snapdragon	N	-
Collinsia heterophylla Buist ex Graham	Chinese houses	N	-
Keckiella cordifolia (Benth.) Straw	climbing bush penstemon	N	-
Plantago erecta E. Morris	dot-seed plantain	N	-
PLATANACEAE	**PLANE TREE OR SYCAMORE FAMILY**		
Platanus racemosa Nutt.	western sycamore	N	-
POLEMONIACEAE	**PHLOX FAMILY**		
Navarretia hamata Greene	hooked navarretia	N	-
POLYGONACEAE	**BUCKWHEAT FAMILY**		
Chorizanthe sp.	spineflower	N	-
Chorizanthe fimbriata Nutt.	fringed spineflower	N	-
Chorizanthe leptotheca Goodman	Ramona spineflower	N	-
Eriogonum fasciculatum Benth. var. *fasciculatum*	coast California buckwheat	N	-
Pterostegia drymarioides Fisch. & C.A. Mey.	California thread-stem	N	-
Rumex crispus L.	curly dock	I	Limited
Rumex salicifolius Weinm.	willow dock	N	-
PRIMULACEAE	**PRIMROSE FAMILY**		
Dodecatheon clevelandii Greene ssp. *clevelandii*	shooting star, wild cyclamen	N	-
RANUNCULACEAE	**BUTTERCUP FAMILY**		
Clematis pauciflora Nutt.	ropevine	N	-
Delphinium cardinale Hook.	scarlet larkspur, cardinal larkspur	N	-
Delphinium parryi A. Gray	blue larkspur	N	-
Thalictrum polycarpum	meadow-rue	N	-
RHAMNACEAE	**BUCKTHORN FAMILY**		
Ceanothus tomentosus Parry	coast blue lilac	N	-
Rhamnus crocea Nutt.	spiny redberry	N	-
Rhamnus ilicifolia Kellogg	holly-leaf redberry	N	-

APPENDIX A-A
PLANT SPECIES OBSERVED WITHIN MTRP
(continued)

Scientific Name	Common Name	Origin	Cal-IPC
ROSACEAE	**ROSE FAMILY**		
Adenostoma fasciculatum Hook. & Arn.	chamise	N	-
Cercocarpus betuloides Nutt.	mountain-mahogany	N	-
Heteromeles arbutifolia (Lindl.) M. Roem.	toyon, Christmas berry	N	-
Prunus ilicifolia (Nutt. ex Hook. & Arn.) Walp. ssp. *ilicifolia*	holly-leafed cherry, islay	N	-
Rubus ursinus Cham. & Schltdl.	California blackberry	N	-
RUBIACEAE	**MADDER OR COFFEE FAMILY**		
Galium angustifolium A. Gray ssp. *angustifolium*	narrow-leaf bedstraw	N	-
Galium aparine L.	goose grass, stickywilly	N	-
SALICACEAE	**WILLOW FAMILY**		
Populus fremontii S. Watson ssp. *fremontii*	Fremont cottonwood, alamo	N	-
Salix exigua Nutt.	narrow-leaved willow	N	-
Salix gooddingii C.R. Ball.	Goodding's black willow	N	-
Salix lasiolepis Benth.	arroyo willow	N	-
SAXIFRAGACEAE	**SAXIFRAGE FAMILY**		
Jepsonia parryi (Torr.) Small	mesa saxifrage	N	-
SCROPHULARIACEAE	**FIGWORT FAMILY**		
Castilleja exserta (A.A. Heller) T.I. Chuang & Heckard	purple owl's clover	N	-
Cordylanthus rigidus (Benth.) Jeps. ssp. *setigerus* T.I. Chuang & Heckard	thread-leaved bird's-beak	N	-
Scrophularia californica Cham. & Schltdl.	California figwort	N	-
SOLANACEAE	**NIGHTSHADE FAMILY**		
Datura wrightii Regel	Jimson weed, thorn-apple, tolguacha	N	-
Solanum americanum Mill.	white nightshade	N	-
Solanum parishii A. Heller	Parish's nightshade	N	-
VIOLACEAE	**VIOLET FAMILY**		
Viola pedunculata Torr. & A. Gray	johnny-jump-up	N	-
VITACEAE	**GRAPE FAMILY**		
Vitis girdiana Munson	desert wild grape	N	-

APPENDIX A-A
PLANT SPECIES OBSERVED WITHIN MTRP
(continued)

SOURCES: Jepson Online Interchange <http://ucjeps.berkeley.edu/interchange.html> (2009); K.N. Brenzel (editor), *Sunset Western Garden Book* (Sunset Publishing, Menlo Park, CA, 2001); John P. Rebman and Michael G. Simpson, *Checklist of the Vascular Plants of San Diego County,* 4th ed. (San Diego Natural History Museum, San Diego, CA, 2006); USDA Plants Database <http://plants.usda.gov/> (2008); California Invasive Plant Council Invasive Plant Inventory <http://www.cal-ipc.org> 2010.

ORIGIN
N = Native to locality
I = Introduced species from outside locality

Cal-IPC Rating
High = Invasive species with severe ecological impacts
Moderate = Invasive species with substantial and significant, but not severe, ecological impacts
Limited = Invasive species with minor ecological impacts

APPENDIX A-B

Wildlife Species Observed/Detected within MTRP during 2009/10 Surveys

APPENDIX A-B
WILDLIFE SPECIES OBSERVED/DETECTED WITHIN MTRP DURING 2009/10 SURVEYS

Scientific Name	Common Name	Source of Occurrence
INVERTEBRATES (Nomenclature from Eriksen and Belk 1999; Milne and Milne 1980; Mattoni 1990; and Opler and Wright 1999)		
ANOSTRACA	**FAIRY SHRIMP**	
Branchinecta sandiegonensis	San Diego fairy shrimp	#
HESPERIIDAE	**SKIPPERS**	
Erynnis funeralis	funereal duskywing	#
Hylephila phyleus	fiery skipper	#
PAPILIONIDAE	**PARNASSIANS & SWALLOWTAILS**	
Papilio eurymedon	pale swallowtail	#
Papilio rutulus	western tiger swallowtail	#
PIERIDAE	**WHITES & SULPHURS**	
Anthocharis sara	Sara or Pacific orangetip	#
Pontia protodice	common or checkered white	#
Pieris rapae	cabbage white	#
LYCAENIDAE	**BLUES, COPPERS, & HAIRSTREAKS**	
Icaricia acmon acmon	Acmon blue	#
Lycaena hermes	Hermes copper	#
Strymon melinus pudica	common or gray hairstreak	#
RIODINIDAE	**METALMARKS**	
Apodemia virgulti	Behr's metalmark	#
NYMPHALIDAE	**BRUSH-FOOTED BUTTERFLIES**	
Adelpha bredowii californica	California sister	#
Limenitis lorquini lorquini	Lorquin's admiral	#
Euphydryas editha quino	Quino checkerspot	#
Junonia coenia	common buckeye	#
Nymphalis antiopa antiopa	mourning cloak	#
Vanessa atalanta rubria	red admiral	#
Vanessa virginiensis	Virginia or American lady	#
AMPHIBIANS (Nomenclature from Crother 2001 and Crother et al. 2003)		
PELOBATIDAE	**SPADEFOOT TOADS**	
Spea hammondii	western spadefoot	#
HYLIDAE	**TREE FROGS**	
Pseudacris regilla	Pacific treefrog	*
RANIDAE	**TRUE FROGS**	
Rana catesbeiana	American bullfrog	* #
PIPIDAE	**CLAWED FROGS**	
Xenopus laevis	African clawed frog (I)	*

ATTACHMENT A-B
WILDLIFE SPECIES OBSERVED/DETECTED WITHIN MTRP DURING 2009/10 SURVEYS
(continued)

Scientific Name	Common Name	Source of Occurrence
REPTILES (Nomenclature from Crother 2001 and Crother et al. 2003)		
IGUANIDAE	**IGUANID LIZARDS**	
Phrynosoma coronatum (San Diego#*blainvillii* pop.)	coast horned lizard	#
Sceloporus occidentalis	western fence lizard	* #
Sceloporus orcutti	granite spiny lizard	* #
Uta stansburiana	common side-blotched lizard	* #
SCINCIDAE	**SKINKS**	
Eumeces skiltonianus interparietalis	Coronado skink	
TEIIDAE	**WHIPTAIL LIZARDS**	
Aspidoscelis hyperythra	orange-throated whiptail	*
Aspidoscelis hyperythra beldingi	Belding's orange-throated whiptail	
Aspidoscelis tigris	western whiptail	*
Aspidoscelis tigris stejnegeri	coastal whiptail	
ANGUIDAE	**ALLIGATOR LIZARDS**	
Elgaria multicarinata webbii	San Diego alligator lizard	*
LEPTOTYPHLOPIDAE	**SLENDER BLIND SNAKES**	
Leptotyphlops humilis	western threadsnake	*
BOIDAE	**BOAS**	
Lichanura trivirgata roseofusca	coastal rosy boa	*
COLUBRIDAE	**COLUBRID SNAKES**	
Masticophis lateralis lateralis	California striped racer	
Salvadora hexalepis	western patch-nosed snake	*
Salvadora hexalepis virgultea	coast patch-nosed snake	
Thamnophis hammondii	two-striped gartersnake	*
Trimorphodon biscutatus	Lyre snake	*
CROTALIDAE	**RATTLESNAKES**	
Crotalus oreganus	Western rattlesnake	*
Crotalus ruber	red diamond rattlesnake	* #
BIRDS (Nomenclature from American Ornithologists' Union 1998 and Unitt 2004)		
ANATIDAE	**DUCKS, GEESE, & SWANS**	
Anas platyrhynchos platyrhynchos	mallard	* #
Anas strepera strepera	gadwall	* #
Oxyura jamaicensis rubida	ruddy duck	* #
ODONTOPHORIDAE	**NEW WORLD QUAIL**	
Callipepla californica californica	California quail	* #
PODICIPEDIDAE	**GREBES**	
Podilymbus podiceps podiceps	pied-billed grebe	* #
PHALACROCORACIDAE	**CORMORANTS**	
Phalacrocorax auritus albociliatus	double-crested cormorant	* #

ATTACHMENT A-B
WILDLIFE SPECIES OBSERVED/DETECTED WITHIN MTRP DURING 2009/10 SURVEYS
(continued)

Scientific Name	Common Name	Source of Occurrence
ARDEIDAE	**HERONS & BITTERNS**	
Ardea alba	great egret	* #
Ardea herodias	great blue heron	* #
Butorides virescens	green heron	
Ixobrychus exilis	least bittern	* #
Nycticorax nycticorax	black-crowned night heron	* #
CATHARTIDAE	**NEW WORLD VULTURES**	
Cathartes aura	turkey vulture	* #
ACCIPITRIDAE	**HAWKS, KITES, & EAGLES**	
Accipiter cooperii	Cooper's hawk	* #
Aquila chrysaetos canadensis	golden eagle	
Buteo jamaicensis	red-tailed hawk	* #
Buteo lineatus elegans	red-shouldered hawk	* #
Elanus leucurus	white-tailed kite	* #
FALCONIDAE	**FALCONS & CARACARAS**	
Falco peregrinus anatum	peregrine falcon	
Falco sparverius sparverius	American kestrel	* #
RALLIDAE	**RAILS, GALLINULES, & COOTS**	
Fulica americana americana	American coot	* #
Gallinula chloropus cachinnans	common moorhen	* #
Rallus longirostris	clapper rail	*
CHARADRIIDAE	**LAPWINGS & PLOVERS**	
Charadrius vociferus vociferus	killdeer	
SCOLOPACIDAE	**SANDPIPERS & PHALAROPES**	
Actitis macularius	spotted sandpiper	*
LARIDAE	**GULLS, TERNS, & SKIMMERS**	
Hydroprogne caspia	Caspian tern	*
COLUMBIDAE	**PIGEONS & DOVES**	
Columba livia	rock dove (I)	*
Streptopelia decaocto	Eurasian collared dove	*
Zenaida macroura marginella	mourning dove	* #
CUCULIDAE	**CUCKOOS & ROADRUNNERS**	
Geococcyx californianus	greater roadrunner	* #
TYTONIDAE	**BARN OWLS**	
Tyto alba pratincola	common barn owl	* #
STRIGIDAE	**TYPICAL OWLS**	
Bubo virginianus	great horned owl	* #
CAPRIMULGIDAE	**GOATSUCKERS**	
Chordeiles acutipennis texensis	lesser nighthawk	*
Phalaenoptilus nuttallii	common poorwill	*
APODIDAE	**SWIFTS**	
Aeronautes saxatalis	white-throated swift	* #

ATTACHMENT A-B
WILDLIFE SPECIES OBSERVED/DETECTED WITHIN MTRP DURING 2009/10 SURVEYS
(continued)

Scientific Name	Common Name	Source of Occurrence
TROCHILIDAE	**HUMMINGBIRDS**	
Archilochus alexandri	black-chinned hummingbird	* #
Calypte anna	Anna's hummingbird	* #
Calypte costae	Costa's hummingbird	* #
Stellula calliope	calliope hummingbird	
Selasphorus rufus	rufous hummingbird	* #
PICIDAE	**WOODPECKERS & SAPSUCKERS**	
Picoides nuttallii	Nuttall's woodpecker	* #
Picoides pubescens turati	downy woodpecker	* #
TYRANNIDAE	**TYRANT FLYCATCHERS**	
Contopus sordidulus	western wood pewee	
Empidonax difficilis	Pacific slope flycatcher	* #
Empidonax traillii	willow flycatcher	
Myiarchus cinerascens cinerascens	ash-throated flycatcher	* #
Sayornis nigricans semiatra	black phoebe	* #
Sayornis saya	Say's phoebe	*
Tyrannus verticalis	western kingbird	* #
Tyrannus vociferans vociferans	Cassin's kingbird	* #
VIREONIDAE	**VIREOS**	
Vireo bellii pusillus	least Bell's vireo	* #
Vireo gilvus swainsonii	warbling vireo	*
Vireo huttoni huttoni	Hutton's vireo	* #
Vireo solitarius cassinii	Cassin's vireo	*
CORVIDAE	**CROWS, JAYS, & MAGPIES**	
Aphelocoma californica	western scrub-jay	* #
Calocitta colliei	Black-throated magpie-jay	*
Corvus brachyrhynchos hesperis	American crow	* #
Corvus corax clarionensis	common raven	* #
ALAUDIDAE	**LARKS**	
Eremophila alpestirs actia	California horned lark	* #
HIRUNDINIDAE	**SWALLOWS**	
Petrochelidon pyrrhonota tachina	cliff swallow	* #
Stelgidopteryx serripennis	northern rough-winged swallow	* #
Tachycineta bicolor	tree swallow	* #
Tachycineta thalassina lepida	violet-green swallow	*
AEGITHALIDAE	**BUSHTIT**	
Psaltriparus minimus minimus	bushtit	* #
SITTIDAE	**NUTHATCHES**	
Sitta carolinensis aculeata	white-breasted nuthatch	* #
TROGLODYTIDAE	**WRENS**	
Catherpes mexicanus conspersus	canyon wren	* #
Salpinctes obsoletus obsoletus	rock wren	* #
Thryomanes bewickii	Bewick's wren	* #
Troglodytes aedon parkmanii	house wren	* #

ATTACHMENT A-B
WILDLIFE SPECIES OBSERVED/DETECTED WITHIN MTRP DURING 2009/10 SURVEYS
(continued)

Scientific Name	Common Name	Source of Occurrence
SYLVIIDAE	**GNATCATCHERS**	
Polioptila caerulea	blue-gray gnatcatcher	* #
Polioptila californica californica	coastal California gnatcatcher	* #
TURDIDAE	**THRUSHES**	
Catharus guttatus	hermit thrush	
Catharus ustulatus	Swainson's thrush	* #
TIMALIIDAE	**BABBLERS**	
Chamaea fasciata henshawi	wrentit	* #
MIMIDAE	**MOCKINGBIRDS & THRASHERS**	
Mimus polyglottos polyglottos	northern mockingbird	* #
Toxostoma redivivum redivivum	California thrasher	* #
STURNIDAE	**STARLINGS & MYNAS**	
Sturnus vulgaris	European starling (I)	* #
PTILOGONATIDAE	**SILKY FLYCATCHERS**	
Phainopepla nitens lepida	phainopepla	* #
PARULIDAE	**WOOD WARBLERS**	
Dendroica coronata	yellow-rumped warbler	* #
Dendroica nigrescens	black-throated gray warbler	* #
Dendroica occidentalis	hermit warbler	*
Dendroica petechia	yellow warbler	* #
Dendroica townsendi	Townsend's warbler	*
Geothlypis trichas	common yellowthroat	* #
Icteria virens auricollis	yellow-breasted chat	* #
Oporornis tolmiei	MacGillivray's warbler	* #
Vermivora celata	orange-crowned warbler	* #
Vermivora ruficapilla ridgwayi	Nashville warbler	* #
Wilsonia pusilla	Wilson's warbler	* #
EMBERIZIDAE	**EMBERIZIDS**	
Aimophila ruficeps canescens	southern California rufous-crowned sparrow	* #
Ammodramus savannarum perpallidus	grasshopper sparrow	* #
Chondestes grammacus strigatus	lark sparrow	*
Melospiza melodia	song sparrow	* #
Pipilo crissalis	California towhee	* #
Pipilo maculatus	spotted towhee	* #
Spizella atrogularis cana	black-chinned sparrow	* #
Zonotrichia atricapilla	golden-crowned sparrow	
Zonotrichia leucophrys	white-crowned sparrow	
CARDINALIDAE	**CARDINALS & GROSBEAKS**	
Passerina caerulea salicaria	blue grosbeak	* #
Passerina amoena	lazuli bunting	* #
Pheucticus melanocephalus maculatus	black-headed grosbeak	* #

ATTACHMENT A-B
WILDLIFE SPECIES OBSERVED/DETECTED WITHIN MTRP DURING 2009/10 SURVEYS
(continued)

Scientific Name	Common Name	Source of Occurrence
ICTERIDAE	**BLACKBIRDS & NEW WORLD ORIOLES**	
Agelaius phoeniceus	red-winged blackbird	* #
Euphagus cyanocephalus	Brewer's blackbird	
Icterus bullockii	Bullock's oriole	* #
Icterus cucullatus nelsoni	hooded oriole	* #
Molothrus ater	brown-headed cowbird	* #
Quiscalus mexicanus	great-tailed grackle	* #
Sturnella neglecta	western meadowlark	* #
FRINGILLIDAE	**FINCHES**	
Carduelis lawrencei	Lawrence's goldfinch	*
Carduelis psaltria hesperophilus	lesser goldfinch	* #
Carduelis tristis salicamans	American goldfinch	* #
Carpodacus mexicanus frontalis	house finch	* #
PASSERIDAE	**OLD WORLD SPARROWS**	
Passer domesticus	house sparrow (I)	* #
MAMMALS (Nomenclature from Baker et al. 2003)		
VESPERTILIONIDAE	**VESPER BATS**	
Eptesicus fuscus	big brown bat	
Lasiurus blossevillii	western red bat	* #
Lasiurus cinereus	hoary bat	*
Myotis yumanensis	Yuma myotis	* #
Pipistrellus hesperus	western pipistrelle	* #
MOLOSSIDAE	**FREE-TAILED BATS**	
Nyctinomops femorosaccus	pocketed free-tailed bat	* #
Nyctinomops macrotis	big free-tailed bat	
Tadarida brasiliensis	Mexican free-tailed bat	* #
LEPORIDAE	**RABBITS & HARES**	
Lepus californicus bennettii	San Diego black-tailed jackrabbit	* #
Sylvilagus audubonii	desert cottontail	* #
Sylvilagus bachmani	brush rabbit	*
SCIURIDAE	**SQUIRRELS & CHIPMUNKS**	
Spermophilus beecheyi	California ground squirrel	* #
GEOMYIDAE	**POCKET GOPHERS**	
Thomomys bottae	Botta's pocket gopher	*
HETEROMYIDAE	**POCKET MICE & KANGAROO RATS**	
Chaetodipus californicus femoralis	Dulzura pocket mouse	
Chaetodipus fallax	San Diego pocket mouse	* #
Dipodomys simulans	Dulzura kangaroo rat	*

ATTACHMENT A-B
WILDLIFE SPECIES OBSERVED/DETECTED WITHIN MTRP DURING 2009/10 SURVEYS
(continued)

Scientific Name	Common Name	Source of Occurrence
MURIDAE	**OLD WORLD MICE & RATS (I)**	
Microtus californicus	California vole	*
Neotoma bryanti	Bryant's woodrat	*
Neotoma lepida intermedia	San Diego desert woodrat	
Neotoma macrotis	large-eared woodrat	*
Peromyscus boylii	brush mouse	*
Peromyscus californicus	California mouse	*
Peromyscus eremicus	cactus mouse	*
Rattus rattus	black or house rat (I)	*
Reithrodontomys megalotis	western harvest mouse	*
CANIDAE	**CANIDS**	
Canis latrans	coyote	* #
PROCYONIDAE	**PROCYONIDS**	
Procyon lotor	northern raccoon	*
FELIDAE	**CATS**	
Lynx rufus	bobcat	*
CERVIDAE	**DEER**	
Odocoileus hemionus	mule deer	* #

(I) = Introduced species

SOURCE OF OCCURRENCE

* = BioBlitz at Mission Trails Regional Park (San Diego Natural History Museum 2009)
\# = RECON 2010 biological surveys (RECON 2010).

APPENDIX A-C

Sensitive Species at MTRP Not Selected for Individual Management

Sensitive Species at MTRP not Selected for Individual Management

MTRP contains a myriad of sensitive biological resources. Using a compilation of survey data, literature review, and conversations with regional experts, some species were not selected for individual management actions (Table C-1). Although individual management actions were not specifically identified for these species, the majority are located within management guilds, which provide ASMDs for a groups of sensitive species and habitats with shared threats (see Section 4.5). References to relevant management guilds and ASMDs for MSCP covered species are presented following each species description. In cases where the species is not identified to be part of management guild, a justification for coverage is provided.

MSCP covered species within section A-C.1 may be prioritized for individual management at a later date if conditions change significantly within the park and/or regionally for the species. These management prioritization decisions will be made by City staff in coordination with regional conservation efforts (SDMMP) as part of an adaptive management frame work. Data used to inform adaptive management decisions will include (but not be limited to) grey literature, public data, academic publications, and decadal survey updates for MSCP covered species.

A-C.1 MSCP Covered Sensitive Species Occurring In MTRP

Plants

A-C.1.1 San Diego goldenstar (*Bloomeria clevelandii*)

San Diego goldenstar is a CNPS Rank 1B.1 and MSCP covered species. This herbaceous perennial in the lily family (Liliaceae) grows one foot tall and has bright yellow flowers in May (Hickman 1993). San Diego goldenstar is found below 1,500 feet in southwestern San Diego County and northern Baja California, Mexico. It grows in grasslands and vernal pool habitats and on the edges of coastal sage scrub and chaparral. While typically found in clay soils, it may also occur in fine sandy loam on mounds between vernal pools. San Diego goldenstar looks somewhat like common goldenstar (*Bloomeria crocea*), but the filaments of San Diego goldenstar sit on a conspicuously raised base (Reiser 2001).

TABLE C-1
MSCP COVERED SPECIES NOT SELECTED FOR INDIVIDUAL MANAGEMENT AT MTRP

Species	Rationale
San Diego goldenstar	Abundant and widely dispersed at MTRP
	Managed within Management Guild: East Elliott Clay Ridgelines
	Managed within Management Guild: Tierrasanta Clay Ridge
	Managed within Management Guild: CSS *Artemisia*/*Eriogonum*
San Diego barrel cactus	Abundant and widely dispersed at MTRP
	Managed within Management Guild: East Elliott Clay Ridgelines
	Managed within Management Guild: Tierrasanta Clay Ridge
	Managed within Management Guild: CSS *Artemisia*/*Eriogonum*
Orcutt's brodiaea	Managed within Management Guild: East Elliott Clay Ridgelines
Southwestern willow flycatcher	Managed within Management Guild: Riparian woodlands
	No nesting observed at MTRP
Coastal California gnatcatcher	Abundant and widely dispersed at MTRP
	Managed within Management Guild: CSS *Artemisia*/*Eriogonum*
Cooper's hawk	Managed within Management Guild: Riparian woodlands
Golden eagle	No nesting observed at MTRP
Least Bell's vireo	Managed within Management Guild: Riparian woodlands
Light-footed clapper rail	Nesting not verified at MTRP
	Foraging habitat within Management Guild: Riparian woodlands
Northern harrier	No nesting observed at MTRP
Peregrine falcon	Threats and management at regional level
	Size of home range makes preserve level management difficult
Southern California rufous-crowned sparrow	Abundant and widely dispersed at MTRP
	Managed within Management Guild: CSS *Artemisia*/*Eriogonum*
Southwestern pond turtle	Lake Murray contains high degree of edge effects. Regional conservation efforts focused on high-quality habitats
Belding's orange throated whiptail	Abundant and widely dispersed at MTRP
	Managed within Management Guild: CSS *Artemisia*/*Eriogonum*
San Diego horned lizard	Managed within Management Guild: CSS *Artemisia*/*Eriogonum*
Southern mule deer	Threats (connectivity) and management at regional level
	Size of home range makes preserve level management difficult
Mountain lion	Threats (connectivity) and management at regional level
	Size of home range makes preserve level management difficult

Several large populations of San Diego goldenstar have been observed growing in clay soils and chaparral vegetation within the Lake Murray, Fortuna Mountain, and East Elliott areas (State of California 2011, City of San Diego 2001). The Lake Murray area population was observed growing within sparse chamise chaparral vegetation on clay soils between paved, high-use public walkways. The East Elliott area contains a large meta-population of San Diego goldenstar (Figures C-1a,b). According to a brief analysis of data points compiled by the California Natural Diversity Database (CNDDB), approximately 7.4 percent (5 of 68) of known populations of San Diego goldenstar are found within the MTRP boundaries.

Guild membership(s) / Conditions of Coverage / ASMD's:

- East Elliot Clay Ridgelines (Section 4.5.2.5)
- Tierrasanta Clay Ridge (Section 4.5.3.5)
- Coastal Sage Scrub *Artemisia*/*Eriogonum* (Section 4.5.5.5)

A-C.1.2 Orcutt's brodiaea (*Brodiaea orcuttii*)

Orcutt's brodiaea is a CNPS (2001) Rank 1B.1 species and is covered under the MSCP. This bulbiferous perennial in the lily family (Liliaceae) flowers from April through July. Its range is limited to San Diego, Riverside, and Orange counties and Baja California, Mexico, at elevations up to 5,500 feet (Hickman 1993). It is typically found in chaparral and lower montane coniferous forest communities, particularly areas with vernally moist grasslands, mima mounds, or at the edge of vernal pools or streams (Reiser 2001). It is known to occur in clay, and sometimes serpentine, soils, including Stockpen gravelly loam on Otay Mesa and Redding gravelly loam on Mira Mesa (Reiser 2001).

A population of Orcutt's brodiaea has been observed in East Fortuna at MTRP (State of California 2011; Figure C-2). According to a brief analysis of data points compiled by the CNDDB, approximately 0.9 percent (1 of 105) of known populations of Orcutt's brodiaea is found within the MTRP boundaries.

Guild membership(s) / Conditions of Coverage / ASMDs:

- East Elliot Clay Ridgelines (Section 4.5.2.5)

A-C.1.3 Coast barrel cactus (*Ferocactus viridescens*)

Coast barrel cactus is a CNPS List 2.1 species, and is a covered species under the MSCP. This globular succulent in the cactus family (Cactaceae) grows to one foot tall and flowers in May and June. It is found only in coastal San Diego County and Baja

California, Mexico. This species occurs in coastal sage scrub and grassland habitats at elevations below 500 feet (Hickman 1993). Optimal habitat for the coast barrel cactus appears to include coastal hill slopes and ridges growing among cobbles (Reiser 2001). It is the only barrel cactus found in coastal San Diego County.

Many populations of coast barrel cactus have been observed on clay soils within MTRP, the East Elliott expansion area, and the West Sycamore expansion area (City of San Diego 2001; State of California 2011; RECON 2010; Figures C-3a-c). Coast barrel cactus at MTRP appears to be associated with sparse coastal sage scrub/chaparral, clay soils, and ridge top topography. According to a brief analysis of data points compiled by the CNDDB, approximately 1.9 percent (3 of 154) of known populations of coast barrel cactus is found within the MTRP boundaries.

Guild membership(s) / Conditions of Coverage / ASMDs:

- East Elliot Clay Ridgelines (Section 4.5.2.5)
- Tierrasanta Clay Ridge (Section 4.5.3.5)
- Coastal Sage Scrub *Artemisia*/*Eriogonum* (Section 4.5.5.5)

Reptiles

A-C.1.4 Southwestern pond turtle (*Actinemys marmorata pallida*)

The southwestern pond turtle is a CDFW species of special concern and an MSCP covered species. Its range includes the coastal ranges from the San Francisco Bay region south into Baja California, Mexico (Stebbins 2003), and it occurs from sea level to 4,700 feet (Jennings and Hayes 1994). It is also known to occur in the desert in the Mojave River basin and San Andreas Canyon (Jennings and Hayes 1994). Habitat for the southwestern pond turtle typically consists of ponds, small lakes, reservoirs, and slow-moving streams.

The southwestern pond turtle is frequently associated with aquatic systems where aquatic vegetation is abundant and may be seen basking on logs or mudbanks. It is generally found in persistent, slow-moving streams or ponds, and is uncommon in high-flow streams (Jennings and Hayes 1994). Although relatively little research about nesting behavior has been conducted, most evidence suggests nesting occurs in upland habitats adjacent to ponds and streams, generally where there is at least four inches of soil in which eggs may be laid (Zeiner 1988)

In southern California, the southwestern pond turtle is active year-round. Breeding occurs between April and May. Its diet consists of aquatic invertebrates, carrion, and occasionally aquatic vegetation.

There is very little habitat within the MTRP that is potentially suitable to support southwestern pond turtles. A single southwestern pond turtle was recorded in the Lake Murray area at the north end of the lake (SANGIS 2011; Figure C-4). This species has potential to breed and forage throughout Lake Murray. Kumeyaay Lake and the area upstream of the Old Mission Dam also have potential to support southwestern pond turtles, although none have been reported there. The East Elliott area contains two stock ponds, but both are ephemeral and likely do not hold water long enough to support pond turtles. In general, Lake Murray at MTRP is not suitable for the establishment or enhancement of western pond turtle populations due to the proximity of urban edge effects and recreation and its incompatibility with an accepted regional strategy.

MSCP Conditions of Coverage:

Maintain and manage a 1,500-feet area around known locations within preserve lands for the species. Within this impact avoidance area, human impacts will be minimized, nonnative species detrimental to pond turtles controlled/removed and habitat restoration/ enhancement measures implemented (MSCP 1998; Table 3-5).

Current regional strategy for the western pond turtle is to enhance intact populations (upstream of the San Vicente reservoir) to be used as source populations for reintroduction into other selected receiver sites (USGS 2015). Currently, ponds at MTRP have not been selected as a regional management priority for reintroduction. Pond turtle habitat surrounding Kumeyaay Lake is within the riparian woodlands management guild (Section 4.5.4) and benefit from guild-wide management of edge effects including invasive weed eradication. In the event that western pond turtles are regionally prioritized for reintroduction into urban areas including MTRP, the species will be reevaluated for single species or guild management under the adaptive management framework.

A-C.1.5 Belding's orange-throated whiptail (*Aspidoscelis* [=*Cnemidophorus*] *hyperythra beldingi*)

Belding's orange-throated whiptail is a CDFW species of special concern and an MSCP-covered species. This species ranges from the coast in the west to the western slopes to the Peninsular ranges in the east, and from Orange and southwestern San Bernardino counties in the north to the tip of Baja California, Mexico in the south (Stebbins 2003). It is a habitat generalist and is commonly found in sandy areas of low, open sage scrub or

chaparral, particularly where there is California buckwheat (*Eriogonum fasciculatum*), sage (*Salvia* spp.) or chamise (*Adenostoma fasciculatum*; Lemm 2006), but it also occurs in open grassland/shrubland econtones and in riparian habitats.

This species is a dietary specialist, feeding primarily on the western subterranean termite (*Reticulitermes hesperus*), which comprises 86 percent or more of the lizard's stomach contents (Bostic 1966). It is active during the spring and summer months, but is inactive during the fall and winter, as adults brumate (become inactive) from late July until late April. Juvenile whiptails have shorter inactivity periods, usually from December through March. Brumation sites are on soft, well-drained slopes with southern exposure and little or no vegetation cover, and road cuts tend to be suitable. The orange-throated whiptail has declined within its range as a result of habitat loss and fragmentation (McGurty 1980). That being said, surveys conducted by the County of San Diego in association with other NRMPs have found that the species is still fairly common and widespread within available habitat.

This species has been observed in numerous locations in and adjacent to the MTRP, primarily in coastal sage scrub or chaparral (State of California 2011, Figures C-5a,b). Belding's orange-throated whiptail has been recorded at three locations within the West Sycamore area, 11 locations in the Fortuna area, and five locations in the Cowles area. As suitable scrub, grassland, and riparian habitats exist throughout the MTRP, this likely represents just a small portion of the overall population within the MTRP. Orange-throated whiptail likely occurs throughout all of the areas within MTRP. According to a brief analysis of data points compiled by the CNDDB, approximately 0.9 percent (3 of 346) of known populations of Belding's orange throated whiptail is found within the MTRP boundaries.

Guild membership(s) / Conditions of Coverage / ASMD's:

- Coastal Sage Scrub *Artemisia*/*Eriogonum* (Section 4.5.5.5)

A-C.1.6 San Diego horned lizard (*Phrynosoma coronatum blainvillii*)

The San Diego horned lizard is a CDFW species of special concern and an approved MSCP covered species. This lizard ranges from coastal southern California to the desert foothills and into Baja California, Mexico. Coast horned lizard is often associated with coastal sage scrub, and its abundance has been shown to be correlated with presence of chaparral plants (Fisher et al 2002), especially areas of level to gently sloping ground with well-drained loose or sandy soil (Mills 1991). This animal usually avoids dense vegetation, preferring 20 to 40 percent bare ground in its habitat. Populations along the coast and inland have been severely reduced by loss of habitat. Where it can be found,

the San Diego horned lizard can be locally abundant, with densities near 20 adults per acre (Mills 1991).

The San Diego horned lizard is a dietary specialist focusing on native harvester ants (*Pogonomyrmex* spp.), which contribute up to 90 percent of the horned lizard's diet (Pianka and Parker 1975). It will eat other insects opportunistically, but does not eat invasive Argentine ants (Jennings and Hayes 1994). The proportion of non-ant arthropods in a horned lizard's diet increases in locales where Argentine ants are present, and in fact, horned lizard abundance is generally lower in sites with Argentine ants (Fisher et al. 2002).

Adults are active from late March to late August; young are active from August to November or December.

This species is known to occur in and adjacent to the MTRP within chaparral and coastal sage scrub habitats (State of California 2011). Two individuals were observed in Diegan coastal sage scrub and southern mixed chaparral in the southeastern portion of the West Sycamore area (SanBios 2001), one individual was observed along a trail through chaparral habitat in the Cowles Mountain area (RECON 2011), one individual was observed on the ridgelines of East Elliott (City of San Diego 2012), and one individual was historically recorded in the Fortuna Mountain area (SanBios 1978; Figures C-6a,b). According to a brief analysis of data points compiled by the CNDDB, approximately 0.3 percent (2 of 677) of known populations of San Diego horned lizard is found within the MTRP boundaries.

Guild membership(s) / Conditions of Coverage / ASMD's:

- Coastal Sage Scrub *Artemisia*/*Eriogonum* (Section 4.5.5.5)

Birds

A-C.1.7 Cooper's hawk (*Accipiter cooperi*)

The Cooper's hawk is a CDFW watch list species and a MSCP covered species. The Cooper's hawk ranges year-round throughout most of the United States: wintering southward to Central America, and breeding as far north as southern Canada (Rosenfeld and Bielefeldt 1993). In southern California it is a widespread breeding species in both natural and urban environments, utilizing both eucalyptus trees and mature, native riparian forest (e.g. oaks, cottonwoods; Unitt 2004). Nesting generally occurs between March and July. Although southern California Cooper's hawks are non-migratory, the local population is augmented in winter by migrants from northern regions. This hawk forages primarily on medium-sized birds, but may also eat small mammals

(Rosenfeld and Bielefeldt 1993). This species declined during the first part of the 20th Century, but population numbers have rebounded since the 1980s, when Cooper's hawks began nesting in urban and suburban eucalyptus woodlands (Unitt 2004).

Estimates of home range size for this species from across the continent (Craighead and Craighead 1969; Bloom 1995) are fairly consistent at approximately one square mile (640 acres), although this number certainly varies with the kind and dispersion of landscape elements such as tree groves. A comparable density figure of four pairs per nine square miles was documented by the San Diego County Bird Atlas Project (Unitt 2004).

Recent surveys (RECON 2010) found Cooper's hawk on several sections of the San Diego River, including an active nest in a large oak near the Grasslands Crossing Trail junction with Junipero Serra Trail (Figures C-7a,b). It is likely that other pairs also nest along the river and in trees in tributary drainages such as Oak Canyon. The Cowles Mountain, Mission Gorge, and Fortuna Mountain management areas of MTRP provide high-quality habitat for this species in the form of extensive riparian forest (approximately four miles) in proximity to extensive scrub-covered slopes and other vegetation types for foraging.

Based on an estimated territorial size requirement of approximately one to two square miles per mating pair (Craighead and Craighead 1969; Bloom 1995; Unitt 2004), it is likely that no more than four or five pairs of this species occupy MTRP. The East Elliott and West Sycamore management areas lack sufficient tree cover to support significant nesting activities by this species. Sixteen visits to this area during the first half of 2003 (NRC 2004) resulted in only one marginal detection (using adjacent residential development as well as undeveloped land) of Cooper's hawk. According to a brief analysis of data points compiled by the CNDDB, approximately 1.0 percent (1 of 102) of known populations of Cooper's hawk is found within the MTRP boundaries.

Guild membership(s) / Conditions of Coverage / ASMD's:

- Riparian woodlands (Section 4.5.4.5)

A-C.1.8 Southern California rufous-crowned sparrow (*Aimophila ruficeps canescens*)

The southern California rufous-crowned sparrow is a CDFW species of special concern and an MSCP-covered species. This resident bird ranges throughout coastal southern California, from Santa Barbara County south to San Diego County and into northwestern Baja California, Mexico (Collins 1999). Nests are most often made on the ground at the bases of bunchgrasses and low shrubs. Generally, this species begins nesting in March

(Unitt 2004), but under warm, dry weather conditions in the early months of the year, nesting may begin in February (Lovio, 1996 unpublished data). Preferred habitat includes the more open phases of coastal sage scrub or areas with sparse grass cover and rock or other openings, often on south-facing slopes (Unitt 2004; Lovio, 1996 unpublished data). The birds remain in their established territories for life, with juveniles probably dispersing within only a few miles from where they were hatched (Unitt 2004). Insects constitute the primary food item of this species during the breeding season, and seeds and other plant foods dominate the diet during the remaining months. Urbanization has decreased the amount of habitat suitable for southern California rufous-crowned sparrows, although the relationship between habitat fragmentation and this species' distribution is complex. Anthropogenic edge often provides the habitat conditions favored by this species, and it is capable of reproducing successfully on small habitat fragments in a suburban matrix (Lovio 1996). However, other studies have shown the species to decline in abundance on small habitat isolates relative to large patches (Bolger et al. 1997). Isolated populations of southern California rufous-crowned sparrow have been observed to persist in fragments as small as 988 acres (Unitt 2004). As MTRP contains over 5,000 acres of available habitat for southern California rufous-crowned sparrow, it is unlikely that individuals are under threat at MTRP from habitat fragmentation.

This cumulative distributional database for this species in MTRP, which includes locations documented in 2009 and 2010 (RECON 2010) and records reported to the CNDDB (State of California 2011), shows this species to be fairly widespread throughout lower elevation, shrub-dominated vegetation in all areas of MTRP (Figures C-8a-c). According to a brief analysis of data points compiled by the CNDDB, approximately 0.5 percent (1 of 185) of known populations of southern California rufous-crowned sparrow are found within the MTRP boundaries.

Guild membership(s) / Conditions of Coverage / ASMD's:

- Coastal Sage Scrub *Artemisia*/*Eriogonum* (Section 4.5.5.5)

A-C.1.9 Golden eagle (*Aquila chrysaetos*)

The golden eagle is a federally protected species under the Bald and Golden Eagle Protection Act, is a CDFW species of special concern, is fully protected by the state of California, and is an MSCP covered species. This large, wide-ranging predator occurs throughout North America and is an uncommon resident in extensive, predominantly undeveloped parts of central San Diego County. The nesting population in San Diego County is concentrated in the foothill zone and coastal lowlands, but remains east of the urbanized coastal zone. The golden eagle nests on cliffs or in large trees in secluded areas. This species forages over large areas of grassland and open chaparral or sage

scrub, where it preys primarily upon rabbits and ground squirrels. Several golden eagle territories in the coastal lowland have been eliminated by urbanization, agricultural development, and other human disturbances (Unitt 2004). Immature golden eagles disperse for hundreds to thousands of miles over a period of several years before settling in a breeding home range (WRI 2010). Dispersing young birds are subject to a variety of risks, and only about half of young birds survive to one year of age (WRI 2010b). Countywide, the population has decreased by about 50 percent over the past 100 years (WRI 2010b).

Nesting golden eagle pairs in southern California are non-migratory (WRI 2010b) and require between 19 and 59 square miles of relatively open, undeveloped terrain (Brown and Amadon 1989). If breeding golden eagles occur in the vicinity of MTRP, it is likely that only one pair occupies the Miramar-MTRP-Sycamore Canyon-Fanita ranch area.

An immature golden eagle was seen foraging on MCAS Miramar, near MTRP lands just north of Highway 52 on 30 April 2010 during NRMP Phase II surveys (RECON 2011; Figure C-9). This constitutes one observation in 15 dates of diurnal survey associated with that field effort. Clark (2010) had no detections of eagles in 18 days of field work during the same period. Nevertheless, given the large-scale movements and area requirements of this species, it has potential to occasionally forage at MTRP.

A stable eagle nest site occurred in or near MTRP as recently as 1981 (Scott 1985). The probability for foraging and nesting are low due to the recreation, disturbance, and development near cliffs and foraging habitat. A cliff-nesting bird study conducted at MTRP in 2010 (Clark 2010) found no sign of current nesting of this species. Nevertheless, MTRP may provide a portion of the home range and/or buffering for nearby resident eagles.

MSCP Conditions of Coverage:

This species does not have specific conditions of coverage within the MSCP.

Golden eagles use MTRP for foraging. Potential nesting sites at (cliff faces) are within the Cliffs and Rocky Outcrops Management Guild (Section 4.5.1) and, in the event of a nesting occurrence, will benefit from guild-wide treatment of edge effects including trail closure/reroute, recreational exclusionary signage, and Ranger patrols. In the event that a trend of nesting golden eagles are observed within the park, the species will be reevaluated for single species management under the adaptive management framework.

A-C.1.10 Northern harrier (*Circus cyaneus*)

The northern harrier is a CDFW species of special concern, and its nesting sites are considered sensitive by CDFW. This species is a fairly common winter visitor and a

formerly widespread breeder throughout lowland portions of California. The northern harrier forages for small mammals and birds in grasslands, agricultural fields, and coastal marshes by coursing low above the ground, using acute hearing as well as eyesight to locate prey. Harriers nest on the ground in open habitats such as marshes, grasslands, fields, or areas of sparse shrubs (Unitt 2004; Zeiner et al. 1990). In southern California, this species nests predominantly in grassland. Few harriers currently nest in southern California due to loss or fragmentation of large tracts of suitable habitat (Small 1994). In San Diego County, the harrier is a sparse breeder owing to the few, scattered large areas of grassland and other primarily non-woody habitats remaining on the lower coastal slope. The low density of this species is attributable to typical raptor characteristics of large home range and territorial behavior among pairs. However, within the remaining large tracts of habitat, multiple pairs often breed, such that the breeding population in San Diego County was estimated to be 25–75 pairs in 2004 (Unitt 2004). The local breeding population likely varies widely in response to varying rainfall levels and the presumed resulting fluctuation in prey abundance.

Despite the presence of a fairly large grassland area east of Fortuna Mountain, no northern harriers were detected during the course of 15 field excursions conducted during daylight hours in 2010 (RECON 2010). Furthermore, no occurrences of this species for MTRP have been reported from the CNDDB (State of California 2011) or other sources (San Diego Natural History Musem 2009). Clark visited MTRP 18 times during 2010 and did not detect harriers during surveys (Clark 2010). Sixteen field visits to the East Elliott management area during the first half of 2003 (NRC 2004) revealed only two detections of harriers in the eastern grassland and lower slopes of sage scrub in winter and early spring. Unitt (2004) found eight harriers in Sycamore Canyon in the winter of 1998, further suggesting primarily non-breeding use of the area by this species (Figure C-10). Nevertheless, the grasslands of MTRP hold potential for foraging and possibly nesting harriers in the event of spatial shifts or population expansion in the region.

MSCP Conditions of Coverage:

Area-specific management directives must: manage agricultural and disturbed lands (which become part of the preserve) within four miles of nesting habitat to provide foraging habitat; include an impact avoidance area (900 feet or maximum possible within the preserve) around active nests (MSCP 1998; Table 3-5).

As part of the MPU, redundant trails within the park (including the grasslands east of Fortuna Mountain) have been consolidated and rerouted, decreasing habitat fragmentation and edge effects. Although harriers have been observed foraging within MTRP, no nesting occurrences have been observed. In the event that nesting harriers are observed within the park, the species will be reevaluated for single species management under the adaptive management framework.

A-C.1.11 Southwestern willow flycatcher (*Empidonax traillii extimus*)

The southwestern willow flycatcher is federally and state-listed as endangered and is an MSCP covered species. This migratory bird breeds in southern California, Arizona, New Mexico, extreme southern portions of Nevada and Utah, western Texas, and extreme northwestern Baja California, Mexico (USFWS 1995). The southwestern willow flycatcher is present in San Diego County in late spring and summer (Unitt 2004), and breeds from late mid-May to mid-July. In California, this species requires relatively large stands of mature riparian forest with dense undergrowth for breeding. Its diet consists mainly of insects and the occasional fruit (Sedgwick 2000). The southwestern willow flycatcher is sensitive to human activity in riparian areas. Parasitism by brown-headed cowbirds has been a significant factor in the decline of this species in California, Arizona, and elsewhere (Finch and Stoleson 2000; Sedgwick 2000).

The southwestern willow flycatcher does not currently breed in San Diego County on a consistent basis south of the San Dieguito River (State of California 2011). However, it characteristically occurs in many places briefly as a late spring migrant. 2010 surveys (RECON 2010b) resulted in one observation in the relatively open, disturbed section of the river floodplain just below the Old Mission Dam on May 24 and an inconclusive location based only on call notes in dense riparian forest on the north side of Kumeyaay Lake on June 9 (Figure C-11). The latter location supports tall, dense riparian forest suitable for nesting of this species. The riparian forest habitat on the San Diego River through MTRP may be suitable for this species and has potential to support the species in the future as populations in southern California recover and expand.

Guild membership(s) / Conditions of Coverage / ASMD's:

- Riparian woodlands (Section 4.5.4.5)

A-C.1.12 American peregrine falcon (*Falco peregrinus anatum*)

The American peregrine falcon is listed as state endangered, is a California fully protected species, and is a MSCP covered species. It ranges along the west coast of the United States into Mexico. Peregrine falcons prey on a variety of bird species, taken on the wing, and will also take small mammals, fish, and insects. Nesting sites are typically located on high cliffs, in trees, or on man-made structures, and the same nest site may be used for many years. Nest sites are often highly secluded and inaccessible.

The decline of the peregrine falcon is attributed to widespread use of the pesticide dichlorodiphenyltrichloroethane (DDT) during the first two-thirds of the 20th Century, which caused the birds to lay eggs too thin to withstand incubation (Zeiner et al. 1990).

DDT was banned in the early 1970s, and a recovery program for the species began soon after. Extirpated as a breeding species from San Diego County until it re-established partially through human intervention in the mid-1980s, nesting peregrine falcons remain few and highly restricted to within one to two miles of the coastline (Unitt 2004).

The peregrine falcon is extremely mobile and able to cover extensive distances during daily forays, and so may be seen virtually anywhere. Although fairly broad in its foraging behavior, this species does show a propensity for predating larger bird species associated with water bodies.

An adult peregrine falcon was observed flying northward over MTRP in June 2010 (RECON 2010, Figure C-12), but extensive field surveys that year failed to record any other occurrences. The June sighting (nesting season), combined with other observations from the San Diego River watershed over a period of two decades, suggests the possibility of a nesting pair in the interior of the county, perhaps on the upper gorge of the river (Lovio, unpublished observations). A falcon pair was also observed (2012) nesting in a water tower 0.8 mile east of the MTRP boundaries (B. Miller, pers. comm.) A solitary falcon was observed transiting across MTRP in 2009, though no nesting or foraging activity was observed (RECON 2010). Nesting within MTRP, however, remains unlikely, as the few cliffs large enough to potentially provide nesting sites have relatively high levels of human recreation and disturbance. A cliff-nesting bird study conducted at MTRP in 2010 (Clark 2010) found no sign of current nesting of this species.

MSCP Conditions of Coverage:

This species does not have specific conditions of coverage within the MSCP.

Peregrine falcons use MTRP for foraging and sporadic nesting. Potential nesting sites at (cliff faces) are within the Cliffs and Rocky Outcrops Management Guild (Section 4.5.1) and, in the event of a nesting occurrence, will benefit from guild-wide treatment of edge effects including trail closure/reroute, recreational exclusionary signage, and Ranger patrols. In addition, potential foraging sites at MTRP (open water and wetlands within the San Diego River flood plain) are within the Riparian woodlands management guild (Section 4.5.4), and benefit from guild-wide management of edge effects including cowbird trapping and invasive weed eradication. In the event that a trend of nesting Peregrine falcons is observed within the park, the species will be reevaluated for single species management under the adaptive management framework.

A-C.1.13 Coastal California gnatcatcher (*Polioptila californica californica*)

The coastal California gnatcatcher is federally listed as threatened, is a CDFW species of special concern, and is an MSCP covered species. The San Diego County population exceeds 2,000 pairs, with fires in 1996, 2003 (Unitt 2004), and 2007 temporarily reducing the carrying capacity of several of the habitat cores for this species. For example, the wildfires of October 2003 affected 4 percent of the known coastal California gnatcatcher occurrences, 16 percent of its designated critical habitat, and 28 percent of the USFWS model for suitable habitat (Bond and Bradley 2004, as cited in Unitt 2004). However, a recent study revealed that three of 67 regional gnatcatcher survey points in San Diego County (about 5 percent) that did not support gnatcatchers immediately after the 2003 fires, did support the species by 2007 (USFWS 2009a), suggesting the earliest stages of habitat recovery. Extensive fall fires in 2007 did not reach MTRP.

Coastal California gnatcatchers occur on the lower coastal slope of southern California from Ventura County and the Los Angeles basin south to Baja California, Mexico (Atwood 1980; Jones and Ramirez 1995). This resident species occurs below the 2,400-foot elevation level, with 90 percent of the birds at locations below 1,000 feet. Within this distribution, the greater gnatcatcher population has been reduced through loss of habitat to urban and agricultural development since before the mid-20th Century.

The gnatcatcher breeds primarily in coastal sage scrub vegetation, preferring patches dominated by California sagebrush and flat-top buckwheat and avoiding those dominated by sage (*Salvia* spp.), laurel sumac, and lemonadeberry (Weaver 1998a, as cited in Unitt 2004). These preferences appear to relate more to vegetation structure than to a floristic relationship. A breeding pair's territory ranges from less than one hectare along the coast to over nine hectares farther inland, and is about 80 percent larger during the non-breeding season (Unitt 2004). During dry months, the species may forage opportunistically in adjacent riparian areas, grassland, or developed areas.

Assessment of the current and potential distribution of gnatcatchers at MTRP derives from the data base comprising records from USFWS, SanBIOS, Rancho Encantada project documentation, CNDDB (State of California 2011), and City of San Diego MSCP records, as well as modeling potential habitat quality through the MSCP California Gnatcatcher Habitat Evaluation Model (TAIC 2002; Figures C-13a-c, C-14a-c).

The cumulative gnatcatcher location database for the Fortuna Mountain, Mission Gorge, Cowles Mountain, and Lake Murray management areas shows concentrated locations on the lower elevation western and northeastern fringes of the Fortuna complex and on coastal sage scrub patches surrounding Lake Murray (see Figure C-14b). These areas are appropriately rated as "high" and "very high" quality by the TAIC California Gnatcatcher Habitat Evaluation Model. The corresponding slopes of Fortuna Mountain had been recovering for 12 or more years by that time. These slopes of Fortuna were in

turn severely burned in the fall 2003 fire, presumably rendering the slopes of Cowles as the relatively older stands of coastal sage scrub.

A gnatcatcher survey conducted on the eastern third of the East Elliott area of MTRP (Castlerock properties, east of the landfill) in spring and summer of 2003, prior to the fall Cedar Fire, revealed a sparse and inconsistent distribution of gnatcatchers (Natural Resource Consultants 2004). The coastal sage scrub prior to the fire was variable in density, but generally included a high incursion of grasses and other herbaceous species, suggesting that it was recovering from the fire in 1981. The cumulative gnatcatcher data base for East Elliott shows a higher density in the eastern section than recorded in 2003, suggesting the carrying capacity is higher than the 2003 survey indicated, given suitable maturity of the vegetation.

All coastal sage scrub on the East Elliott area was severely burned in the fall 2003 fire. Recent (2011), general inspections of the 2003 gnatcatcher survey area suggest that most or all of this area lacks the habitat structure to support a high gnatcatcher density after eight years of recovery. However, the MSCP California Gnatcatcher Habitat Evaluation Model (TAIC 2002) designates most of this area as “high” and “very high” quality, and map records show a relatively high population density surrounding the landfill. At least 10 additional years of vegetation recovery are expected before gnatcatcher populations release saturation density.

The West Sycamore management area shares a similar fire history and vegetation composition to East Elliott, with coastal sage scrub vegetation somewhat more dense and mature. According to a brief analysis of data points compiled by the CNDDB, approximately 2.1 percent (17 of 804) of known populations of coastal California gnatcatcher is found within the MTRP boundaries.

Guild membership(s) / Conditions of Coverage / ASMD’s:

- Coastal Sage Scrub *Artemisia*/*Eriogonum* (Section 4.5.5.5)

A-C.1.14 Light-footed clapper rail (*Rallus longirostris levipes*)

The light-footed clapper rail is listed as endangered by the federal and state governments and is a covered species under the City of San Diego MSCP. The light-footed clapper rail is found primarily in lower salt marsh habitat, especially in areas dominated by cordgrass (*Spartina foliosa*); it has also been found in virtually all marshlike habitats, including pickleweed (*Salicornia* spp.) stands and freshwater marsh dominated by cattails (*Typha* spp.). Nesting activity usually begins in March and ends by August. Because clapper rails are ground-nesting birds, their nests are highly susceptible to predators unless they have adequate cover and isolation. Those birds that

nest in more upland areas of the marsh are more likely to fall prey to mammals. The clapper rail is an opportunistic omnivore, feeding mostly on crabs, small fish, snails, insects, and other invertebrates in shallow water or mudflats.

In San Diego County, light-footed clapper rails are an uncommon and very localized resident found in tidal salt marshes, as well as some freshwater marshes, including Kumeyaay Lake at MTRP (Unitt 2004). Historically, this species has ranged from Carpinteria Marsh in Santa Barbara County south to San Quintin, Baja California, Mexico. Range and numbers have been greatly reduced over the last couple of decades by destruction and degradation of habitat (Unitt 2004). In San Diego County, the largest population is known from the Tijuana River estuary.

Clapper rails have been reported or detected during official state-wide surveys in the freshwater marsh surrounding Kumeyaay Lake on the San Diego River since 2006 (Zembal et al. 2010, Figure C-15). However, nesting at this location has not been verified; it is believed that these birds are conditioned to respond to taped calls by recreational bird-watchers and do not exhibit typical calls that signify paired breeding status (Zembal et al. 2010).

A smaller area of marsh occurs on the perimeter of the impoundment behind the Old Mission Dam, but rails have not been reported from this location. Although small, scattered patches of marsh vegetation occur elsewhere along the river through MTRP, they are presumably insufficient in size to support consistent presence of rails, although they may function as “stepping stones” for movement by rails along the river.

MSCP Conditions of Coverage:

Area-specific management directives must include active management of wetlands to insure a healthy tidal salt marsh environment to protect against detrimental edge effects (MSCP 1998; Table 3-5).

MTRP is well outside of the tidal influence of the Pacific Ocean (approximately 12 miles to the west) and does not contain salt marsh habitat. As such, active management to promote salt marsh habitat at MTRP is impractical and ecologically incorrect. Rails have been observed foraging in the freshwater marsh surrounding Kumeyaay Lake, but as to date no nesting has been observed. As the wetlands surrounding Kumeyaay Lake are within the riparian woodlands management guild (Section 4.5.4), they benefit from guild-wide management of edge effects including cowbird trapping and invasive weed eradication.

A-C.1.15 Least Bell's vireo (*Vireo bellii pusillus*)

The least Bell's vireo is federally and state-listed as endangered and is a MSCP covered species. Least Bell's vireo winters in Mexico and breeds in southern California and northern Baja California, Mexico. Its historical breeding range once extended from northwestern Baja California, Mexico, to interior northern California (Franzreb 1989), but its current distribution is restricted to eight southern counties, the majority occurring in San Diego County (USFWS 1998a). Prior to listing, populations of least Bell's vireo declined drastically due to extensive loss of riparian habitat to agricultural and urban development, including channelization and mining of streams, and nest parasitism by brown-headed cowbirds. That being said, regional conservation efforts have had moderate success as vireos have increased in abundance in southern California by a factor of 10 in 20 years (McGraw 2006) due to habitat recovery and restoration and extensive brown-headed cowbird trapping programs.

The species is found in riparian habitats, including cottonwood-willow woodlands and forests, oak woodlands, and mule fat scrub, and requires dense cover for nesting (USFWS 1998a). Least Bell's vireo arrives on its breeding grounds in mid-March and remains until September or October. Its diet consists primarily of insects, spiders, and some fruit (Brown 1993).

RECON documented 16 pairs of vireo along the San Diego River and two pairs in Oak Canyon within MTRP during NRMP Phase II surveys (RECON 2010 and 2010b; Figures C-16). In addition, USGS documented 17 pairs of vireo during the same time period (Lynn and Kus 2010). Comparison of the distribution of pairs with the cumulative data base for MTRP shows that this estimate of breeding pairs and their dispersion is relatively stable. Density of vireos is relatively higher in the vicinity of Kumeyaay Lake (northeast end) and downstream of the Jackson Drive trail extension (southwest end), with lower density supported between. According to a brief analysis of data points compiled by the CNDDB, approximately 1.2 percent (3 of 256) of known populations of least Bell's vireo is found within the MTRP boundaries.

Guild membership(s) / Conditions of Coverage / ASMD's:

- Riparian woodlands (Section 4.5.4.5)

Mammals

A-C.1.16 Southern mule deer (*Odocoileus hemionus fuliginata*)

Southern mule deer are presently widespread throughout undeveloped portions of San Diego County, ranging from Camp Pendleton to the Laguna Mountains, Sweetwater

River, and Otay Lakes at elevations of 400 to 3,600 feet (Bleich and Holl 1982). Resident and migratory populations are present throughout California. This species requires large, undisturbed tracts of native habitats, including chaparral, coastal sage scrub, mixed grassland/shrub habitats, oak woodland, riparian woodland, and mixed conifer forest. Breeding usually occurs between November and February, with the fawning period between June and August. The diet of the southern mule deer consists of forbs, grasses, and nuts. Although the species is not threatened with extinction within its range, urbanization and habitat fragmentation could result in local extirpation without appropriate conservation measures.

Southern mule deer were observed during 2010 biological surveys (RECON 2010) and are expected to inhabit much of the MTRP (Figures C-18a,b). In addition, between November 2009 and March 2010, Western Tracking Institute (WTI) conducted mammal surveys to determine the current status, use patterns, and forage base for mammals, including mule deer, within the Fortuna Mountain, Mission Gorge, and Cowles Mountain areas of MTRP (WTI 2010). WTI concluded that MTRP supports a robust population of mule deer; of all mammal species detected, the highest number of observations and indicators were recorded for mule deer. That being said, recent genetic work has found that gene flow among southern mule deer is somewhat stagnant and may be limited by male dispersal across major freeways in San Diego (Mitelberg 2010).

WTI identified 16 mule deer hotspots within the Fortuna Mountain and Mission Gorge areas, as well as the northwestern portion of the Cowles Mountain area, where evidence of relatively high concentrations of activity was observed. Some of the hotspots identified include the Shepherd's Pond area, the series of canyons on the northeast and eastern sides of North Fortuna Mountain, Suycott Wash along the north side of the San Diego River, the canyons north of Kwaay Paay Mountain, the area west of Cowles Mountain and southwest of Pyles Peak, and an area north of the visitor center.

The portion of MTRP surveyed by WTI also supports adequate "Safe Harbor Zones," forage, and water sources to support mule deer (Figure C-19). The Safe Harbor Zones are defined as "areas that are sufficiently isolated topographically and provide the necessary elements of basic cover, water, and forage so that dens, birthing areas, and beds are likely" (WTI 2010). The Safe Harbor Zones were largely identified within the side canyons that run east and west from the North Fortuna and South Fortuna ridgelines, especially the finger canyons bordered by the North Fortuna, Fortuna Saddle, and North Perimeter Trails. The healthy forage base found within MTRP consists of grasses and early successional chaparral vegetation, on which mule deer are known to thrive. Water sources within this surveyed portion of MTRP include the San Diego River and Shepherd's Pond. These Safe Harbor Zones were used as an environmental constraint in the early planning stages of the Master Plan Update associated with this document.

The East Elliott and West Sycamore areas of MTRP are also support mule deer. East Elliott is comparable in size to the Fortuna Mountain area and supports similar habitats to those found within the Fortuna Mountain, Mission Gorge, and Cowles Mountain areas. In addition, East Elliott has direct connectivity to the Fortuna Mountain area by way of Oak Canyon and Spring Canyon, which both appear to be functional wildlife corridors for large mammals (WTI 2010). The West Sycamore area is immediately contiguous with adjacent tracts of open space (though of different public and private jurisdictions) known to support mule deer. In addition, Sycamore Canyon and West Sycamore Canyon would likely provide viable movement corridors for large mammal species between the West Sycamore and East Elliott areas.

The Lake Murray area has a low potential to support mule deer, as Navajo Road and Mission Trails Golf Course likely serve as a substantial barrier to wildlife movement south of the Cowles Mountain area. The Lake Murray area is constrained by development to the south, east, and west, and largely consists of open water (Lake Murray). While this area may provide quality habitat for plants, small terrestrial wildlife, and flighted species, it is not expected to support substantial populations of large mammals.

MSCP Conditions of Coverage

None

Justification for Coverage

Mule deer “hot spots” were identified and used as constraints Master Plan Update to avoid and/or minimize recreation pressures on the species. In addition, an analysis of internal and regional wildlife corridors were included in the NRMP (Section 2.2.4).

A-C.1.17 Mountain lion (*Puma concolor)*

Mountain lions are widespread, but uncommon, in California, ranging from sea level to alpine meadows. This large, solitary mammal requires relatively large, undisturbed tracts of native habitats, including chaparral, oak woodland, and mixed conifer forest, as long as mule deer (their primary food source) are present. They also utilize riparian habitats, primarily as corridors. Home ranges for adult animals in coastal southern California range from 112 to 829 square kilometers (43 to 320 square miles; Crooks 2002); males have larger home ranges than females. The mountain lion breeding season is year-round (Shivaraju and Dewey 2003). The mountain lion has shown a dramatic decline in southern California due to habitat fragmentation, restriction of movement, and increased encounters with humans (Zeiner et al. 1990).

Between November 2009 and March 2010, WTI conducted mammal surveys to determine the current status, use patterns, and forage base for mammals, including

mountain lion, within the Fortuna Mountain, Mission Gorge, and Cowles Mountain areas of MTRP (WTI 2010). WTI concluded that MTRP supports mountain lion, as well as a robust population of its primary food source, mule deer.

Even though mountain lion evidence is rare due to the solitary nature of individuals and low density of their populations, numerous sightings have been reported within MTRP (Figure C-20). Evidence of mountain lion presence within the Fortuna Mountain, Mission Gorge, and Cowles Mountain areas of MTRP was largely restricted to the San Diego River corridor or connecting swales, including an area just west and north of the Golfcrest/Mission Gorge Road intersection and south of the Junipero Serra Trail Road.

The presence of mountain lion within MTRP indicates an overall healthy ecosystem within MTRP, as large carnivores are typically the most vulnerable to ecological disturbances and fragmentation, and are often the first to become extirpated (SDSU 2006). However, as the adverse effects of fragmentation and isolation increase over time, the presence of mountain lion today is not necessarily an accurate indicator of the ability of MTRP to support a permanent population. As with mule deer, the existence of sufficient connectivity to suitable habitat throughout the region is critical to the species' survival.

The East Elliott and West Sycamore areas of MTRP are also anticipated to support mountain lion. East Elliott is comparable in size to the Fortuna Mountain area and supports similar habitats to those found within the Fortuna Mountain, Mission Gorge, and Cowles Mountain areas. In addition, East Elliott has direct connectivity to the Fortuna Mountain area by way of Oak Canyon and Spring Canyon, which both appear to be functional wildlife corridors for large mammals (WTI 2010). Although the West Sycamore area does not have immediate jurisdictional connectivity with the southern areas of MTRP, it has extensive open space connectivity to other non-City entities (County of San Diego, MCAS Miramar) and supports similar habitats to those found in the other areas known to support mountain lion. In addition, Sycamore Canyon and West Sycamore Canyon would likely provide viable movement corridors for large mammal species between the West Sycamore and East Elliott areas.

The Lake Murray area is not anticipated to support mountain lion, as Navajo Road and Mission Trails Golf Course likely serve as a substantial barrier to wildlife movement south of the Cowles Mountain area. The Lake Murray area is constrained by development to the south, east, and west, and largely consists of open water (Lake Murray). While this area may provide quality habitat for plants, small terrestrial wildlife, and flighted species, it is not expected to support substantial populations of large mammals such as mountain lions.

MSCP Conditions of Coverage

None.

Justification for Coverage

An analysis of internal and regional wildlife corridors are included in the NRMP (Section 2.2.4).

A-C.2 Sensitive Species Occurring In MTRP That Are Not Covered By the MSCP

A-C.2.1 San Diego sagewort (*Artemisia palmeri*)

San Diego sagewort is a CNPS Rank 4.2 species. This perennial in the sunflower family (Asteraceae) grows as a series of long wand-like stems from the base and blooms from July to September (Munz 1974). It is found in San Diego County and northern Baja California, Mexico (CNPS 2001). In San Diego County, its distribution ranges from La Jolla south to Otay and east to Alpine (Beauchamp 1986). In coastal areas it occurs mostly near creeks and drainages, where it can occur in low numbers in dense riparian vegetation and may be difficult to detect. Further inland it may occur in mesic chaparral vegetation, such as that found on the north-facing slopes (Reiser 2001).

A-C.2.2 San Diego sunflower (*Bahiopsis* [=*Viguiera*] *laciniata*)

San Diego sunflower is a CNPS Rank 4.2 species. This shrub in the sunflower family (Asteracae) has shiny, resinous leaves and showy yellow flowers that bloom from February to June (Hickman 1993; Munz 1974). Its range extends from Sonora and Baja California, Mexico, northward into San Diego and Orange counties (CNPS 2001), although the population in Orange County may not be native (Reiser 2001). In San Diego County it is rare north of Highway 78, becoming increasingly common to the south, until it is the dominant coastal sage shrub in non-coastal southern San Diego County (Reiser 2001). San Diego sunflower occurs on dry, shrubby slopes in Diegan coastal sage scrub and chaparral habitats between 200 and 2,500 feet.

A-C.2.3 Peninsular spineflower (*Chorizanthe lepthotheca*)

Peninsular spineflower is a CNPS Rank 4.2 species. This small annual plant in the buckwheat family (Polygonaceae) has stems four to eight inches tall and flowers from May to July (Munz 1974). It is found in San Bernardino, Riverside, and San Diego counties and Baja California (CNPS 2001). Peninsular spineflower grows on dry slopes in chaparral or pine forests, often in granitic soils (Munz 1974; Hickman 1993). This plant is similar to the common Turkish rugging (*Chorizanthe staticoides*), but has more numerous stems (Munz 1974) and pale blue or white, rather than pink, flowers

(Reiser 2001). The flowers of peninsular spineflower also grow in looser clusters and stick out farther than those of Turkish rugging (Hickman 1993).

A-C.2.4 Delicate clarkia (*Clarkia delicata*)

Delicate clarkia is a CNPS Rank 1B.2 species. This annual in the evening-primrose family (Onagraceae) grows up to three feet tall and produces rose-lavender to pale pink flowers in May and June. Delicate clarkia is found only in San Diego County and Baja California, Mexico. It grows on dry slopes in oak woodlands and chaparral below 4,000 feet (Munz 1974), preferring sites that are partially shaded with soils that are wet in spring and have abundant herbaceous growth in spring. Delicate clarkia is inconspicuous when not in flower, but readily recognizable by its spoon-shaped rose petals and bright orange-tipped anthers (Reiser 2001).

A-C.2.5 Summer holly (Comarostaphylis diversifolia ssp. diversifolia)

Summer holly is a CNPS Rank 1B.2 species. This evergreen shrub in the heath family (Ericaceae) reaches heights of 15 feet and produces a small white flower from April to June (Munz 1974). Summer holly is found in the chaparral in Orange, Riverside, and San Diego counties, as well as Baja California, Mexico. In San Diego County it generally occurs at low elevations in chaparral communities near the coast. Regionally, summer holly is threatened by development and gravel mining (CNPS 2001). Summer holly at MTRP is considered preserved and is not a major component of regional conservation efforts.

A-C.2.6 Western dichondra (*Dichondra occidentalis*)

Western dichondra is a CNPS Rank 4.2 species, indicating that it has limited distribution or is infrequent throughout its range. Its range extends from Ventura County south into Baja California, Mexico, including the Channel Islands. In San Diego County it is known from Agua Hedionda south to Point Loma and inland to Poway, Otay Mountain, and the Tijuana Hills (Beauchamp 1986). This small perennial herb in the morning-glory family (Convolvulaceae) flowers from March to May. It often grows almost completely hidden under shrubs or trees in coastal sage scrub and chaparral, or among rocky outcrops in grasslands. It grows primarily in dry sandy soils including Heuerhuero soils and Hambright gravelly clay loam (Reiser 2001). On Carmel Mountain Preserve, this species is found in southern maritime chaparral, adjacent to and within the 1986 burned area. The numbers of western dichondra are in a slow decline in southern California because habitat is being lost to development and weeds are invading native plant communities.

A-C.2.7 Mission Canyon blue-cup (*Githopsis diffusa* ssp. *filicaulis*)

Mission Canyon blue-cup is a CNPS Rank 3 species. This small, spreading annual in the bellflower family (Campanulaceae) has a short flowering period in May (Munz 1974). It is known from fewer than five occurrences in San Diego and Riverside counties (CNPS 2001). It occurs at elevations between 1,500 and 2,300 feet, in moist or disturbed areas (Hickman 1993) and isolated, sandy openings in chaparral (Reiser 2001).

A-C.2.8 Graceful tarplant (*Holocarpha virgata* ssp. *elongata*)

Graceful tarplant is a CNPS (2001) Rank 4.2 species. This strongly aromatic, sticky, annual herb in the sunflower family (Asteraceae) has a slender stem that may grow four feet tall and blooms between July and November. It occurs in Orange, Riverside and San Diego counties. It may occur in coastal sage scrub and cismontane woodland (CNPS 2001), but it is most commonly found in grasslands below 2,500 feet (Hickman 1993). Usually there is little shrub cover where graceful tarplant is found, but non-native grasses and herbs may dominate the area (Reiser 2001).

A-C.2.9 Decumbent goldenbush (*Isocoma menziesii* [=*Isocoma menziesii* var. *decumbens*])

Decumbent goldenbush is a CNPS (2001) Rank 1B.2 species. This is a low, spreading shrub in the sunflower family (Asteraceae) with stems up to 20 inches long that blooms between April and November (Munz 1974). This variety is found in the Channel Islands, Orange and San Diego counties, and in Baja California (CNPS 2001). Decumbent goldenbush grows in dry sandy mesas in coastal sage scrub (Munz 1974) intermixed with grassland. In San Diego County, this variety is concentrated in the vicinity of Bonita northward to MCAS Miramar, but has been reported as far south as Otay Mesa and as far north as Carlsbad (Reiser 2001).

Decumbent goldenbush can be distinguished by being a relatively short shrub, with grayish leaves with cobwebby hairs that typically have a few (but variable in number) shallow teeth on the tip (Nesom 1991, cited in Reiser 2001). Munz (1974) differentiates decumbent goldenbush as having few flower heads, with almost simple, compact, and rounded flowerclusters (rather than open panicles), and with leaves mostly 0.4 to 1.2 inches long (rather than 1.2 to 2 inches long).

A-C.2.10 San Diego marsh elder (*Iva hayesiana*)

San Diego marsh elder is a CNPS (2001) Rank 2 species. This plant is a subshrub with multiple stems and relatively fleshy leaves that grows to three feet tall and produces

nodding clusters of inconspicuous flowers between April and September (Munz 1974). This species is distributed in San Diego County and northern Baja California below 1,700 feet. Its habitat is identified as marshes, swamps, and playas (CNPS 2001), alkaline sinks and flats (Munz 1974; Hickman 1993) and creeks of intermittent streambeds (Reiser 2001). In San Diego County it has been reported from the Tijuana Estuary to near Lake Hodges, with populations becoming smaller and more localized in the northern part of its range. San Diego marsh elder is found on sandy alluvial embankments with cobbles on Riverwash, San Miguel-Exchequer or Huerhuero loam soils (Reiser 2001).

A-C.2.11 Robinson's pepper-grass (*Lepidium virginicum* var. *robinsonii*)

Robinson's pepper-grass is a CNPS (2001) Rank 1B.2 species. This annual in the mustard family (Brassicaceae) has divided or lobed leaves along its stem, grows from four to eight inches tall, and flowers between January and April (Munz 1974). Robinson's pepper-grass occurs from Los Angeles County south to Baja California and on Santa Cruz Island. It grows in openings in coastal sage scrub and chaparral vegetation below 1,600 feet. In San Diego County, it is typically found on relatively dry, exposed sites rather than beneath shrubs or near creeks (Reiser 2001). Robinson's peppergrass is shorter than two more widespread varieties of this species that grow in its range, *L.v.* var. *virginicum* and *L.v.* var. *pubescens.* These varieties grow in disturbed areas, such as old fields and roadsides, are taller than eight inches when mature, and have the stem leaves that are dissected to entire. To identify this species using a taxonomic key, however, it is necessary to examine it in fruit (Hickman 1993).

A-C.2.12 California adder's-tongue fern (*Ophioglossum californicum*)

California adder's-tongue fern is a CNPS Rank 4.2. In San Diego County, the fern has been reported from Kearny Mesa, Olivenhain, Proctor Valley, Escondido, and MTRP (RECON 2010, Beauchamp 1986). This perennial rhizomatous herb typically occurs on grassy slopes and near vernal pools and seeps, in coastal and foothill locations below 900 feet elevation. This plant is a primitive fern with a central spike that grows about five inches tall that bears fertile sporangia at the top (Hickman 1993; Reiser 2001). California adder's-tongue fern has a disjunct distribution, being found in the Sierra Nevada foothills, Monterey County in the central coast, and in Orange and San Diego counties and Baja California along the southern coast (CNPS 2001; Hickman 1993). It is found in moist chaparral and grassland communities and along the edges of vernal pools at 200 to 1,000 feet elevation. The California adder's-tongue fern is easily observed during the springtime, but becomes inconspicuous later in the season.

A-C.2.13 Nuttall's scrub oak (*Quercus dumosa*)

Nuttall's scrub oak is a CNPS Rank 1B.1 species. This evergreen shrub in the oak family (Fagaceae) grows less than 10 feet tall and blooms from February to April. This species is found near the coast in Santa Barbara, Orange, and San Diego counties, and in Baja California, Mexico, at elevations below 1,300 feet. It grows in chaparral, coastal sage scrub, and closed-cone coniferous forest habitats (CNPS 2001), preferring coastal chaparral with a relatively open canopy in flat areas, but growing in dense stands on north-facing slopes (Reiser 2001). In San Diego County it is known to grows as far inland as Camp Elliot and Otay Mesa (Reiser 2001), being replaced by the similar scrub oak, *Q. berberidifolia*, in higher, drier locations (Hickman 1993). Nutall's scrub oaks can be distinguished from the scrub oak, with which it may hybridize, by its acorn, which is less than 0.4 inch wide, moderately tuberculed, and with a thin cup (Hickman 1993); and by its leaves, which tend to be smaller, spinier, and more undulated (Reiser 2001) and have densely matted gray hairs (Roberts 1995).

A-C.2.14 Chaparral ragwort (*Senecio aphanactis*)

Chaparral ragwort is a CNPS Rank 2.2 species and is an inconspicuous annual in the sunflower family (Asteraceae) which grows to eight inches tall and blooms from January to April (Reiser 2001). Chaparral ragwort is widely distributed, but is relatively rare within each locality. It can be found in open coastal sage scrub, chaparral, and alkaline flats (Reiser 2001). Chaparral ragwort is similar in appearance to the diminutive, exotic annual common groundsel (*Senecio vulgaris*). Common groundsel has pronounced black-tipped phyllaries, while the phyllaries of the chaparral ragwort are green (Hickman 1993).

A-C.2.15 Purple stemodia (*Stemodia durantifolia*)

Purple stemodia is a CNPS (2001) Rank 2.1 species. This small perennial herb in the figwort family (Scrophulariaceae) produces several stems that reach up to two feet tall and has purple flowers that may bloom during much of the year (Munz 1974). It ranges south to tropical America, east to Texas, with San Diego County the northwestern extent of its range; it is considered extirpated from Riverside and Santa Barbara counties (CNPS 2001). Purple stemodia occurs in wet sand or rocks and drying river beds, in Sonoran desert scrub communities below 1,000 feet (Baldwin et al. 2002, CNPS 2001). In San Diego County it has been reported near a drying stream on Otay Mountain, along the shore of Sweetwater Reservoir, and from Mission Dam, Otay Lake, and Witch Creek (Reiser 2001).

A-C.2.16 San Diego County needle grass (*Stipa* [=*Achnatherum*] *diegoensis*)

San Diego County needle grass is a CNPS (2001) Rank 4.2 species. This species is a tufted perennial grass (Poaceae family) that grows to four feet tall, blooming from February to June. It occurs in the Channel Islands, San Diego County, and Baja California (CNPS 2001). San Diego County needle grass grows in rocky areas of coastal sage scrub and chaparral at elevations below 1,200 feet; mainland populations often occur near streams (Hickman 1993). In San Diego County this grass is found between 1,000 and 2,400 feet elevation along vernal streams and on clay slopes (Reiser 2001). Known San Diego County locations for this species include Proctor Valley, Jamul Mountain, McGinty Mountain, MTRP, and near Lee Valley and Otay Mountain (RECON 2010, Beauchamp 1986).

A-C.2.17 Rush-like bristleweed (*Xanthisma juncea* [=*Machaeranthera juncea*])

Rush-like bristleweed is a CNPS (2001) Rank 4.3 species. This herbaceous perennial shrub in the sunflower family (Asteraceae) grows from one to three feet tall and flowers from June to January (Hickman 1993; CNPS 2001). Its ranges from Sonora and Baja California, Mexico, north to Arizona and San Diego County (CNPS 2001). Habitat for rush-like bristleweed is dry hillsides in coastal scrub and chaparral from 800 to 3,300 feet elevation (CNPS 2001; Hickman 1993); in San Diego it prefers rocky, exposed locations in dry, low chamise chaparral or coastal sage scrub (Reiser 2001). This inconspicuous plant may often be overlooked because of its late flowering period.

Invertebrates

A-C.2.18 San Diego fairy shrimp (*Branchinecta sandiegonensis*)

The San Diego fairy shrimp is federally listed as endangered and was covered by the City's MSCP Subarea Plan, until a federal judge prohibited the further destruction of vernal pool habitat for seven vernal pool species, including the San Diego fairy shrimp (Brewster's Decision; *Center for Biological Diversity v. Bartel,* 98-2234-B [JMA], S.D. Ca.). Brewster's Decision was then rescinded in 2011, allowing Endangered Species Act consultation to occur for these species, but not restoring MSCP coverage of the species (City of San Diego 2011). This species is restricted to vernal pools in coastal southern California and south to northwestern Baja California, Mexico (USFWS 1998b). The life cycle of fairy shrimp is relatively simple, with larvae hatching out of resting eggs after being covered with water for a prescribed period of time, developing into adults, and mating and laying eggs before the pool dries. The development time is influenced both by the water temperature and the species-specific responses to environmental cues. San Diego fairy shrimp are found in vernal pools that are generally less than

30 centimeters deep. This species takes between three and eight days to hatch, and development to the adult stage takes between seven and 20 days. They are generally found in pools without other fairy shrimp, but have been found with versatile fairy shrimp (*Branchinecta lindahli*) and Riverside fairy shrimp (*Streptocephalus woottoni*).

San Diego fairy shrimp have been identified in vernal pools along the eastern border near Santee Lakes, and at one location in the western half of MTRP (State of California 2011; USFWS 2011).

A-C.2.19 Quino checkerspot butterfly (*Euphydryas editha quino*)

The Quino checkerspot butterfly is federally listed as endangered. The Quino checkerspot butterfly's historic range includes the coastal plain and inland valleys of southern California from the Santa Monica Mountains south to northern Baja California. Currently, the species is known from southern San Diego County and southwestern Riverside County. Quino checkerspot butterflies occur at several locations on Otay Mesa and Jacumba in San Diego and near Murrieta and Temecula and eastward to Hemet and Anza in Riverside (USFWS 2009b). The distribution of Quino checkerspot butterflies is primarily defined by the distribution of its principal host plant, dot-seed plantain (*Plantago erecta*). Female Quino checkerspot butterflies have also been observed depositing eggs on woolly plantain (*Plantago patagonia*), white snapdragon (*Antirrhinum coulterianum*), and thread-leaved bird's beak (*Cordylanthus rigidus*) (USFWS 2009b). It is possible that members of the figwort family (Scrophulariaceae), including purple owl's clover (*Castilleja exserta*), are also used (Brown 1991; Mattoni et al. 1997). Quino checkerspot butterfly will use a variety of sparsely vegetated habitats, including open coastal sage scrub and chaparral, vernal pool complexes, oak woodland, and desert pinyon-juniper woodland. Densely vegetated areas and extensive open grasslands are not known to support Quino checkerspot butterfly (Mattoni et al. 1997). Quino checkerspot butterfly exhibits a preference for low-growing vegetation interspersed with barren spots, as its thermodynamic needs require it to avoid shaded areas and flight below the canopy level (Osborne and Redak 2000; USFWS 2009b). Threats to this species include habitat loss, fragmentation, and habitat type conversion. In April 2002, the USFWS designated critical habitat for the quino checkerspot butterfly in portions of San Diego and Riverside counties (USFWS 2009b).

One adult Quino checkerspot butterfly was observed in MTRP in 2005 (State of California 2011), and historically, two observations were recorded in 1953 and 1960 (USFWS 2009b); however, no sustainable populations are known to occur within MTRP. In June 2012, quino surveys within available habitat at MTRP were negative (Higginson 2012)

A-C.2.20 Hermes copper butterfly (*Lycaena hermes*)

The Hermes copper is a locally sensitive species and a local endemic, and is a candidate for federal listing as threatened or endangered (USFWS 2010. This butterfly occurs in San Diego County from MTRP, south and east through southern San Diego County; the northern portion of the species' known historical range has contracted or may no longer exist, and it is estimated that approximately 27 percent of the populations within the southern portion of the species' known historical U.S. range that were extant in 2000 have been extirpated (USFWS 2006). The Hermes copper is restricted to habitats in which its larval host plant, redberry (*Rhamnus crocea*), is found. Adults are encountered most frequently nectaring on California buckwheat, between late May and late July in a single flight season (USFWS 2006). The peak flight time is generally mid-June for males and late June for females (Faulkner and Klein 2001). This butterfly diapauses as an egg on the host plant. This species is threatened by loss of habitat as a result of urbanization and fires, as well as by edge effects of nearby development and habitat fragmentation.

This species is known to occur within coastal sage scrub and southern mixed chaparral habitats in MTRP (State of California 2011; RECON 2004). One individual was observed at Cowles Mountain in 2010, but was not seen in subsequent surveys in 2011 (Deutschman et. al. 2011).

Amphibians

A-C.2.21 Western spadefoot (*Spea hammondii*)

The western spadefoot toad is a CDFW species of special concern. This species ranges from central northern California through the Coast Ranges from San Francisco and south into Baja California, Mexico, at elevations from sea level to 4,500 feet (Stebbins 2003; Zeiner et al. 1988). Habitat for the western spadefoot includes lowlands, washes, floodplains of rivers, alluvial fans, alkali flats, temporary ponds, and vernal pools. Although this species is generally found in areas of open vegetation with sandy or gravelly soil (Stebbins 2003), it has been observed in vernal pools containing clay soils. Surface activity can occur from October through April depending on rainfall, and oviposition occurs between late February and May (Jennings and Hayes 1994). The western spadefoot diet consists of crickets, butterflies, ants, flies, and earthworms (Morey and Gullin, as cited in Jennings and Hayes 1994). Decline in western spadefoot populations is primarily due to habitat loss and fragmentation and possibly pesticide use.

This species was observed at MTRP in Sycamore Canyon west of Sycamore Landfill in the East Elliott area (State of California 2011), and may inhabit vernal pools within MTRP.

Reptiles

A-C.2.23 Coastal western whiptail (Aspidoscelis tigris stejnegeri [=Cnemidophorus tigris multiscutatus])

The coastal subspecies of the western whiptail has no official state or federal status, but was formerly a federal candidate for listing and is considered sensitive by CDFW. The coastal western whiptail ranges from Santa Barbara County south into western Baja California, Mexico, predominantly on the coastal slope. Habitat consists of coastal sage scrub and chaparral communities, woodlands, and streamsides where plants are sparsely distributed (Stebbins 2003). Its diet consists of insects, spiders, scorpions, and other lizards. The decline of populations of coastal western whiptail is also attributed to habitat loss and fragmentation.

This species was observed at various locations throughout MTRP (State of California 2011; RECON 2010).

A-C.2.24 Northern red diamond rattlesnake (*Crotalus ruber*)

The northern red diamond rattlesnake is a CDFW species of special concern. This species occurs below 1,200 meters (4,000 feet) on both sides of the Peninsular Ranges of southwestern California in coastal sage scrub, desert scrub, open chaparral, woodland, and grassland habitats, as well as agricultural fields (Stebbins 2003). This snake is commonly found in areas with rock outcrops. Population declines in the northern red diamond rattlesnake are generally attributable to impacts related to the increased development near habitat in which this snake is found.

The northern red diamond rattlesnake has been observed at various locations in MTRP (State of California 2011).

A-C.2.25 Coronado skink (Eumeces skiltonianus interparietalis)

The Coronado skink is a CDFW species of special concern. The Coronado skink ranges from central Riverside County south to Baja California, Mexico (Jennings and Hayes 1994). In San Diego County, the Coronado skink is found in a variety of plant communities, including grassland, open woodland, forest, and broken chaparral habitats, and is often associated with mesic areas. The Coronado skink is diurnal and most active from early spring until fall; breeding occurs in June or July (Jennings and Hayes 1994). The diet of the Coronado skink consists of moths, beetles, crickets, grasshoppers, and leafhoppers. This species is threatened by habitat loss and fragmentation resulting from urbanization and agriculture.

The Coronado skink was observed adjacent to the Sycamore Landfill in the East Elliott area (State of California 2011), and is expected to occur throughout MTRP.

A-C.2.26 Coast patch-nosed snake (*Salvadora hexalepis virgultea*)

The coast patch-nosed snake is a CDFW species of special concern. This species occurs in coastal California from San Luis Obispo County south into northwestern Baja California, Mexico, from sea level to 7,000 feet (Jennings and Hayes 1994). The coast patch-nosed snake inhabits sandy and rocky areas on the lower slopes of mountains within grassland, chaparral, sage scrub, and desert scrub habitats. This snake is diurnal and active from March to October (Jennings and Hayes 1994), although juveniles can be active on warm winter days (Sweet, as cited in Jennings and Hayes 1994). The major prey of the coast patch-nosed snake is whiptail lizards (*Aspidoscelis* spp.). Habitat loss and fragmentation from urbanization and conversion to agriculture are the main threats to this species.

One coast patch-nosed snake is recorded at the south end of MTRP (State of California 2011); this species is likely to occur at various locations throughout MTRP.

A-C.2.27 Two-striped garter snake (*Thamnophis hammondi*)

The two-striped garter snake is a CDFW species of special concern. The two-striped garter snake ranges from San Luis Obispo County south to El Rosario in Baja California, Mexico, from sea level to 8,000 feet (Jennings and Hayes 1994). They are normally found in or near permanent fresh water, inhabiting streams, ponds, and lakes throughout their range (Stebbins 2003) and can even be found in temporary bodies of water such as vernal pools. The two-striped garter snake inhabits riparian areas during summer months and occupies adjacent coastal sage scrub and grasslands during the winter (Jennings and Hayes 1994). The two-striped garter snake begins breeding in April and continues throughout the summer months. Adults feed on tadpoles, toads, insect larvae, fish, fish eggs, and earthworms. Population declines in the two-striped garter snake are generally attributable to impacts related to the loss of natural wetlands and increased development near and in suitable habitat.

This species has potential to occur along the San Diego River.

Birds

A-C.2.28 Grasshopper sparrow (*Ammodramus savannarum*)

The grasshopper sparrow is a CDFW species of special concern. This species has a patchy distribution within grasslands along coastal California and the foothills of the Sierra Nevadas. Grasshopper sparrows are semi-colonial and are locally rare throughout

southern California, with the numbers of grasshopper sparrows varying annually. Grasshopper sparrows are a localized summer resident in San Diego County and very rare in winter (Unitt 2004).

This species was observed during 2010 biological surveys (RECON 2010) and is expected to forage and nest in grasslands within MTRP.

A-C.2.29 Great blue heron (*Ardea herodias*)

Great blue herons and their nests are protected under the federal Migratory Bird Treaty Act. Great blue herons are distributed throughout the United States and Mexico. Peak abundance is in coastal estuaries, but this species occurs in a wide variety of aquatic habitats. Great blue herons usually nest in colonies of several hundred pairs (Butler 1992). A large, flat platform is constructed of sticks lined with finer twigs and vegetation placed in trees or shrubs 30 to 70 feet above the ground. Few great blue heron breeding colonies occur in San Diego County. In 1991, 49 active nests were documented on Point Loma. Great blue herons capture and feed on small fish, amphibians, invertebrates, reptiles, mammals, and birds. Great blue heron populations are at risk because of loss of habitat, specifically nesting habitat. Development of coastal lowlands and lagoons has decreased nesting sites and threatens the future success of the great blue heron.

The great blue heron was observed at Kumeyaay Lake and Old Mission Dam pond (RECON 2010). This species is expected to roost and/or forage within these pond habitats, but is not expected to breed in MTRP.

A-C.2.30 Great egret (*Casmerodius albus*)

Great egret rookery sites are considered sensitive by CDFW. Distributed throughout the U.S. and Mexico, the great egret is usually found near seashores, streams, ponds, salt- and freshwater marshes, mudflats, and swamps. Great egrets nest in colonies with other herons, ibises, and cormorants, or singly. Nests consist of a frail platform of sticks, twigs, and reeds, placed in a tree or shrub eight to 40 feet above the ground or in cattails one to four feet above water. The great egret forages in shallow water for small fish and amphibians, and also on land for insects, reptiles, and small mammals. They may feed solitarily or in large groups when food is concentrated. Great egret populations were decimated by plume hunters in the late 1800s and by DDT during the 1950s and 1960s. Clutch and brood sizes have increased since the 1972 ban in DDT, and the population is expanding (Stokes and Stokes 1996).

The great egret was observed at Kumeyaay Lake and Old Mission Dam pond (RECON 2010). This species is expected to roost and/or forage within these pond habitats, but is not expected to breed in MTRP.

A-C.2.31 Yellow warbler (*Dendroica petechia*)

The yellow warbler is a CDFW species of special concern. Yellow warblers breed from Alaska south to Peru, including most of the continental United States and Canada, and winter in Central and South America. In California, yellow warblers are an obligate riparian species, nesting and foraging almost exclusively in riparian habitats (Harmsworth Associates 1999). Yellow warblers are common breeders throughout San Diego County. Nesting occurs from late May through early August, and nests are typically three to five feet from the ground (Lowther et al. 1999). Yellow warblers primarily consume insects and other arthropods and occasional wild fruits. This species is declining due to the loss of riparian habitat and as a result of nest parasitism by brown-headed cowbirds. This species has been detected along the San Diego River in MTRP (RECON 2010; State of California 2011), and is expected to breed and forage within this, and other, densely vegetated riparian corridor.

A-C.2.32 White-tailed kite (*Elanus leucurus*)

The white-tailed kite is a California fully protected species that occurs in coastal lowland areas from Oregon to northern Baja California, Mexico (National Geographic Society 2002). This resident bird nests in riparian woodlands, live oaks, or sycamore groves which border grassland or open fields (Unitt 2004). The white-tailed kite forages over open areas and grasslands feeding primarily on small rodents, in particular the California vole or meadow mouse (Unitt 2004), and insects (National Geographic Society 2002). This species is known to roost in large communal groups (Unitt 2004). White-tailed kite populations in southern California have declined due to the loss of grassland foraging habitat to urbanization.

This species is likely to forage and nest along the San Diego River; a nest was observed just east of MTRP during 2010 biological surveys (RECON 2010).

A-C.2.33 California horned lark (*Eremophila alpestris actia*)

The coastal subspecies of the horned lark is a CDFW species of special concern. The horned lark (*E. alpestris*) ranges throughout North America; however, the coastal subspecies occupies the coastal slope of San Diego County, extending east to Montezuma Valley (Ranchita), Mason Valley, and Jacumba (Unitt 2004). Other subspecies and hybrids with other subspecies have been encountered in San Diego County (Unitt 2004). Horned larks occur in the coastal strand, arid grasslands, and sandy desert floors of San Diego County year round (Unitt 2004). Decline of this species is generally attributed to urbanization and human disturbance.

This species was reported to occur approximately 2,000 feet north of the East Elliot Expansion area (State of California 2011), and is expected to forage in grasslands within MTRP.

A-C.2.34 Yellow-breasted chat (*Icteria virens*)

The yellow-breasted chat is a CDFW species of special concern. Yellow-breasted chat breeding range extends from southern California south to central Mexico, and their range includes most of the United States (Eckerle and Thompson 2001). Yellow-breasted chats arrive in California to breed during April or May. Breeding occurs in dense brush or scrub, usually along streams or marshy areas with dense riparian woodlands. Their diet consists mainly of insects and berries (Eckerle and Thompson 2001). Destruction of riparian woodlands by development and other human activities has caused population declines, and it is possible that brown-headed cowbird parasitism may also have contributed to the decline of the species. This species has been detected along the San Diego River in MTRP (RECON 2010 and State of California 2011), and is expected to breed and forage within this, and other, densely vegetated riparian corridor.

A-C.2.35 Black-crowned night heron (*Nycticorax nycticorax*)

Black-crowned night herons and their nests are protected under the Migratory Bird Treaty Act. Black-crowned night herons have an extremely large range, occurring on all continents except Australia and Antarctica. Black-crowned night herons are historically common in fresh, brackish, and saltwater habitats throughout San Diego County and are known to nest at Naval Base Point Loma. Breeding typically occurs between January and June. Their diet includes a variety of food sources, from leeches and earthworms to insects, fish, crustaceans, amphibians, and reptiles (Davis 1993). Threats to the black-crowned heron include loss of foraging and nesting habitat.

The black-crowned night heron was observed at Kumeyaay Lake and Old Mission Dam pond (RECON 2010). This species is expected to roost and/or forage within these pond habitats, but is not expected to breed in MTRP.

A-C.2.36 Double-crested cormorant (*Phalacrocorax auritus albociliatus*)

The double-crested cormorant is a CDFW species of special concern. The double-crested cormorant breeds in isolated colonies along the coast and interior from Alaska to northern Belize (Hatch and Weseloh 1999). This species is a common non-breeding visitor on bays, lagoons, and estuaries in San Diego County (Unitt 2004). Its diet consists primarily of schooling fish species, but expands to aquatic insects, crustaceans, and amphibians (Hatch and Weseloh 1999). The double-crested cormorant suffered a population decline in the 1960s and early 1970s due to dichlorodiphenyltrichloroethane (DDT) residues in marine food chains. Since the suspension of DDT use, population recovery has been hampered by the disappearance of the California sardine and a reduction in anchovy populations (Small 1994).

The double-crested cormorant was observed foraging at Kumeyaay Lake (RECON 2010). This species is expected to roost and/or forage in these pond habitats, but is not expected to breed in MTRP.

Mammals

A-C.2.37 Dulzura California pocket mouse (*Chaetodipus* [=*Perognathus*] *californicus femoralis*)

The Dulzura California pocket mouse is a CDFW species of special concern. This species ranges throughout most of San Diego County into northern Baja California, Mexico. It is generally found on chaparral-covered slopes. Its diet consists of seeds, insects, and sometimes green leaves (Zeiner et al. 1990). This species is threatened by habitat loss due to urbanization and agricultural land uses.

This species has been recorded within MTRP (State of California 2011), and is expected to inhabit the chaparral and scrub communities of MTRP.

A-C.2.38 Northwestern San Diego pocket mouse (*Chaetodipus fallax fallax*)

The northwestern San Diego pocket mouse is a California species of special concern. It ranges from Los Angeles County and extreme southern San Bernardino County southward into west-central Baja California, Mexico (Hall 1981). In San Diego County, the northwestern San Diego pocket mouse is known from Del Mar, Dulzura, Jacumba, Lake Hodges, Pala, San Diego, and San Marcos (RECON 2010, Bond 1977). Habitat for this species is most often sparse or disturbed coastal sage scrub or grasslands with sandy soils. Breeding occurs from March to May. The northwestern San Diego pocket mouse diet consists of seeds from forbs, shrubs, and grasses (Brylski 1983). Threats to this species include degradation of habitat and loss of habitat from development.

This species has been recorded within MTRP (State of California 2011) and is expected to inhabit the disturbed coastal sage scrub or grasslands with sandier soils.

A-C.2.39 Western mastiff bat (*Eumops perotis californicus*)

The greater western mastiff bat is a CDFW species of special concern. This species ranges from central California southward into central Mexico. In California it has been recorded from Butte County southward in the western lowlands, throughout the southern California coastal basins, and in the western portions of the southeastern desert region (Williams 1986). The western mastiff bat is nonmigratory and rare in San Diego County. It is found in rugged, rocky areas where suitable crevices are available for day roosts. It also frequently roosts in buildings (Williams 1986). The western mastiff bat feeds on flying insects such as wasps and bees. Populations of this bat are threatened by

disturbance of roosting sites, especially in those established buildings, and loss of foraging habitat.

This species was reported within MTRP (State of Calfiornia 2011), and was likely foraging in the vicinity. This species was not detected during surveys for cliff-roosting species in 2010 (RECON 2010).

A-C.2.40 Western red bat (*Lasiurus blossevillii*)

The western red bat is a CDFW species of special concern. In California this species ranges from Shasta County to the Mexican border, west of the Sierra Nevada/Cascade crest and deserts. Roosting habitat includes forests and woodlands from sea level up through mixed conifer forests. It roosts primarily in trees, less often in shrubs and roost sites, often in edge habitats adjacent to streams, fields, or urban areas (Zeiner et al. 1990). Preferred roost sites are protected from above, open below, and located above dark ground-cover. The western red bat feeds on a variety of insects over a wide variety of habitats including grasslands, shrublands, open woodlands and forests, and croplands (Zeiner et al. 1990). Reproduction occurs in August and September, and family groups can be found roosting together. Nursery colonies are also established with many females and their young present.

The western red bat was detected incidentally during surveys for cliff-roosting bats. This species was most likely not a roosting inhabitant of the cliffs, but rather foraging nearby, based on the behavioral observations in the field (RECON 2010).

A-C.2.41 Pocketed free-tailed bat (*Nyctinomops femorosacca*)

The pocketed free-tailed bat is a CDFW species of special concern. This bat is distributed in the arid lowlands of Mexico and southwestern United States in southern California, Arizona, New Mexico, and western Texas. In San Diego County it has been found in Borrego Palm Canyon and is currently known to roost in the Split Mountain area of the Anza-Borrego desert. Habitats for this species include pinyon-juniper woodlands, desert scrub, desert succulent scrub, desert riparian, Joshua tree, and palm oasis. The pocketed free-tailed bat occupies crevices in rugged canyons, rock outcrops, and high cliffs. The pocketed free-tailed bat feeds principally on moths and forages over ponds, streams and arid desert habitats (Easterla and Whitaker 1972). Reproduction occurs during the summer months. Population declines are generally attributable to loss of roost sites resulting from human intrusion and physical alteration.

Roosting colonies of pocketed free-tailed bat were detected at the Visitor Center Loop and Southwestern Boundary quarries, while much smaller numbers of this species were observed at four other survey locations (RECON 2010). The quarries and cliff faces, especially those adjacent to perennial water, provide suitable roosting habitat for this species.

A-C.2.42 Big free-tailed bat (Nyctinomops macrotis [= Tadarida macrotis, T. molossa])

The big free-tailed bat is a CDFW species of special concern. Big free-tailed bats range from South America to the Caribbean islands to the western United States. Little is known about its distribution in California. The species is colonial and considered migratory in the western United States (Zeiner et al. 1990). Species records for San Diego County come from urban areas, although the big free-tailed bat may breed in the wooded, mountainous areas of eastern San Diego County. Big free-tailed bats occupy rocky areas and cliff crevices and can be found up to 8,000 feet in elevation. Moths are its primary food item (Zeiner et al. 1990). Population declines are generally attributable to loss of roost sites resulting from human intrusion and physical alteration.

The big free-tailed bat was detected incidentally during surveys for cliff-roosting bats. This species was most likely not a roosting inhabitant of the cliffs, but rather foraging nearby, based on the behavioral observations in the field (RECON 2010). This species is not expected to breed in MTRP.

A-C.2.43 San Diego black-tailed jackrabbit (*Lepus californicus bennettii*)

The San Diego black-tailed jackrabbit is a CDFW species of special concern. This species can be found throughout southern California, with the exception of the high-altitude mountains. The San Diego black-tailed jackrabbit is strictly herbivorous, preferring habitat with ample forage such as grasses and forbs. The San Diego black-tailed jackrabbit breeds throughout the year, with the greatest number of births occurring from April through May. This species is generally solitary, except when mating and raising young (Zeiner et al. 1990).

San Diego black-tailed jackrabbit have been observed in and adjacent to MTRP at various locations (State of California 2011 and RECON 2010), and is expected to inhabit shrub and grassland communities throughout MTRP.

A-C.3 References

Atwood, J.
1980 The United States Distribution of the California Black-tailed Gnatcatcher. *Western Birds* 11:65-78.

Baldwin, B.G., S. Boyd, B.J. Ertter, R.W. Patterson, T.J. Rosatti, D.H. Wilken, eds.
2002 *The Jepson desert manual: vascular plants of southeastern California.* University of California, Berkeley and Los Angeles.

Beauchamp, R.M.
1986 A Flora of San Diego County, California. Sweetwater River Press. National City, California.

Bleich, V. C., and S. A. Holl
1982 Management of Chaparral Habitat for Mule Deer and Mountain Sheep in Southern California. In *Proceedings of the Symposium on Dynamics and Management of Mediterranean-type Ecosystems.* Technical Coordinators C. E. Conrad and W. C. Oechel, pp. 247-254. June 22-26, 1981, San Diego, CA. General Technical Report PSW-58. Pacific Southwest Forest and Range Experiment Station, Forest Service, U.S. Department of Agriculture. Berkeley.

Bloom, P.H
1995 Raptor survey of Naval Weapons Station, Seal Beach, Fallbrook Annex, 1993/94. Prepared for Commanding Officer, Southwest Division, Naval Facilities Engineering Command, San Diego. May.

Bolger, D.T., T.A. Scott, and J.T. Rotenberry
1997 Breeding Bird Abundance in an Urbanizing Landscape in Coastal Southern California. *Conservation Biology* 11:406-421.

Bond, S. I.
1977. An annotated list of the mammals of San Diego County, California. In: Transactions of San Diego County Society of Natural History 18(14): 229-248.

Bostic, D.L.
1966 Food and Feeding Behavior of the Lizard, *Cnemidophorus hyperythrus beldingi*. *Southwest Naturalist* 11: 275-289.

Brown, B. T.
1993 Bell's Vireo (*Vireo bellii*). In *The Birds of North America,* no. 35, edited by A. Poole, P. Stettenheim, and F. Gill. The Birds of North America, Inc., Philadelphia.

Brown, J.
1991. Sensitive and declining butterfly species (Insecta: Lepidoptera) in San Diego County, California. Dudek and Associates, Encinitas, California.

Brown, L. and D. Amadon.
1989 Eagles, Hawks, and Falcons of the World, Volume 2. Wellfleet Press, Secaucus, New Jersey.

Brylski, P.
1983 California Habitat Relationships System, California Department of Fish and Game, California Interagency Wildlife Task Group. Available from [www.dfg.ca.gov/whdab/html/M094.html] (copyright 2003).

Butler, R. W.
1992 Great Blue Heron (*Ardea herodias*). In *The Birds of North America,* no. 25, edited by A. Poole, P. Stettenheim, and F. Gill. The Birds of North America, Inc., Philadelphia.

California Native Plant Society (CNPS)
1994 *Inventory of Rare and Endangered Vascular Plants of California*. 5th edition. Edited by M. Skinner and B. Pavlik.

2001 *Inventory of Rare and Endangered Plants of California.* 6th ed. Edited by D. P. Tibor. Rare Plant Scientific Advisory Committee.

California, State of
2002 (from section c.1.2-Bloomeria clev)

2011 State and Federally Listed Endangered, Threatened, and Rare Plants of California. Natural Diversity Database. Department of Fish and Wildlife. January.

Clark, K.B.
2010 Avian Surveys of Cliffs in Mission Trails Regional Park. Report Prepared for Parks and Recreation, Open Space Division, City of San Diego.

Collins, Paul W.
1999 Rufous-crowned Sparrow, in *The Birds of North America* no.472.

Craighead, J.J. and F.C. Craighead, Jr.
1969 Hawks, Owls, and Wildlife. Dover Publications, Inc., New York.

Crooks, Kevin R.
2002 Relative Sensitivities of Mammalian Carnivores to Habitat Fragmentation. *Conservation Biology* 16 (2) 488-502.

Davis, W. E.
1993 Black-crowned Night Heron (*Nycticorax nycticorax*). In *The Birds of North America,* no. 74, edited by A. Poole, P. Stettenheim, and F. Gill. The Birds of North America, Inc., Philadelphia.

Deutschman, D.H., Berres, M.E., Marschalek D.A., and S.L. Strahm
2011 Two-year evaluation of hermes copper (*Lycaena hermes*) on conserved lands in San Diego County. Prepared for San Diego Association of Governments. October 31, 2011.

Easterla, D. A, and J. O. Whitaker
1972 Food habits of some bats from Big Bend National Park, Texas. Journal of Mammalogy, 53:887-890.

Eckerle, K. P., and C. F. Thompson
2001 Yellow-breasted Chat (*Icteria virens*). In *The Birds of North America,* no. 575, edited by A. Poole and F. Gill. The Birds of North America, Inc., Philadelphia.

Faulkner, D., and M. Klein.
2001 San Diego's sensitive butterflies: A workshop focusing on 10 local species.

Finch, D.M. and S. H. Stoleson.
2000 Status, Ecology, and Conservation of the Southwestern Willow Flycatcher. General Technical Report RMRS-GTR-60. Ogden, Utah: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 131 pp.

Fisher, R.N., Suarez, A.V., and Case, T.J.
2002 Spatial Patterns in the Abundance of the Coastal Horned Lizard. *Conservation Biology* 16 (1): 205-215.

Franzreb, K.E.
1989 Ecology and Conservation of the Endangered Least Bell's Vireo. U.S. Fish and Wildlife Service, Biological Report 89(1). 17 pp.

Hall, E. Raymond
1981 *The Mammals of North America.* 2nd ed. 2 vols. John Wiley & Sons, New York.

Harmsworth Associates
1999 Wetland/Riparian and Grassland Species Reports, Orange County Central/Coastal NCCP Subregion. Report to the County of Orange, the Transportation Corridor Agencies, the Metropolitan Water District of Southern California, the Irvine Ranch Water District, the Santiago County Water District, Edison International, and the Irvine Company.

Hatch, J. J., and D. V. Weseloh
1999 Double-crested Cormorant (*Phalacrocorax auritus*). In *The Birds of North America,* no. 441, edited by A. Poole and F. Gill. The Birds of North America, Inc., Philadelphia.

Hickman, J. C., ed.
1993 *The Jepson Manual: Higher Plants of California.* University of California Press, Berkeley and Los Angeles.

Higginson, J.
2012 Quino Survey Report Mission Trails Regional Park. Prepared for City of San Diego. June.

Jennings, M. R., and M. P. Hayes.
1994 Amphibian and Reptile Species of Special Concern in California. Final report submitted to the California Department of Fish and Game, Inland Fisheries Division, Rancho Cordova, CA. Contract number 8023.

Jones, C. and R. Ramirez.
1995 "Sighting of California Gnatcatcher in Ventura County" (poster presented at the Symposium on the Biology of the California Gnatcatcher, Riverside, California. September 15-16, 1995).

Lemm, J.M.
2006 Field guide to amphibians and reptiles of the San Diego Region. University of California Press.

Lovio, J.C.
1996 Effects of Habitat Fragmentation on the Breeding-bird Assemblage in California Coastal Sage Scrub. Master's Thesis, San Diego State University.

Lowther, P. E., C. Celada, N. K. Klein, C. C. Rimmer, and D. A. Spector
1999 Yellow Warbler (*Dendroica petechia*). In *The Birds of North America,* no. 454, edited by A. Poole and F. Gill. The Birds of North America, Inc., Philadelphia.

Lynn S. and B.E. Kus
2010 Distribution, abundance, and breeding activities of the least Bell's vireo along the San Diego River, California: 2010 Annual Data Summary. Prepared for San Diego River Conservancy.

Mattoni, R., G. F. Pratt, T. R. Longcore, J. F. Emmel, and J. N. George.
1997 The Endangered Quino Checkerspot Butterfly, *Euphydryas editha quino* (Lepidoptera: Nymphalidae). Journal of Research on the Lepidoptera 34: 99-118. < http://www.urbanwildlands.org/Resources/Mattonietal1997.pdf>

McGraw, D.
2006 Five-year Literature Review for the Least Bell's Vireo (*Vireo bellii pusillus*). Unpublished Document Produced Under Contract to the Carlsbad, California Office of the U.S. Fish and Wildlife Service, Department of Interior. June.

McGurty, B. M.
1980 Preliminary Review of the Status of the San Diego Horned Lizard, *Phrynosoma coronatum blainvillei*, and the Orange-throated Whiptail, *Cnemidophorus hyperythrus beldingi*. Report for the California Department of Fish and Game, Inland Fisheries Division, Rancho Cordova, California, under Contract.

Mills, M.
1991 San Diego Horned Lizard (*Phrynosoma coronatum blainvillii*). *San Diego Herpetological Society* 13: 9.

Mitelberg, A.
2010 Social structure and genetic connectivity in the San Diego southern mule deer. M.S. thesis, San Diego State University.

Munz, P.A.
1974 *A Flora of Southern California.* University of California Press, Berkeley.

National Geographic Society
2002 *Field Guide to the Birds of North America.* 4th edition.

Natural Resource Consultants (NRC)
2004 Biological Resources Assessment of the Approximately 117-acre Castle Rock Site, Located in the City of San Diego, County of San Diego, California. August.

Osborne, K. H., R.A. Redak.
2000 Microhabitat conditions associated with the distribution of post-diapause larvae of *Euphydryas editha quino* (Behr) (Lepidoptera: Nymphalidae). Annl. Entomol. Soc. Amer. 93:110-114

Pianka, E. R., and W. S. Parker
1975 Ecology of Horned Lizards: A Review with Special Reference to *Phrynosoma platyrhinos*. *Copeia* 1975(1):141-16.

RECON Environmental, Inc.
2010 Natural Resource Management Plan, Phase II: Biological Inventory and Survey of Portions of Mission Trails Regional Park, San Diego, California. September.

Reiser, C. H.
2001 *Rare Plants of San Diego County.* Aquifir Press, Imperial Beach, CA.

Roberts, F.
1995 *The Oaks of the Southern California Floristic Province*: the oaks of coastal southern California and northwestern Baja California, Mexico. F.W. Roberts Publications, Encinitas, California.

Rosenfeld, R. N., and J. Bielefeldt
1993 Cooper's Hawk (*Accipiter cooperii*). In *The Birds of North America,* no. 75, edited by A. Poole and F. Gill. The Birds of North America, Inc., Philadelphia.

San Diego, City of
1997 City of San Diego MSCP Subarea Plan. March.

2011 Draft Vernal Pool Habitat Conservation Plan. Prepared by Multiple Species Conservation Program.

2012 MSCP sensitive species survey results

2012 City of San Diego Biology Guidelines for the Environmentally Sensitive Lands Regulations (ESL), the Open Space Residential (OR-1-2) Zone, and the California Environmental Quality Act (CEQA).

San Diego State University, Department of Biology
2006 San Diego Multiple Species Conservation Program Covered Species Prioritization. Prepared for California Department of Fish and Game. January.

Scott, T.A.
1985 Human Impacts on the Golden Eagle Population of San Diego County from 1928 to 1981. Master's Thesis, San Diego State University.

Sedgwick, J. A.
2000 Willow Flycatcher (*Empidonax traillii*). In *The Birds of North America*, No. 533 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

Shivaraju, A. and T. Dewey.
2003 "Puma concolor" (On-line), Animal Diversity Web. Accessed September 29, 2004 at http://animaldiversity.ummz.umich.edu/site/accounts/information/Puma_concolor.html.

Small, A.
1994 *California Birds: Their Status and Distribution.* Ibis Publishing Co., Vista, California.

Stebbins, R. C.
2003 *A Field Guide to Western Reptiles and Amphibians.* 3rd ed. Houghton Mifflin, Boston, Massachusetts.

Stokes, D., and L. Stokes
1996 *Stokes Field Guide to Birds - Western Region*. Little, Brown & Co., New York.

Technology Associates International Corporation (TAIC)
2002 California Gnatcatcher Habitat Evaluation Model for USFWS. Digital Data. USFWS Office: Carlsbad, CA.

Unitt, P. A.
2004 *San Diego County Bird Atlas.* Proceedings of the San Diego Society of Natural History, No. 39. San Diego Natural History Museum.

U.S. Fish and Wildlife Service (USFWS)
1995 Final Rule Determining Endangered Status for the Southwestern Willow Flycatcher. *Federal Register* 60 (38): 10694. February 27.

1998a Draft Recovery Plan for the Least Bell's Vireo.

1998b Vernal Pools of Southern California: Recovery Plan. Region One: Portland, Oregon.

2009a Estimation of San Diego County California Gnatcatcher Population Size and Recovery Following the 2003 October wildfires.

2009b Quino Checkerspot Butterfly (*Euphydryas editha quino*). 5-year Review: Summary and Evaluation. August. Carlsbad, California.

2010 Federal Register. Endangered and Threatened Wildlife and Plants; 90-Day Finding on a Petition to List the Hermes Copper Butterfly as Endangered. Department of the Interior.

2011 San Diego Fairy Shrimp (*Branchinecta sandiegonensis*). Species Profile.

U.S. Geological Survey

Western Pond Turtle (*Emys marmorata*) Restoration and Enhancement in San Diego County, CA, 2013-2015. Data summary.

Western Tracking Institute (WTI)

2010 City of San Diego, Mission Trails Regional Park Open Space Mammal Monitoring and Habitat Assessment Project Comprehensive Final Report. May.

Wildlife Research Institute (WRI).

2010 Satellite Telemetry Takes Bird Banding to New Heights. Wild News, Volume 8.

2010b ”Golden Eagle” (On-line). Accessed October 24, 2011 at http://www.wildlife-research.org/goldeneagle.html

Williams, D. F.

1986 Mammalian Species of Special Concern in California. State of California, Resources Agency, California Department of Fish and Game. Wildlife Management Division Admin. Report 86-1.

Zeiner, D. C., *et al*.

1988 *Amphibians and Reptiles.* California’s Wildlife, vol. 1. California Department of Fish and Game, Sacramento.

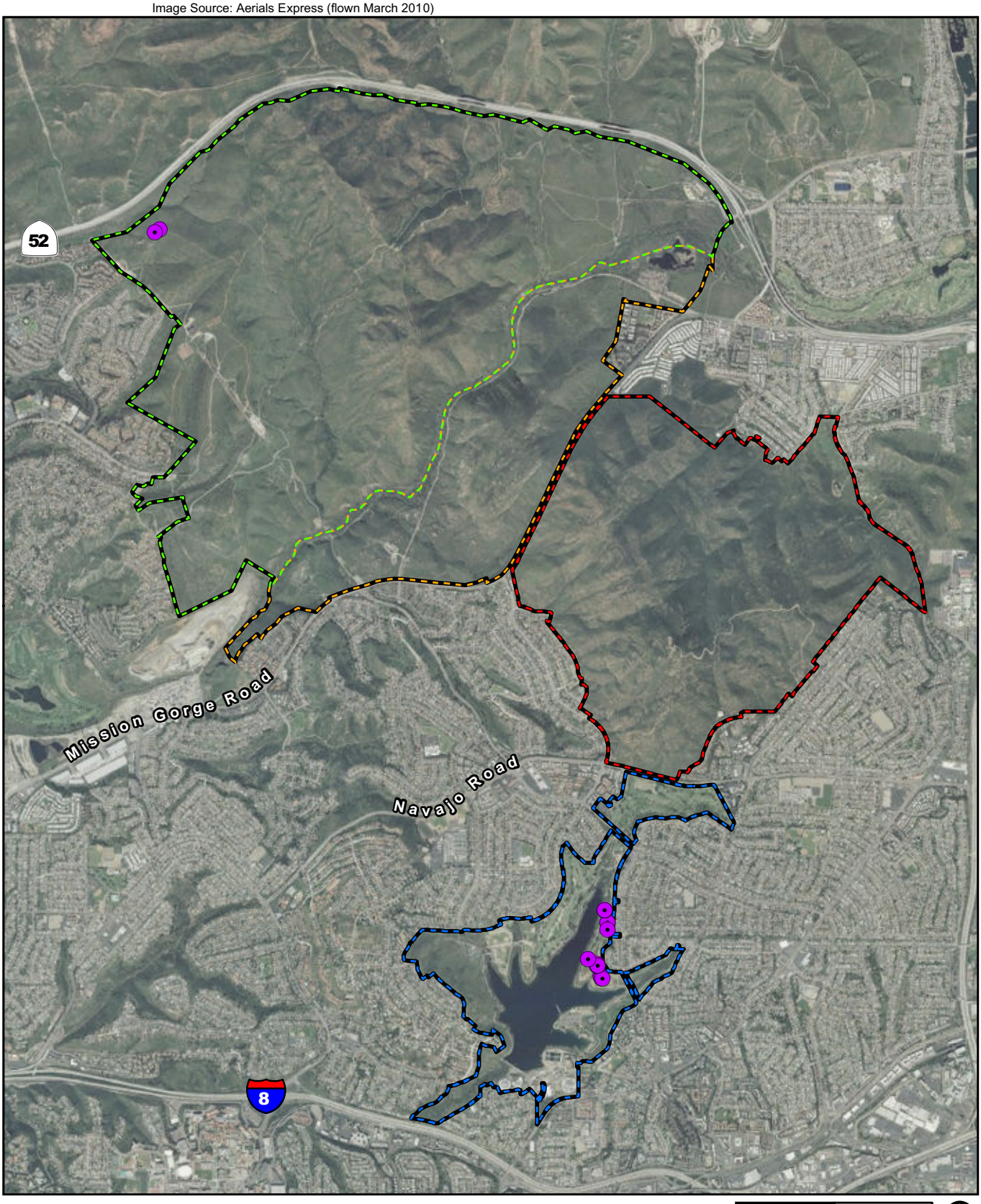
Zeiner, David C., William F. Laudenslayer, Jr., and Kenneth E. Mayer, eds.

1990 *California’s Wildlife,* vols. 1-3. California Statewide Wildlife Habitat Relationships System, California Department of Fish and Game, Sacramento.

Zembal, R., S.M. Hoffman, and J. Konecny

2010 Report to California Department of Fish and Game by the Clapper Rail Recovery Fund and Huntington Beach Wetlands Conservancy. September.

Image Source: Aerials Express (flown March 2010)



0 Miles 1

Project Boundary

San Diego Goldenstar *(Muilla clevelandii)*

Cowles Mountain Area

Fortuna Mountain Area

Lake Murray Area

Mission Gorge Area

FIGURE C-1a

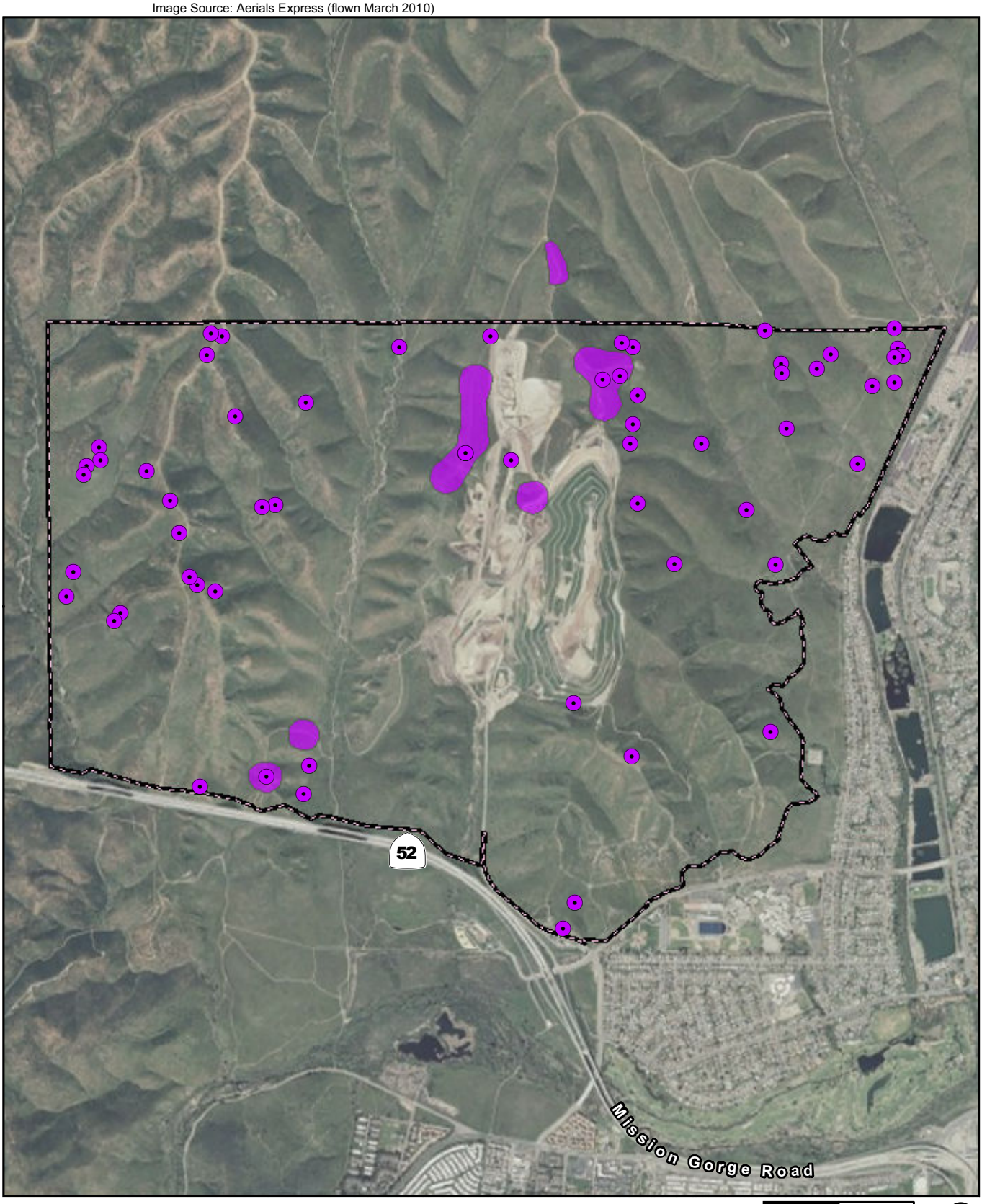
San Diego Goldenstar *(Muilla clevelandii)*

Detected Occurrences: Mission Trails Regional Park

RECON

M:\JOBS3\5286\common_gis\figC-1a.mxd 10/15/2012

Image Source: Aerials Express (flown March 2010)



0 Feet 2,500

Project Boundary

East Elliott Area

San Diego Goldenstar *(Muilla clevelandii)*

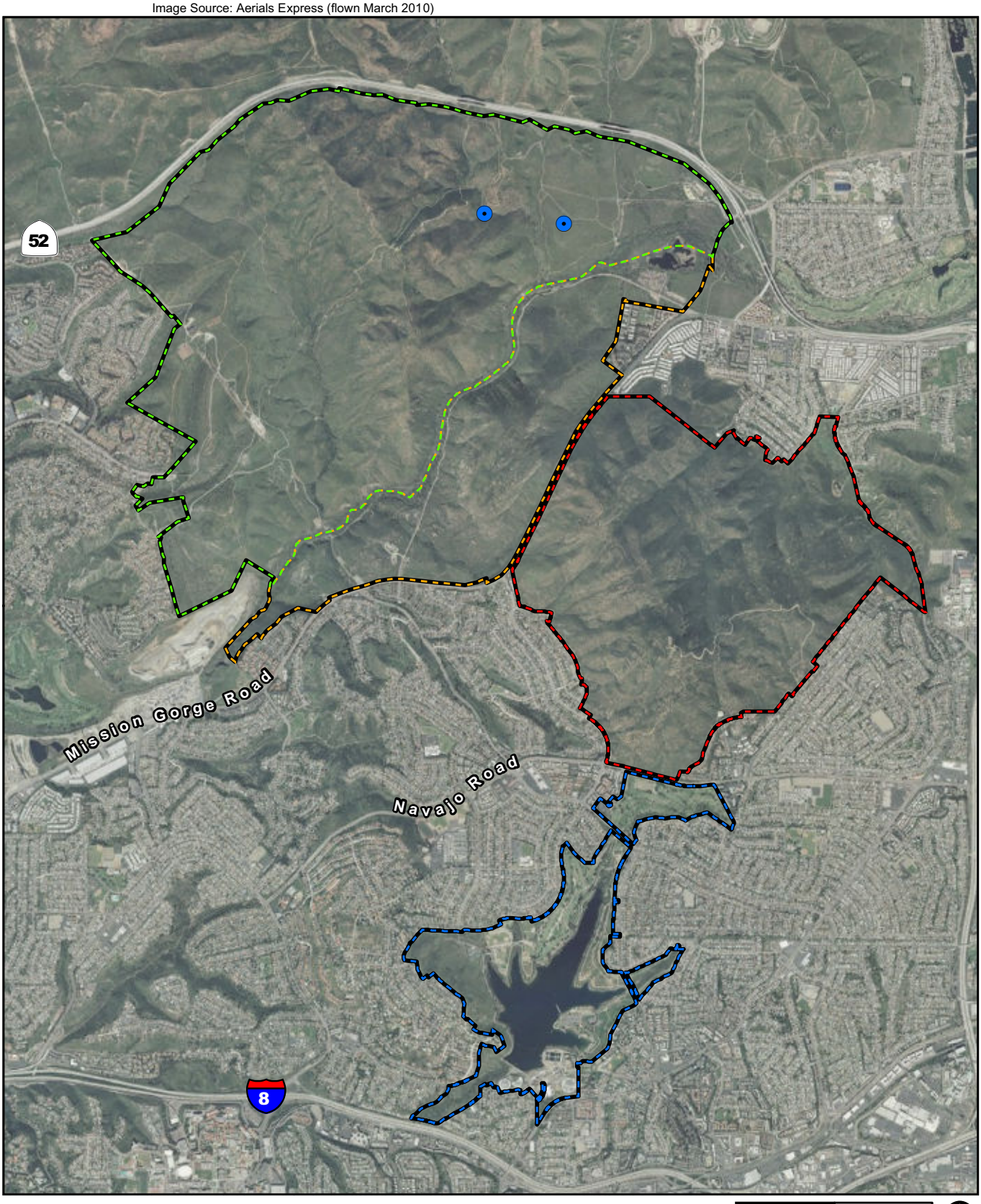
FIGURE C-1b

San Diego Goldenstar *(Muilla clevelandii)*
Detected Occurrences: East Elliott

RECON

M:\JOBS3\5286\common_gis\figC-1b.mxd 10/31/2012

Image Source: Aerials Express (flown March 2010)



0 Miles 1

Project Boundary

Orcutt's Brodiaea *(Brodiaea orcuttii)*

Cowles Mountain Area

Fortuna Mountain Area

Lake Murray Area

Mission Gorge Area

FIGURE C-2

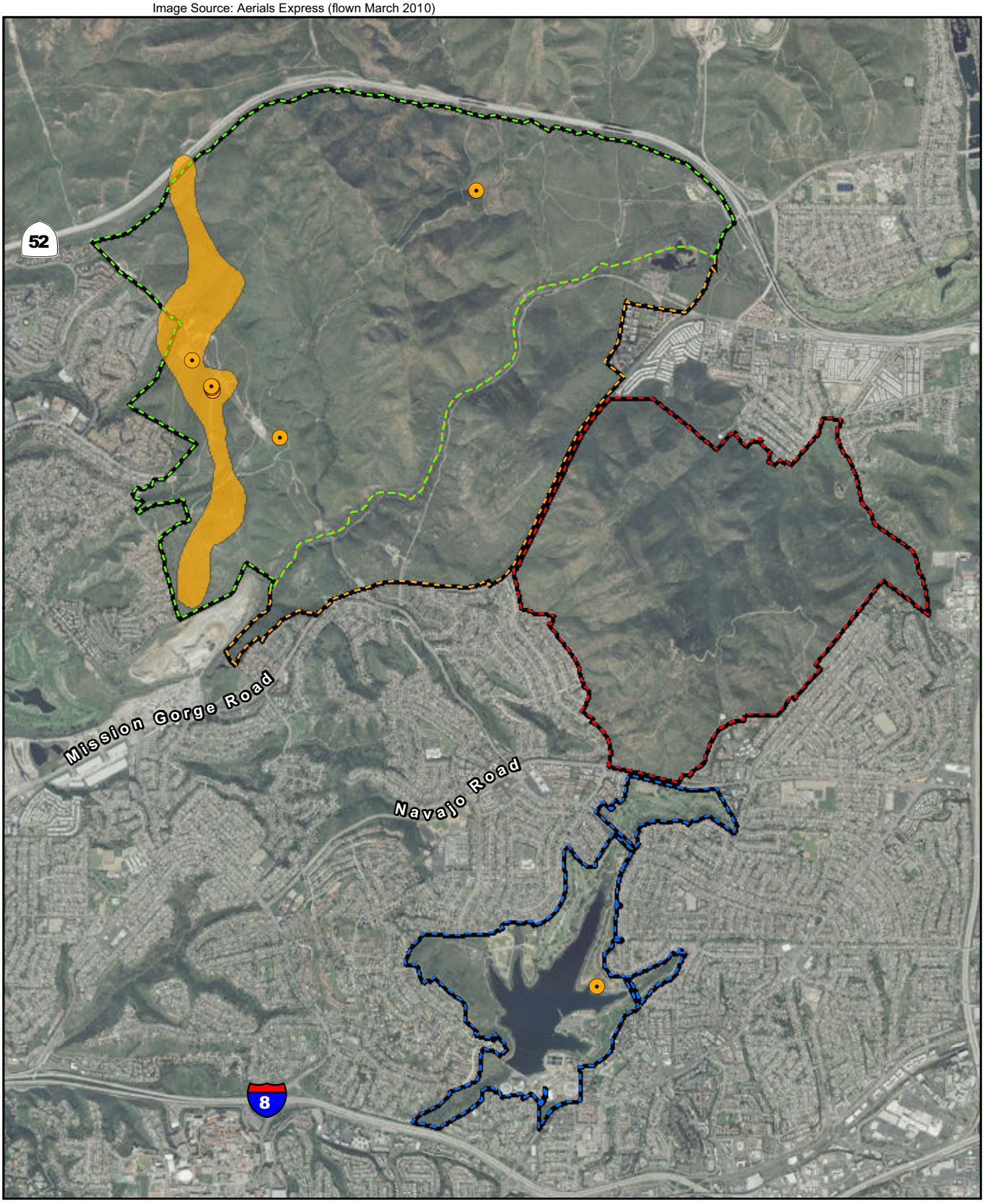
Orcutt's Brodiaea *(Brodiaea orcuttii)*

Detected Occurrences: Mission Trails Regional Park

RECON

M:\JOBS3\5286\common_gis\figC-2.mxd 10/15/2012

Image Source: Aerials Express (flown March 2010)



0 Miles 1

Project Boundary

Coast Barrel Cactus
(Ferocactus viridescens)

Cowles Mountain Area

Fortuna Mountain Area

Lake Murray Area

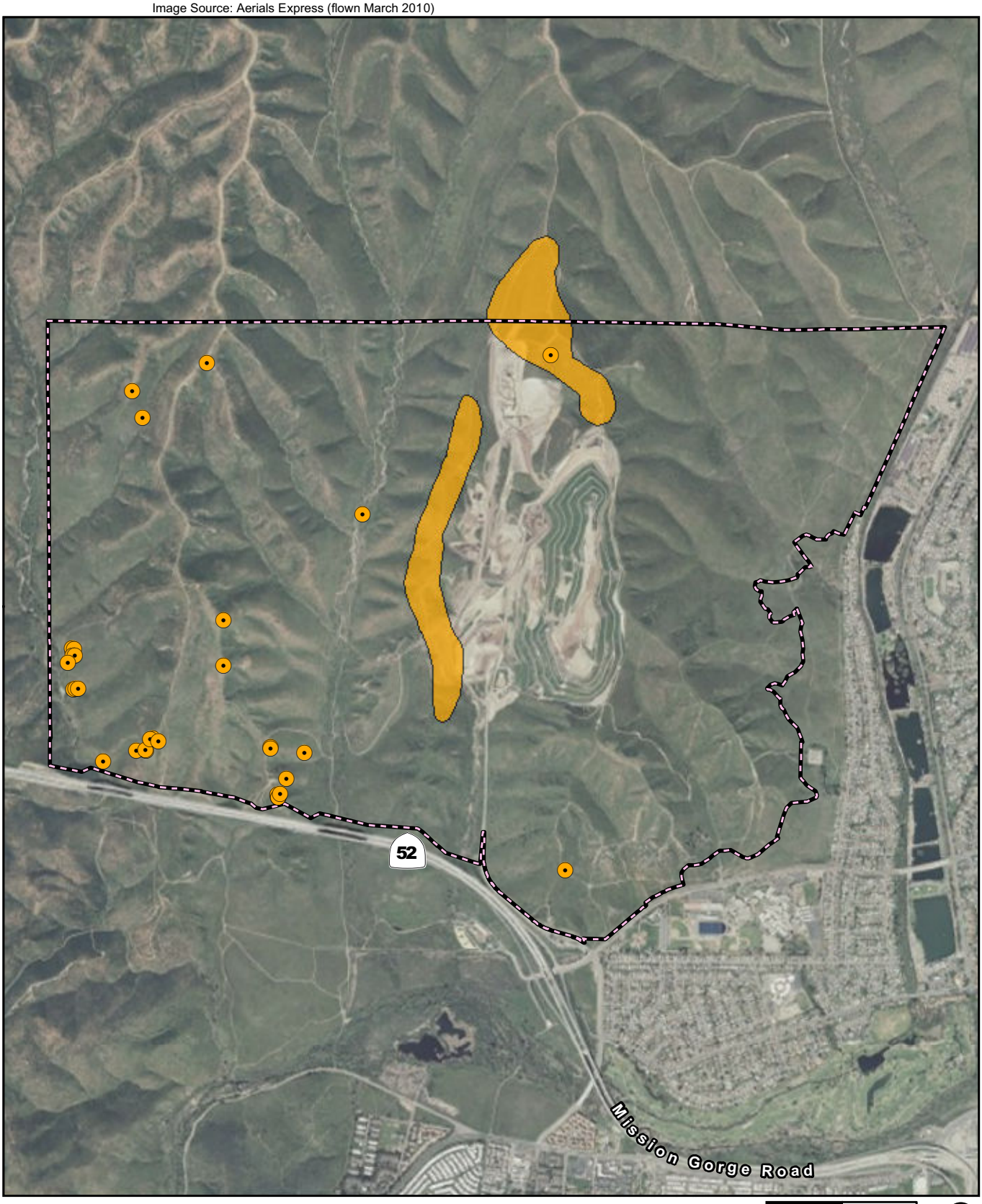
Mission Gorge Area

FIGURE C-3a
Coast Barrel Cactus *(Ferocactus viridescens)*
Detected Occurrences: Mission Trails Regional Park

RECON

M:\JOBS3\5286\common_gis\figC-3a.mxd 10/15/2012

Image Source: Aerials Express (flown March 2010)



0 Feet 2,500

Project Boundary

East Elliott Area

Coast Barrel Cactus *(Ferocactus viridescens)*

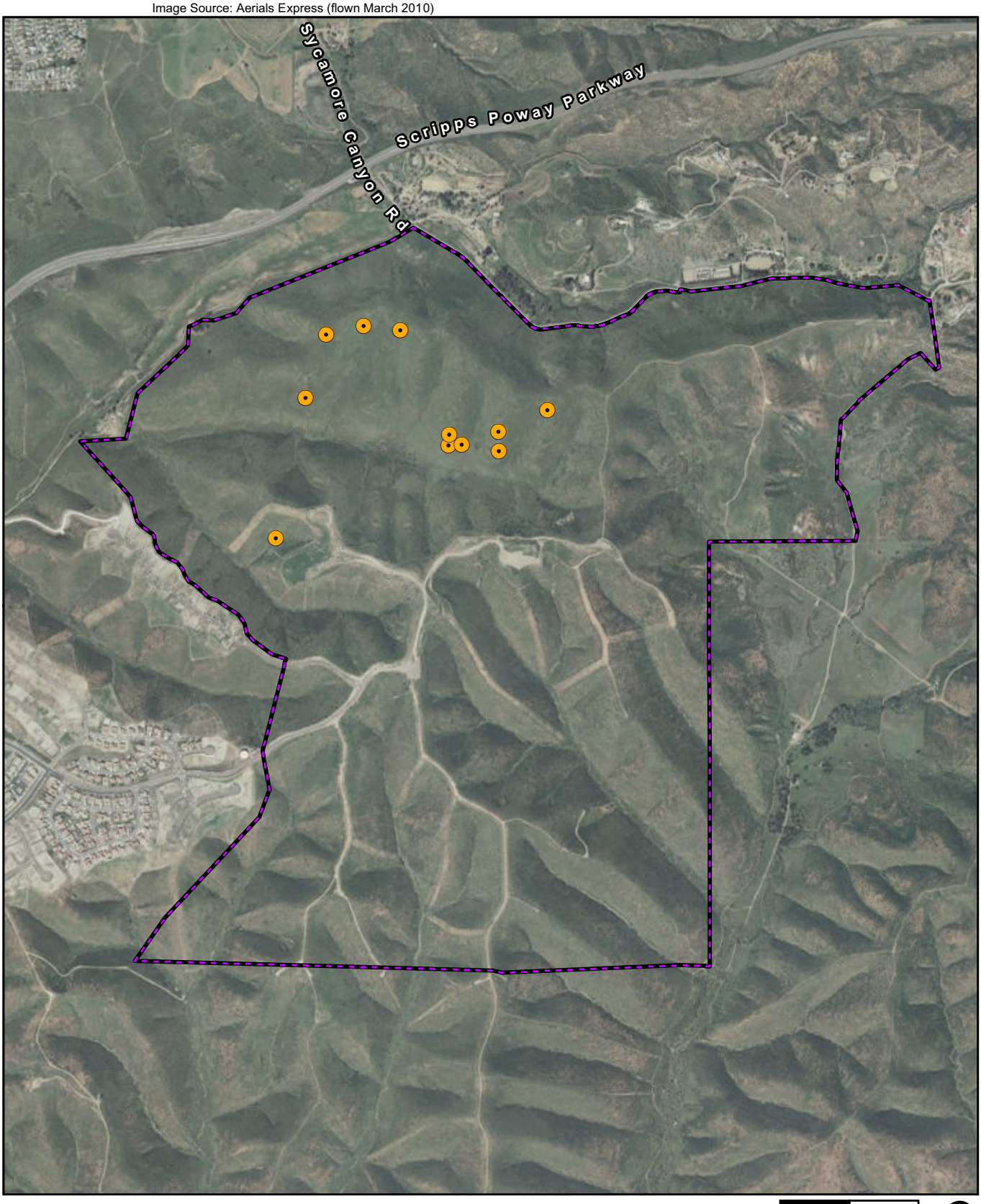
FIGURE C-3b

Coast Barrel Cactus *(Ferocactus viridescens)*
Detected Occurrences: East Elliott

RECON

M:\JOBS3\5286\common_gis\figC-3b.mxd 10/31/2012

Image Source: Aerials Express (flown March 2010)



0 Feet 1,700

Project Boundary

West Sycamore Area

Coast Barrel Cactus *(Ferocactus viridescens)*

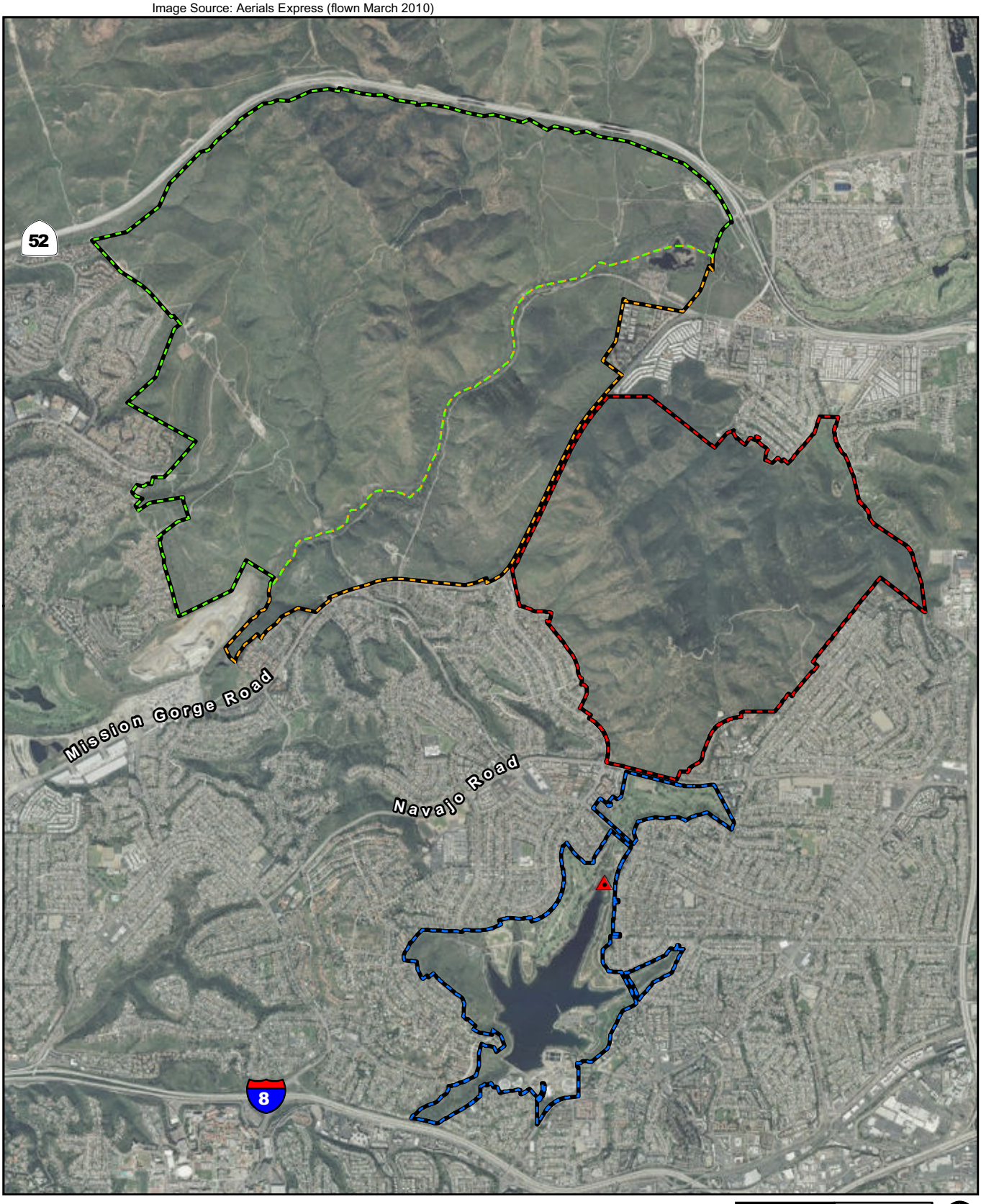
FIGURE C-3c

Coast Barrel Cactus *(Ferocactus viridescens)*
Detected Occurrences: West Sycamore

RECON

M:\JOBS3\5286\common_gis\figC-3c.mxd 10/15/2012

Image Source: Aerials Express (flown March 2010)



0 Miles 1

Project Boundary

Southwestern Pond Turtle
(Actinemys marmorata pallida)

Cowles Mountain Area

Fortuna Mountain Area

Lake Murray Area

Mission Gorge Area

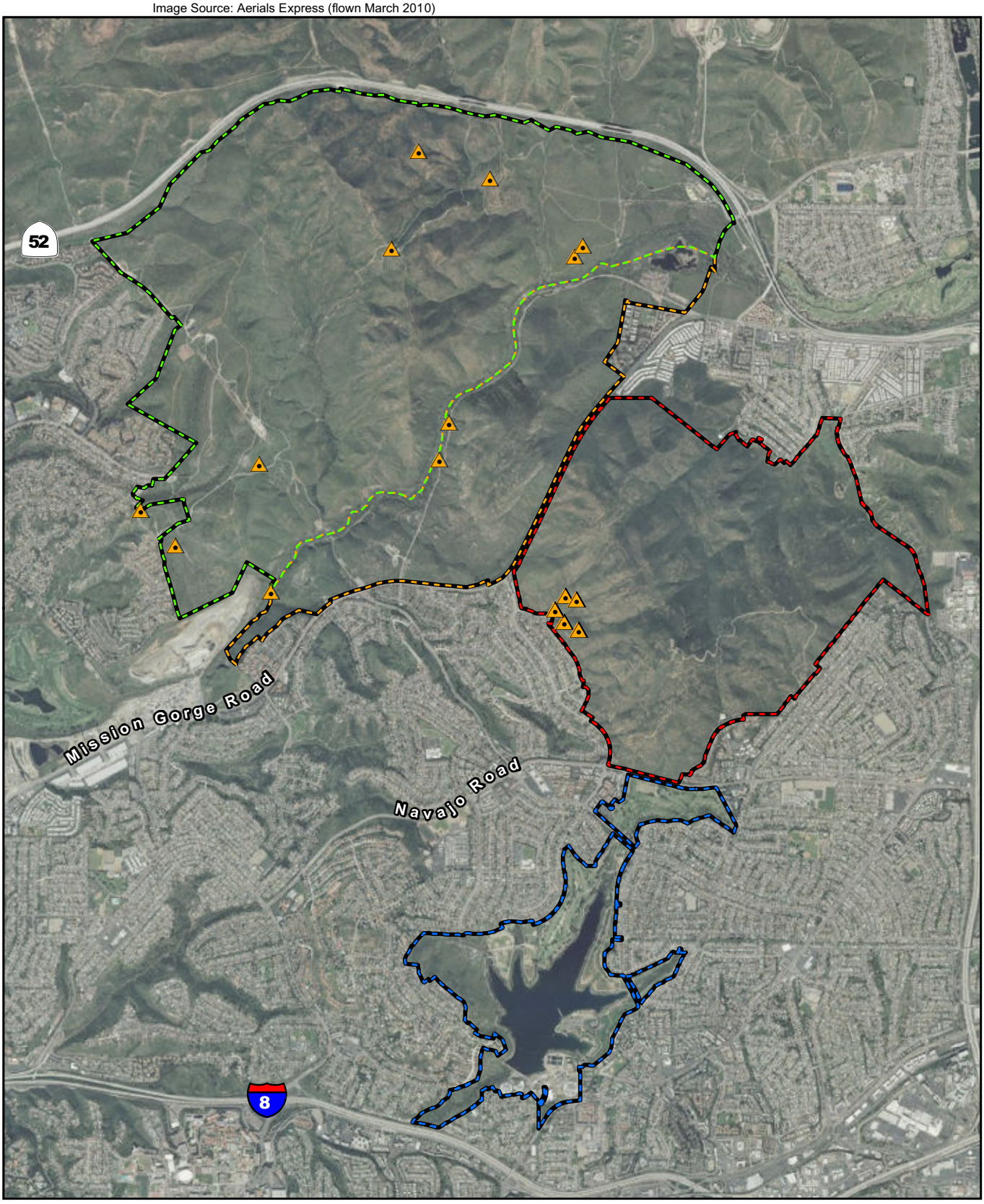
FIGURE C-4

Southwestern Pond Turtle *(Actinemys marmorata pallida)*
Detected Occurrences: Mission Trails Regional Park

RECON

M:\JOBS3\5286\common_gis\figC-4.mxd 10/15/2012

Image Source: Aerials Express (flown March 2010)



0 Miles 1

Project Boundary

Belding's Orange-throated Whiptail
(Aspidoscelis hyperythra beldingi)

Cowles Mountain Area

Fortuna Mountain Area

Lake Murray Area

Mission Gorge Area

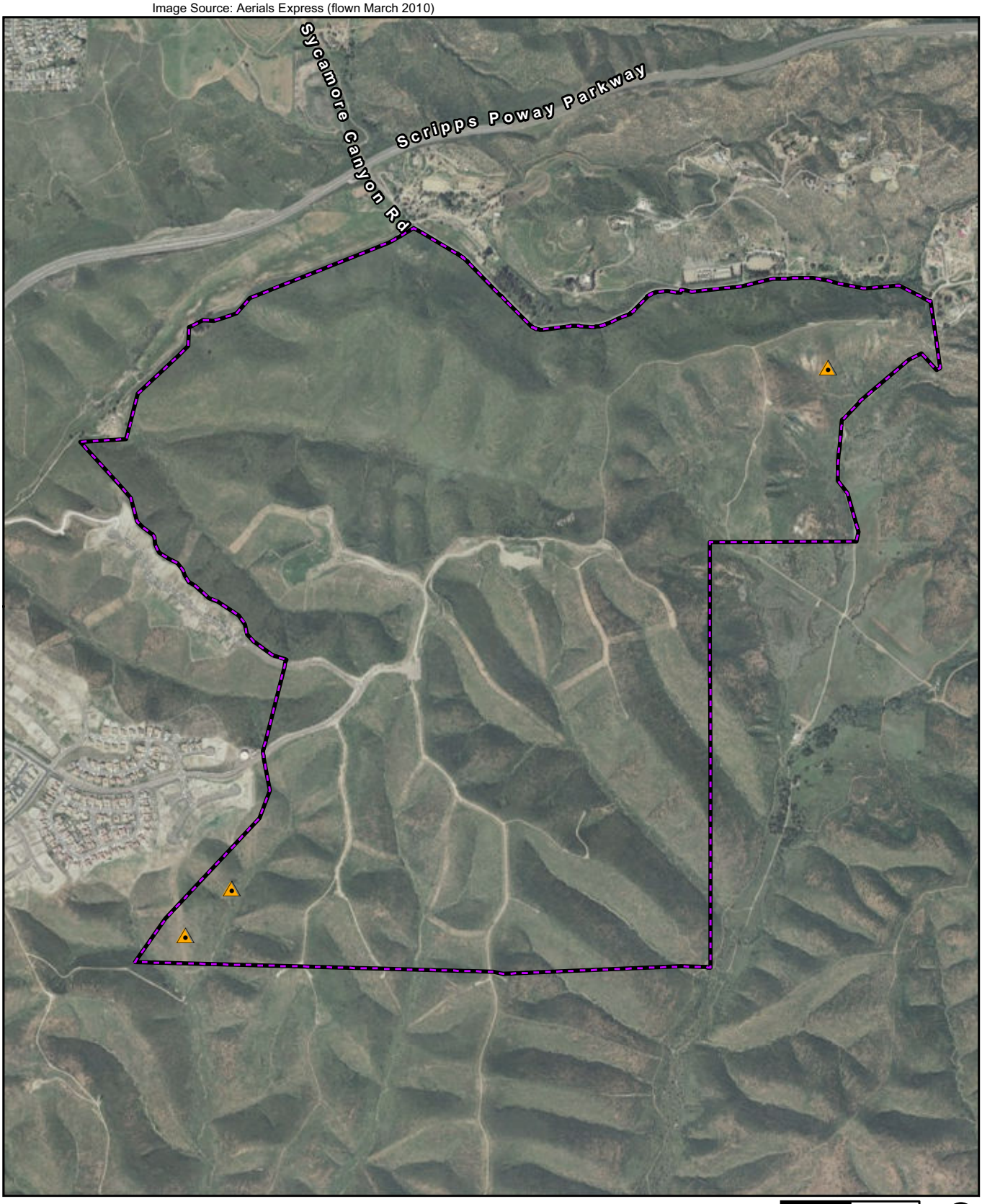
FIGURE C-5a

Belding's Orange-throated Whiptail *(Aspidoscelis hyperythra beldingi)*
Detected Occurrences: Mission Trails Regional Park

RECON

M:\JOBS3\5286\common_gis\figC-5a.mxd 10/15/2012

Image Source: Aerials Express (flown March 2010)



Project Boundary

West Sycamore Area

Belding's Orange-throated Whiptail *(Aspidoscelis hyperythra beldingi)*

0 Feet 1,700

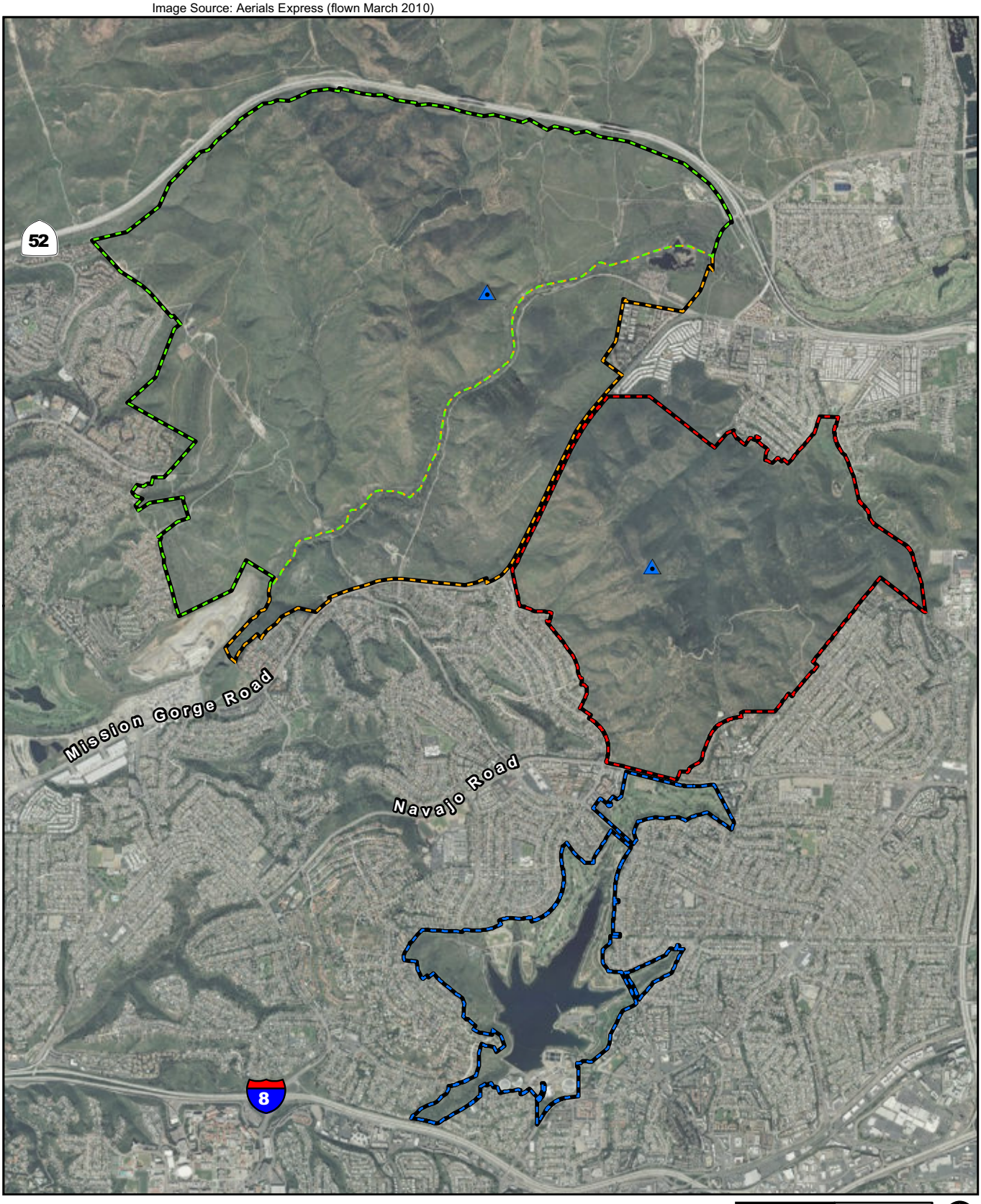
FIGURE C-5b

Belding's Orange-throated Whiptail *(Aspidoscelis hyperythra beldingi)*
Detected Occurrences: West Sycamore

RECON

M:\JOBS3\5286\common_gis\figC-5b.mxd 10/15/2012

Image Source: Aerials Express (flown March 2010)



0 Miles 1

Project Boundary

San Diego Horned Lizard
(Phrynosoma coronatum blainvillii)

Cowles Mountain Area

Fortuna Mountain Area

Lake Murray Area

Mission Gorge Area

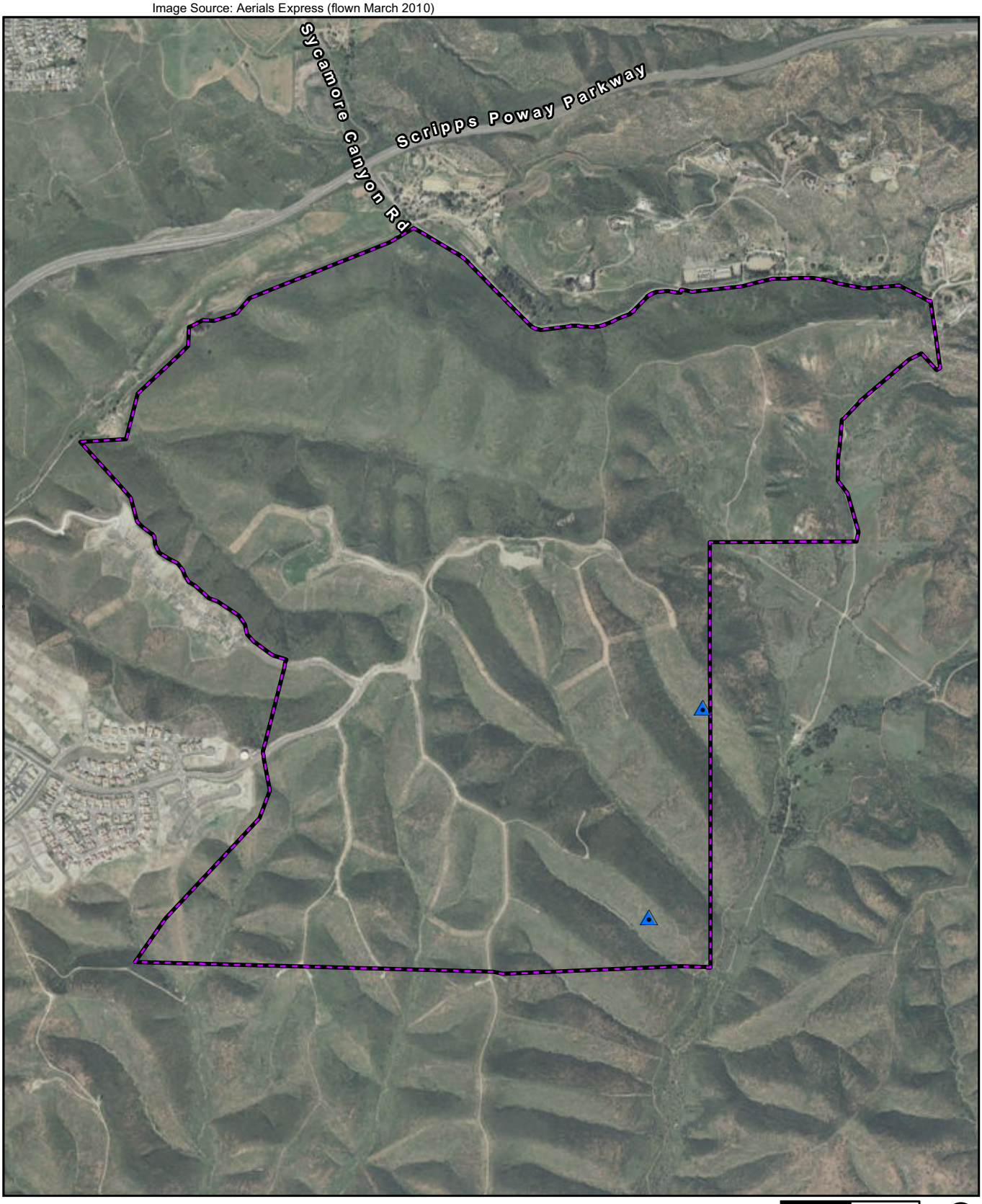
FIGURE C-6a

San Diego Horned Lizard *(Phrynosoma coronatum blainvillii)*
Detected Occurrences: Mission Trails Regional Park

RECON

M:\JOBS3\5286\common_gis\figC-6a.mxd 10/15/2012

Image Source: Aerials Express (flown March 2010)



Project Boundary

West Sycamore Area

San Diego Horned Lizard *(Phrynosoma coronatum blainvillii)*

0 Feet 1,700

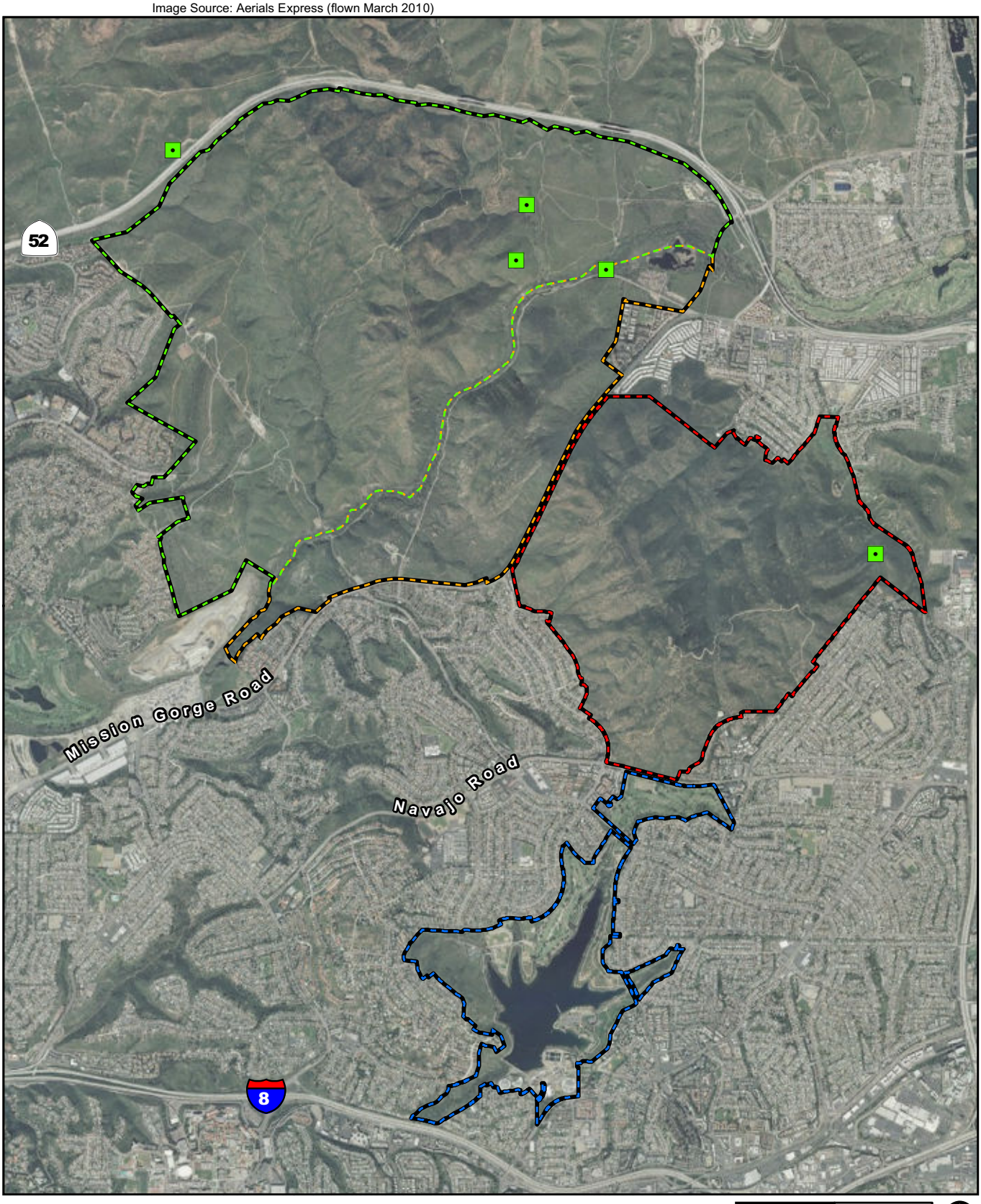
FIGURE C-6b

San Diego Horned Lizard *(Phrynosoma coronatum blainvillii)*
Detected Occurrences: West Sycamore

RECON

M:\JOBS3\5286\common_gis\figC-6b.mxd 10/15/2012

Image Source: Aerials Express (flown March 2010)



0 Miles 1

Project Boundary
Copper's Hawk *(Accipiter cooperii)*
Cowles Mountain Area
Fortuna Mountain Area
Lake Murray Area
Mission Gorge Area

FIGURE C-7a
Copper's Hawk *(Accipiter cooperii)*
Detected Occurrences: Mission Trails Regional Park

RECON

M:\JOBS3\5286\common_gis\figC-7a.mxd 10/15/2012

Image Source: Aerials Express (flown March 2010)

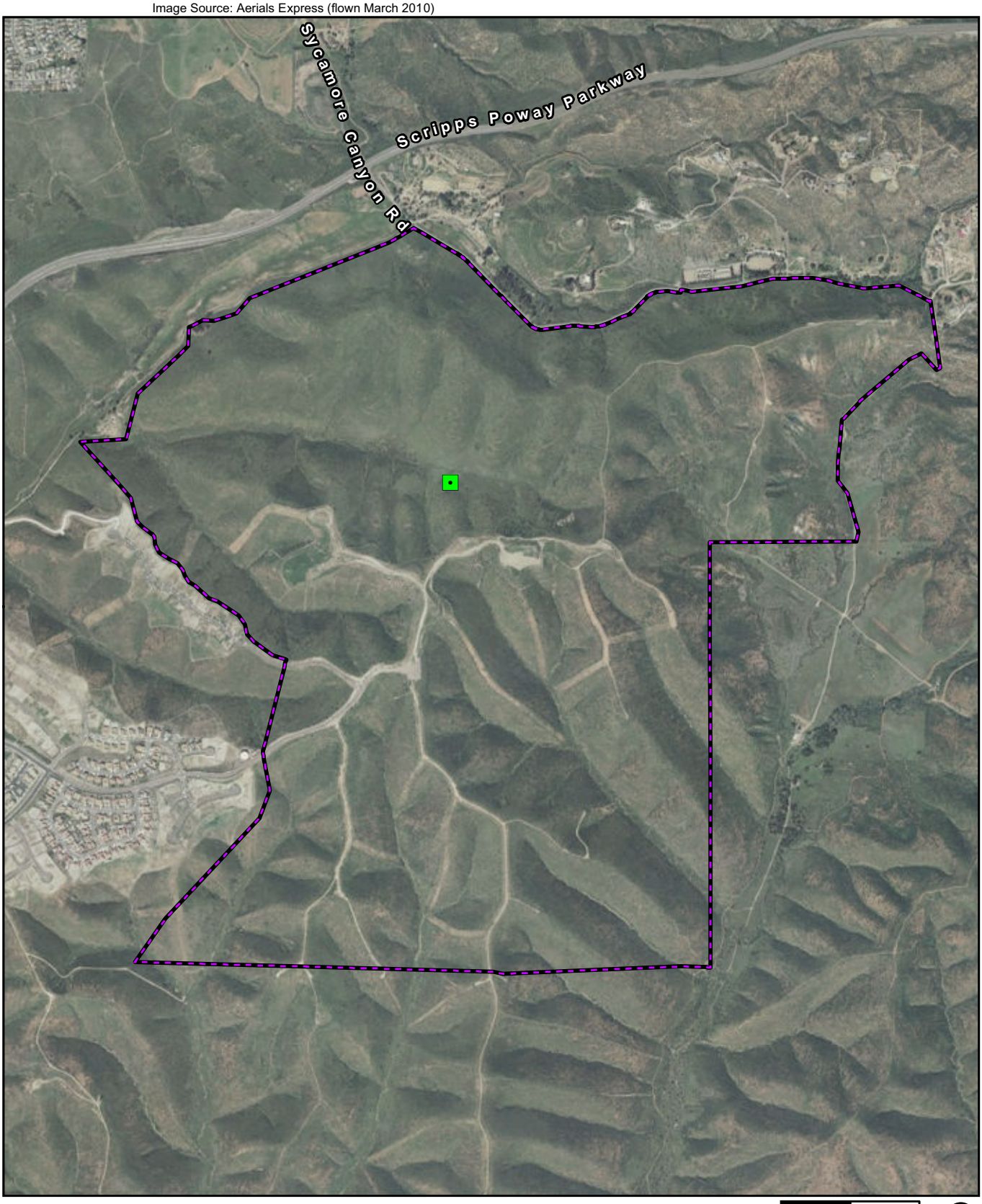


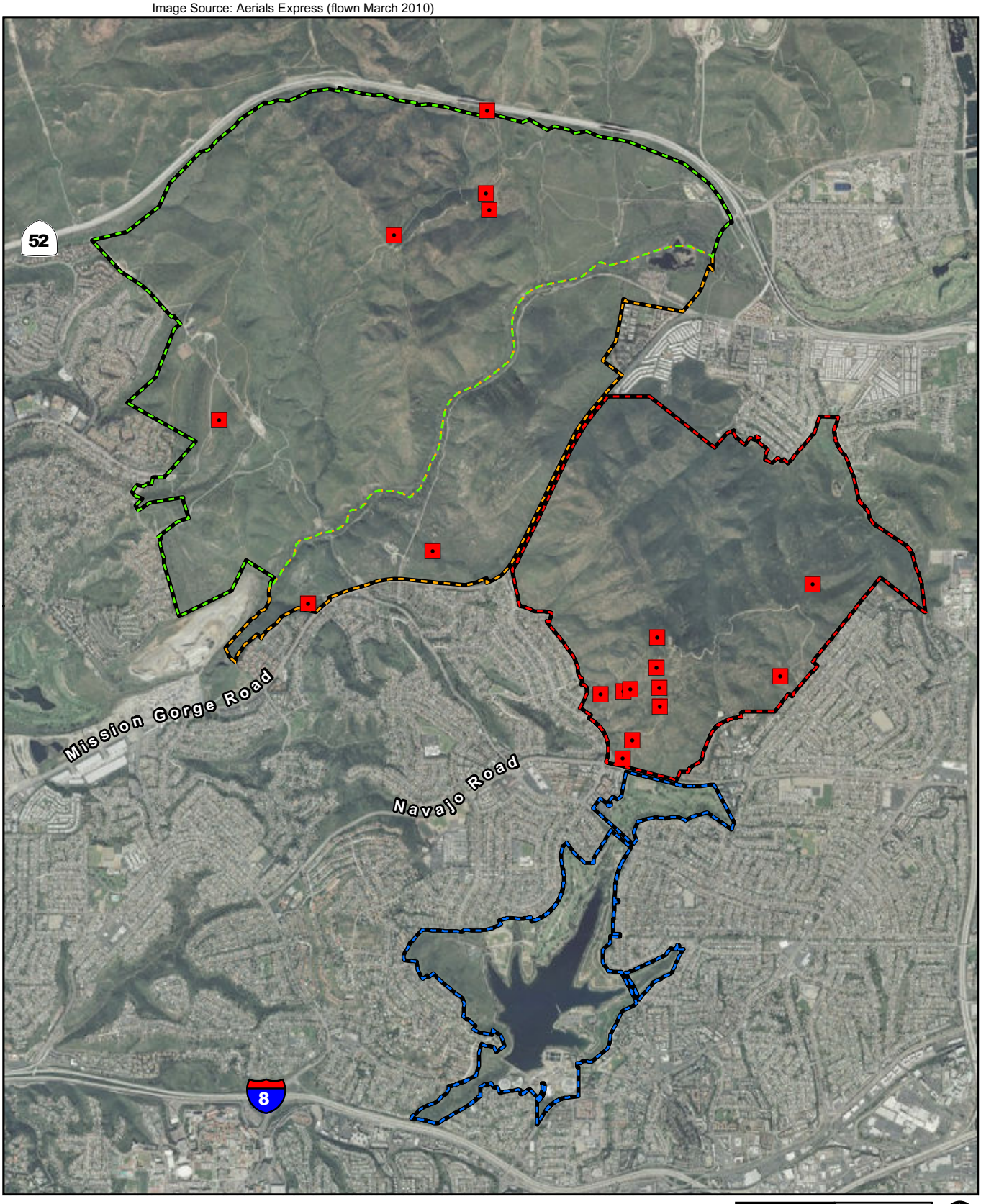
FIGURE C-7b

Copper's Hawk *(Accipiter cooperii)*
Detected Occurrences: West Sycamore

RECON

M:\JOBS3\5286\common_gis\figC-7b.mxd 10/15/2012

Image Source: Aerials Express (flown March 2010)



0 Miles 1

Project Boundary

Southern California Rufus-crowned Sparrow *(Aimophila ruficeps canescens)*

Cowles Mountain Area

Fortuna Mountain Area

Lake Murray Area

Mission Gorge Area

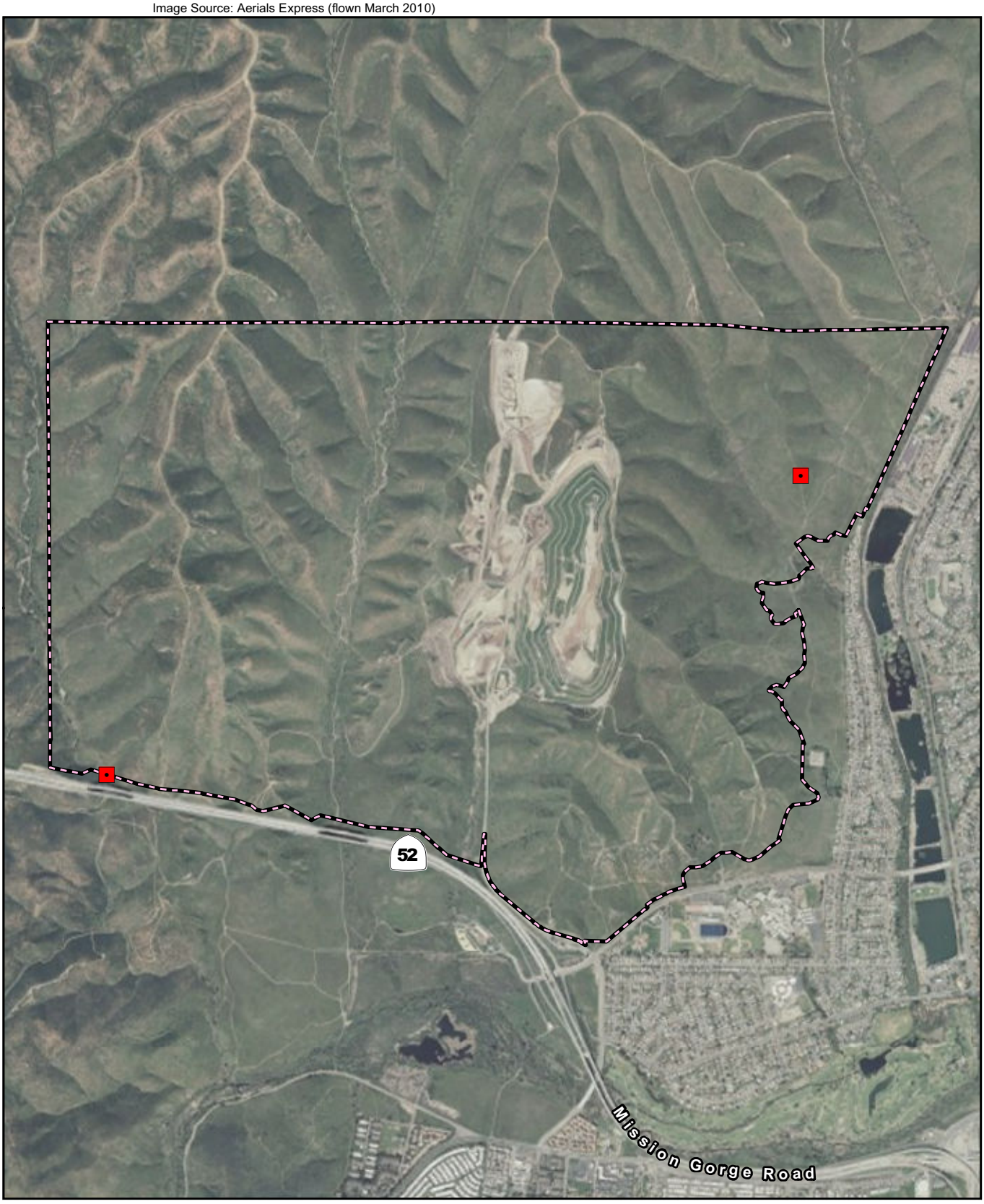
FIGURE C-8a

Southern California Rufus-crowned Sparrow *(Aimophila ruficeps canescens)*
Detected Occurrences: Mission Trails Regional Park

RECON

M:\JOBS3\5286\common_gis\figC-8a.mxd 10/15/2012

Image Source: Aerials Express (flown March 2010)



Project Boundary

East Elliott Area

Southern California Rufus-crowned Sparrow *(Aimophila ruficeps canescens)*

0 Feet 2,500

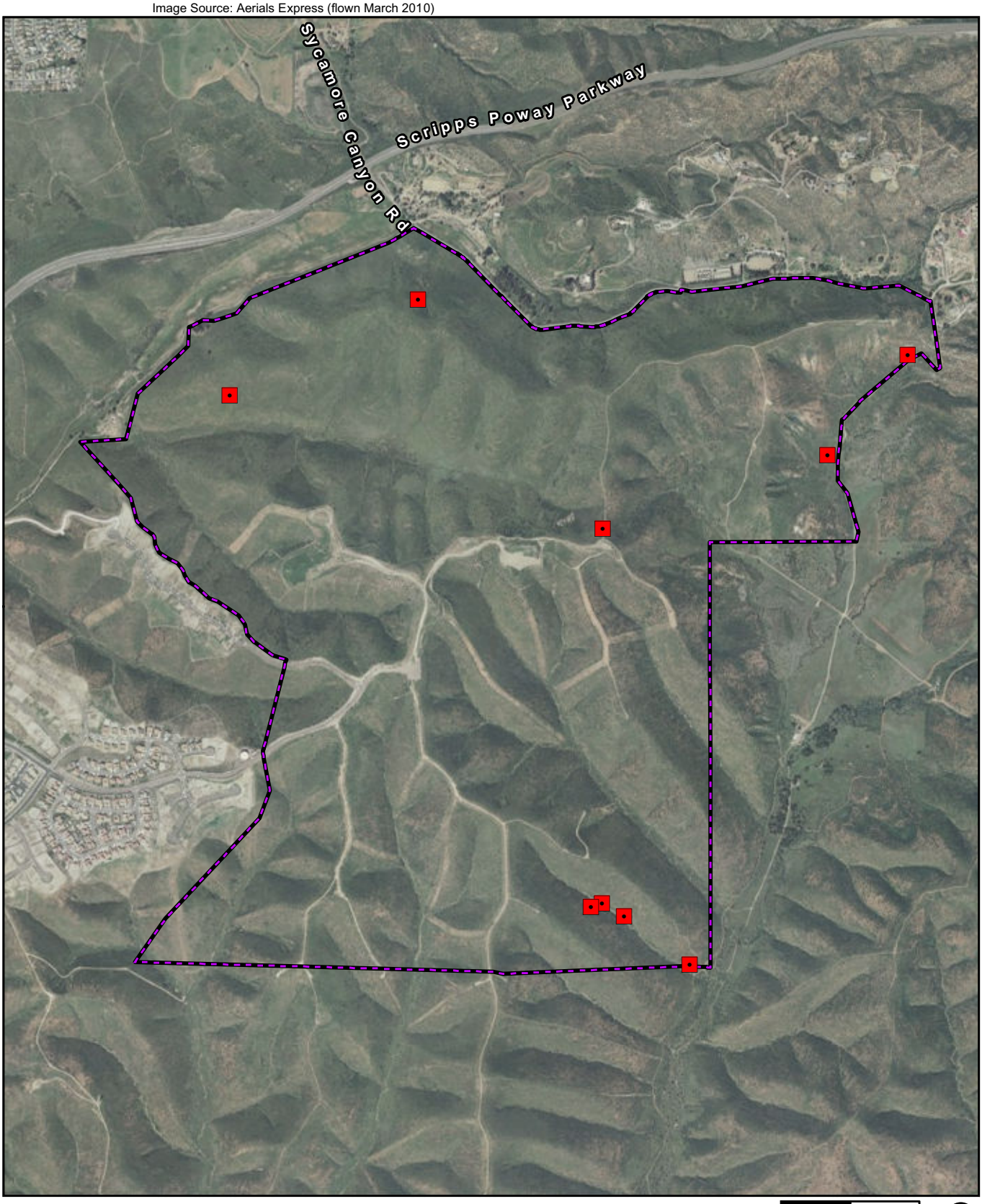
FIGURE C-8b

Southern California Rufus-crowned Sparrow *(Aimophila ruficeps canescens)*
Detected Occurrences: East Elliott

RECON

M:\JOBS3\5286\common_gis\figC-8b.mxd 10/31/2012

Image Source: Aerials Express (flown March 2010)



Project Boundary

West Sycamore Area

Southern California Rufus-crowned Sparrow *(Aimophila ruficeps canescens)*

0 Feet 1,700

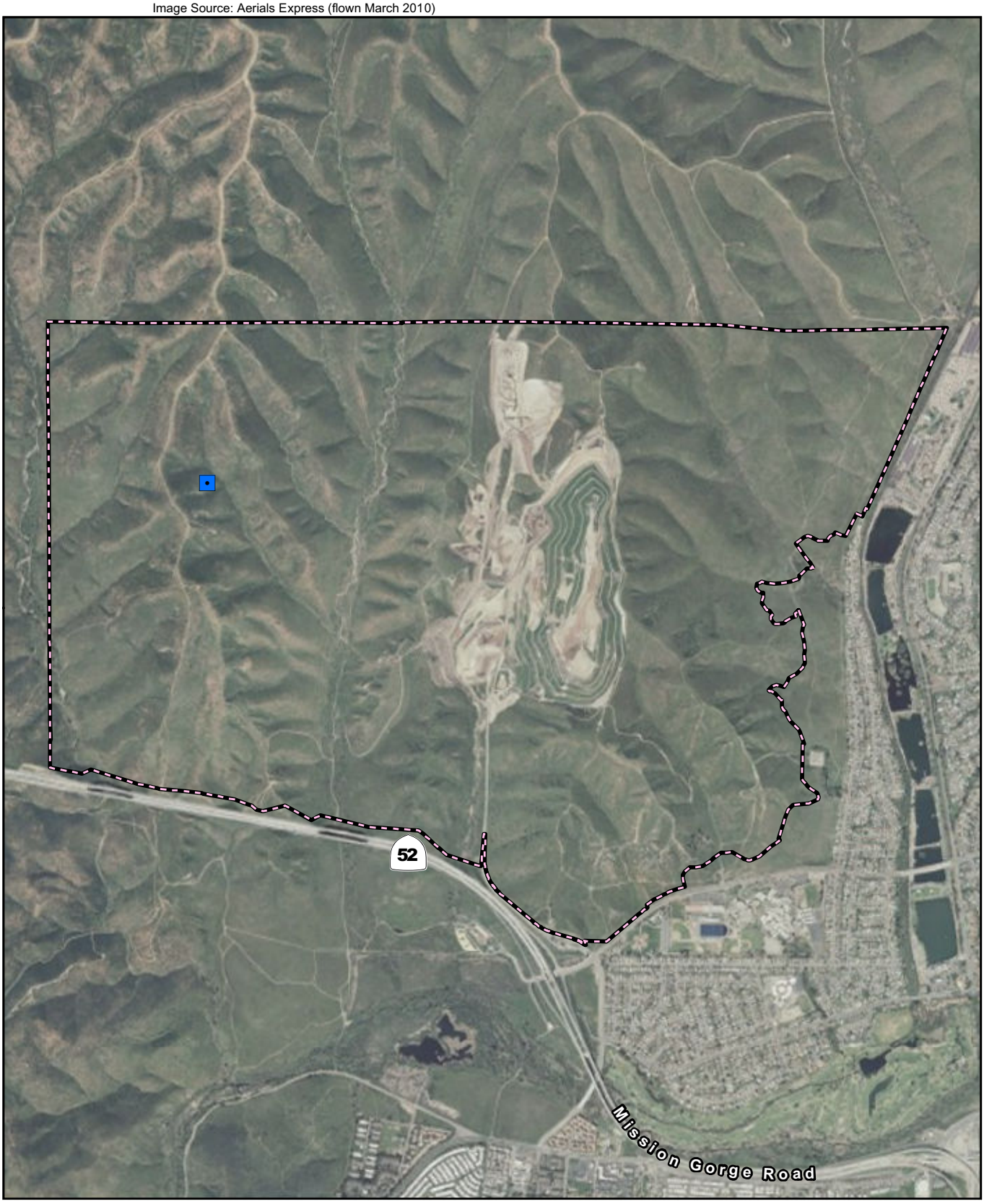
FIGURE C-8c

Southern California Rufus-crowned Sparrow *(Aimophila ruficeps canescens)*
Detected Occurrences: West Sycamore

RECON

M:\JOBS3\5286\common_gis\figC-8c.mxd 10/15/2012

Image Source: Aerials Express (flown March 2010)



0 Feet 2,500

Project Boundary

East Elliott Area

Golden Eagle (*Aquila chrysaetos*)

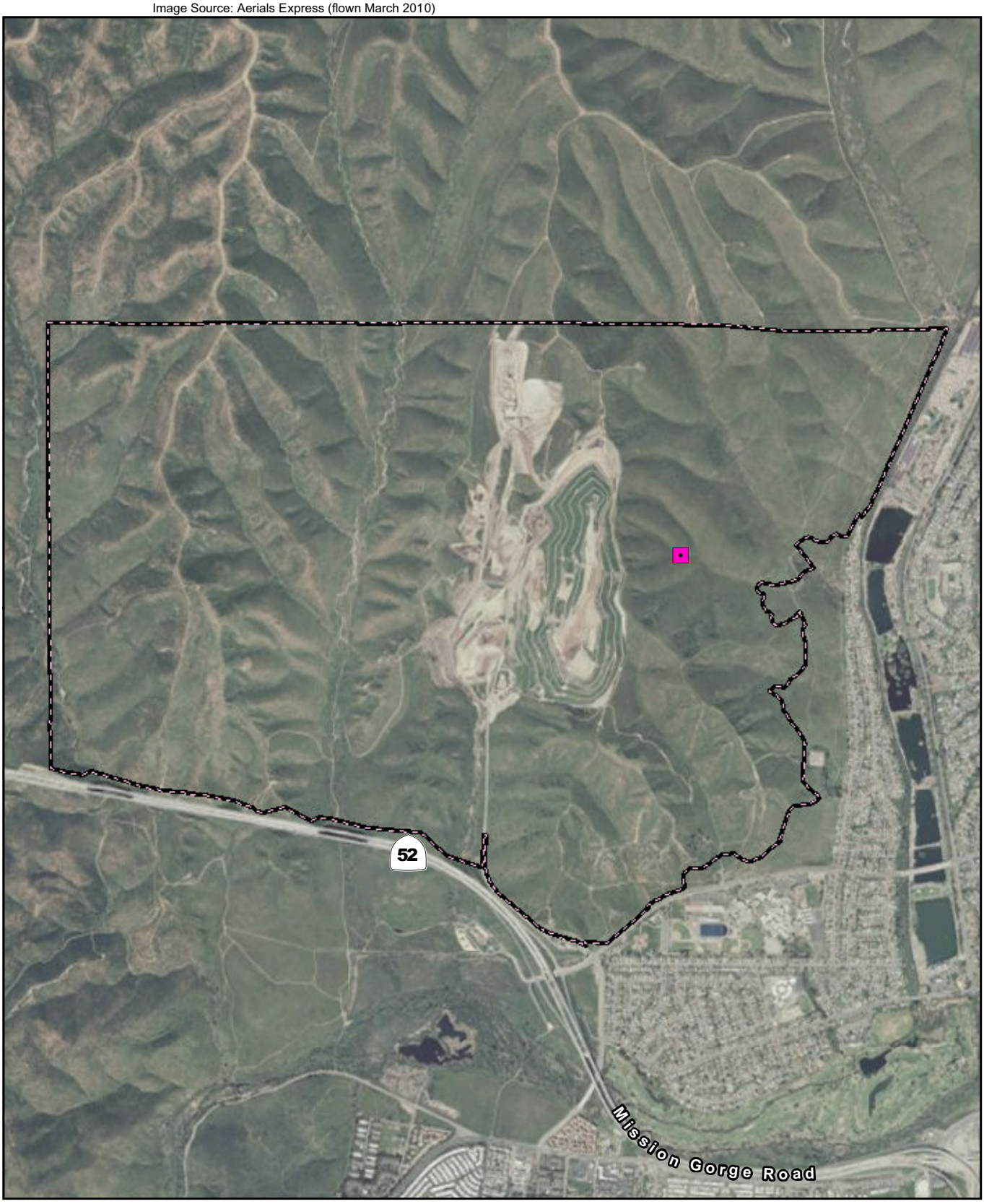
FIGURE C-9

Golden Eagle (*Aquila chrysaetos*)
Detected Occurrences: East Elliott

RECON

M:\JOBS3\5286\common_gis\figC-9.mxd 10/31/2012

Image Source: Aerials Express (flown March 2010)



0 Feet 2,500

Project Boundary

East Elliott Area

Northern Harrier *(Circus cyaneus)*

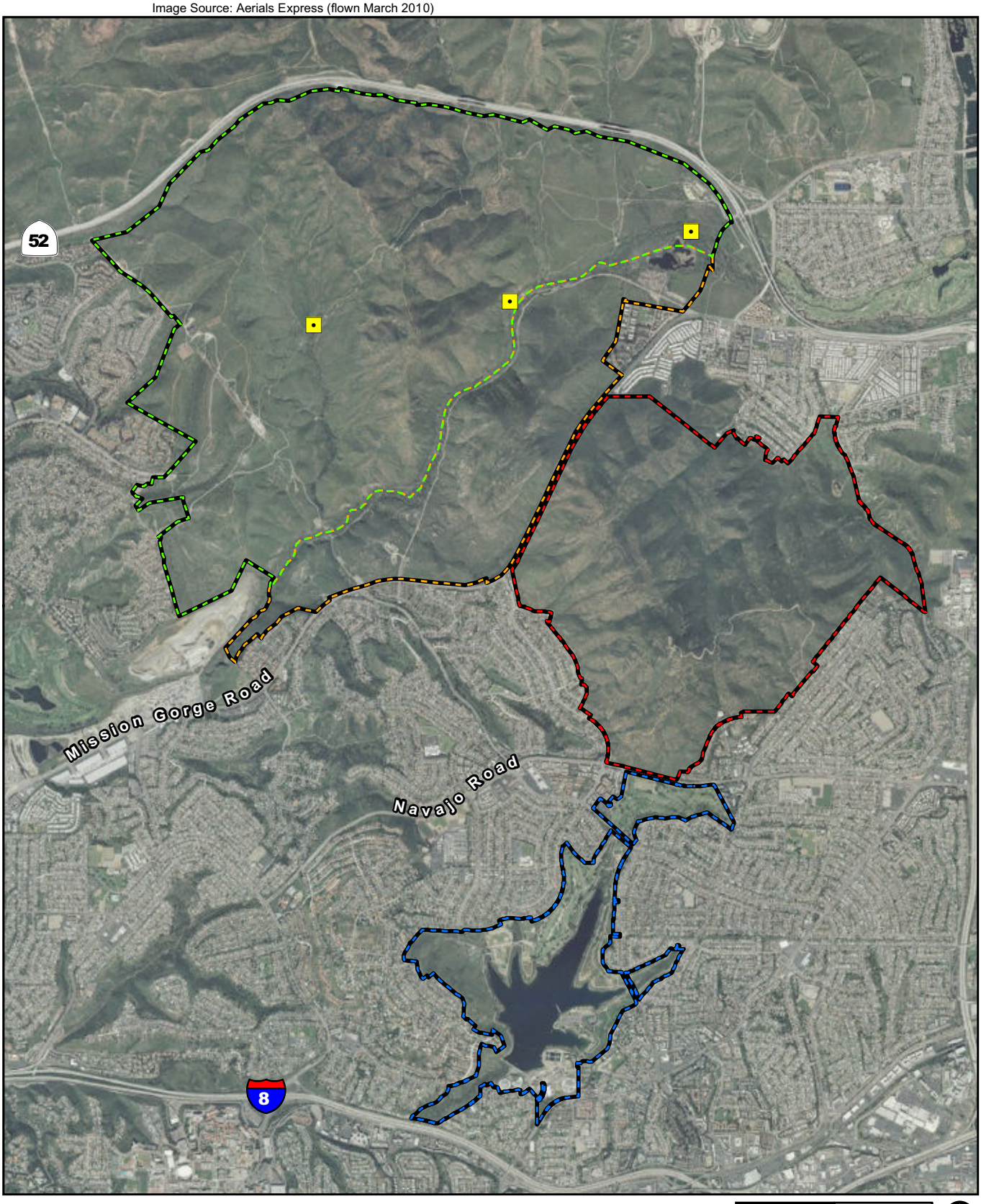
FIGURE C-10

Northern Harrier *(Circus cyaneus)*
Detected Occurrences: East Elliott

RECON

M:\JOBS3\5286\common_gis\figC-10.mxd 10/31/2012

Image Source: Aerials Express (flown March 2010)



0 Miles 1

Project Boundary

Southwestern Willow Flycatcher
(Empidonax traillii extimus)

Cowles Mountain Area

Fortuna Mountain Area

Lake Murray Area

Mission Gorge Area

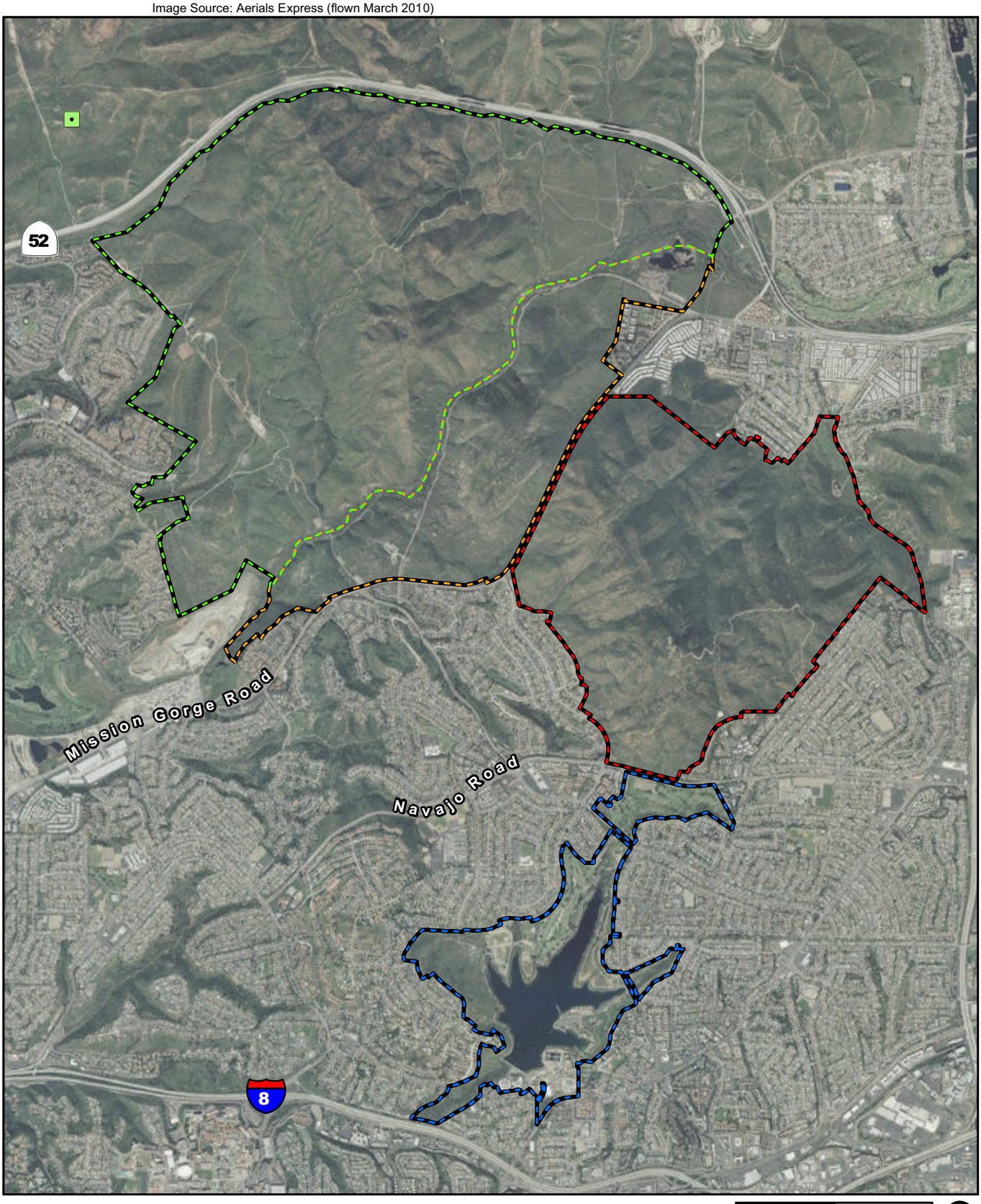
FIGURE C-11

Southwestern Willow Flycatcher *(Empidonax traillii extimus)*
Detected Occurrences: Mission Trails Regional Park

RECON

M:\JOBS3\5286\common_gis\figC-11.mxd 10/15/2012

Image Source: Aerials Express (flown March 2010)



0 Miles 1

Project Boundary

American Peregrine Falcon *(Falco peregrinus anatum)*

Cowles Mountain Area

Fortuna Mountain Area

Lake Murray Area

Mission Gorge Area

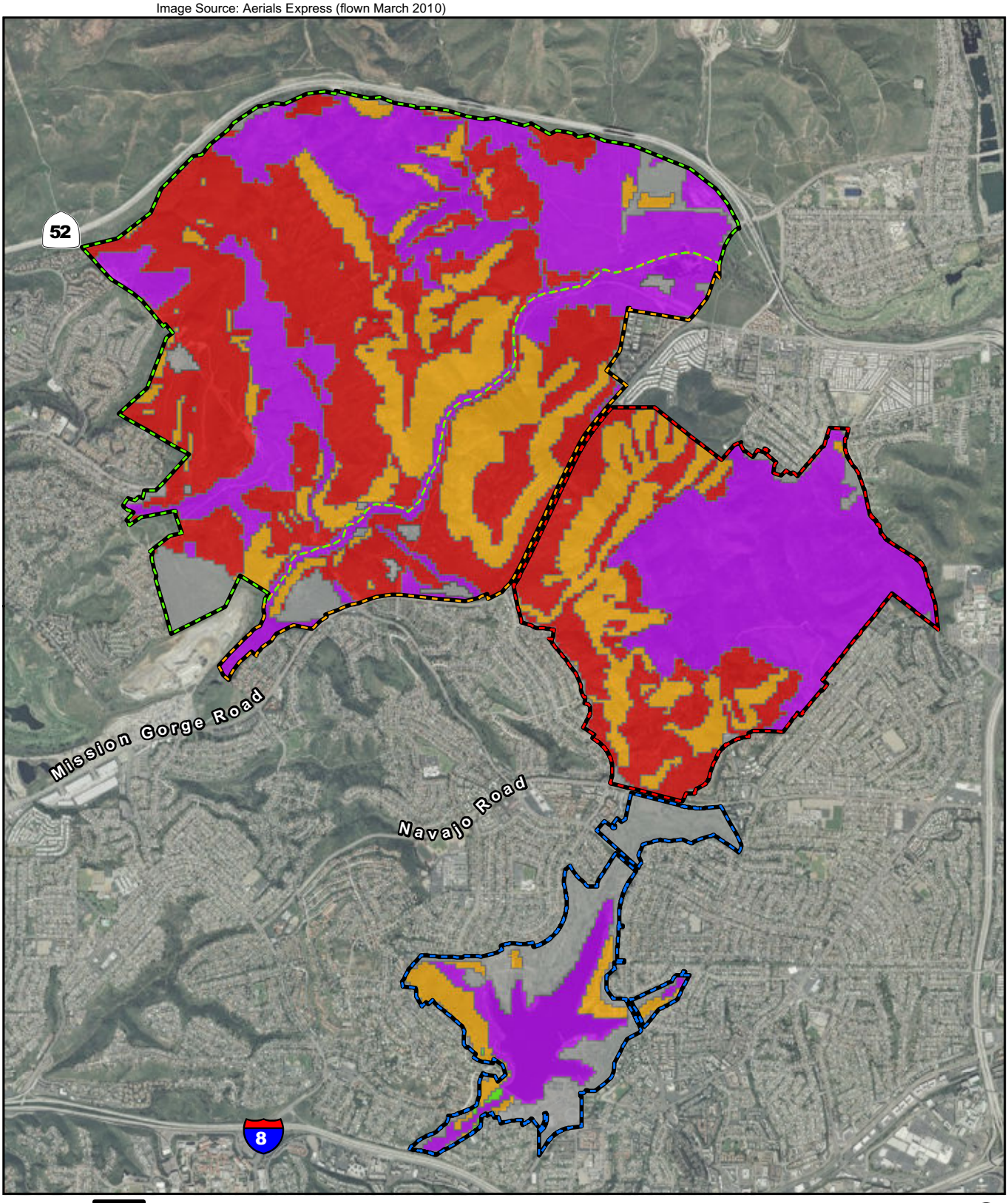
FIGURE C-12

American Peregrine Falcon *(Falco peregrinus anatum)*
Detected Occurrences: Mission Trails Regional Park

RECON

M:\JOBS3\5286\common_gis\figC-12.mxd 10/15/2012

Image Source: Aerials Express (flown March 2010)



Project Boundary
Cowles Mountain Area
Fortuna Mountain Area
Lake Murray Area
Mission Gorge Area

CAGN Habitat Evaluation Model
Moderate
High
Very High
Other
Developed

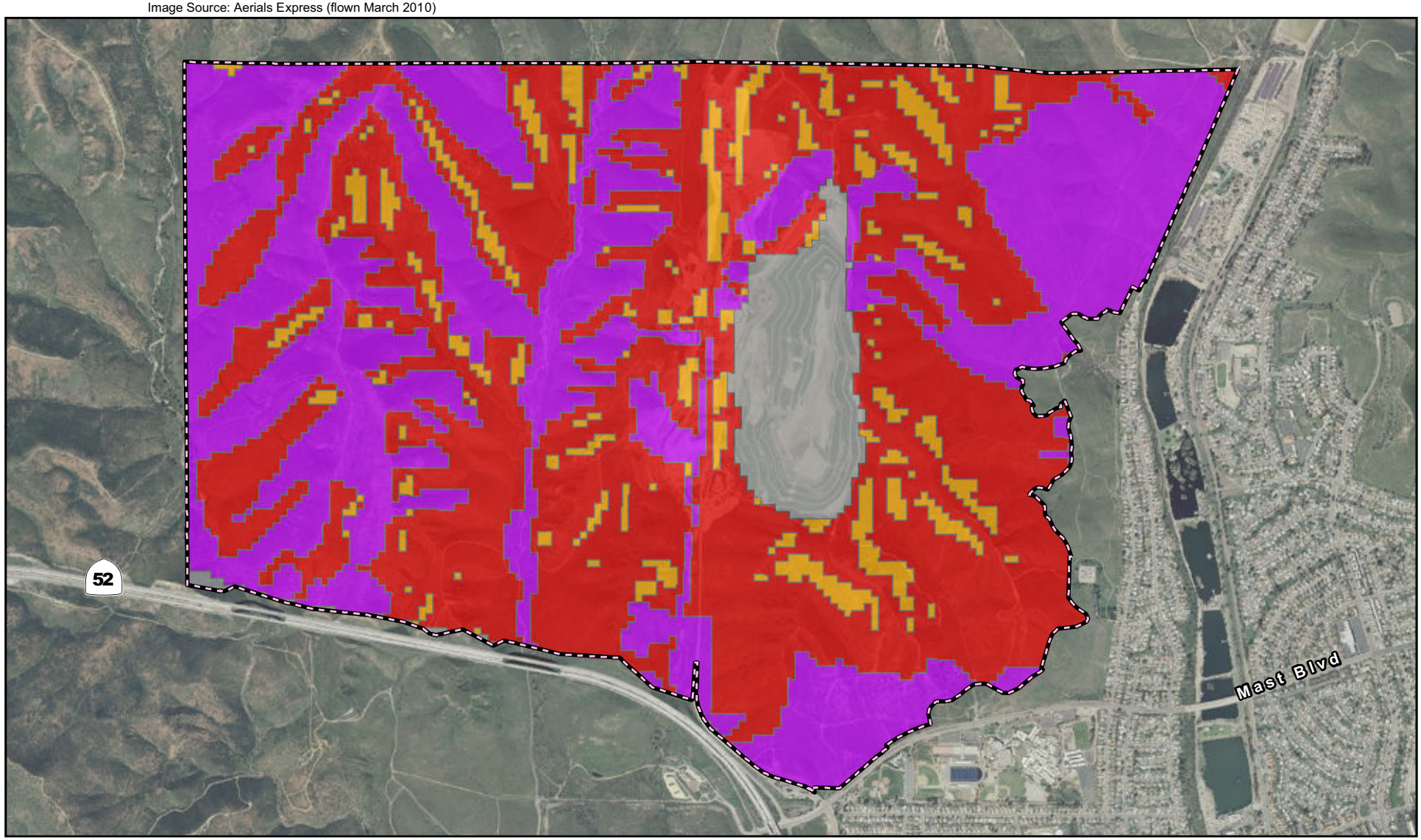
0 Miles 1

RECON

M:\JOBS3\5286\common_gis\figC-13a.mxd 10/15/2012

FIGURE C-13a
Coastal California gnatcatcher
(*Polioptila californica californica*)
Habitat Evaluation Model: MTRP Areas

Image Source: Aerials Express (flown March 2010)



Project Boundary
East Elliott Area

CAGN Habitat Evaluation Model
High
Very High
Other
Developed

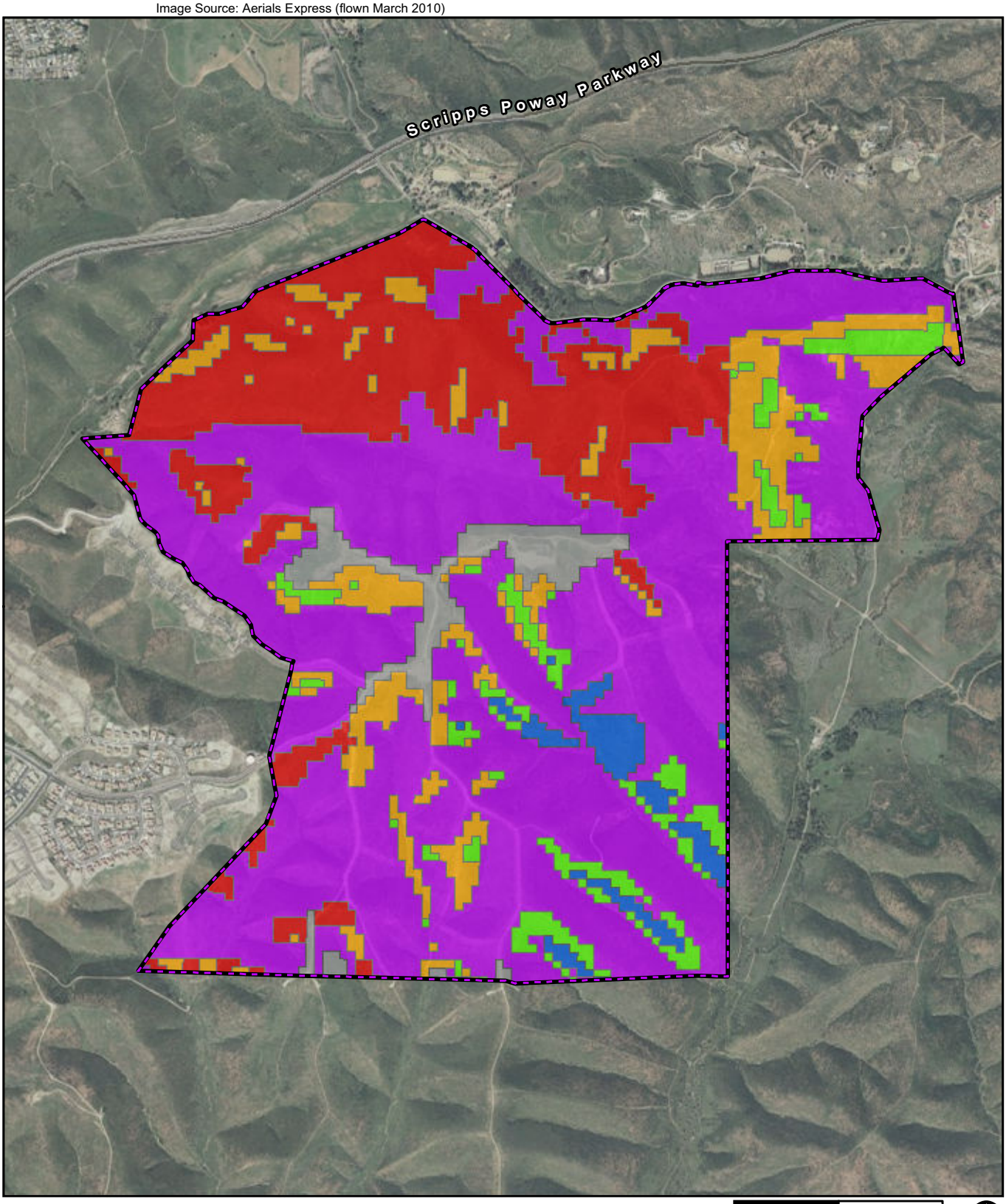
0 Feet 2,000

FIGURE C-13b
Coastal California gnatcatcher
(*Polioptila californica californica*)
Habitat Evaluation Model: MTRP East Elliott Area

RECON

M:\JOBS3\5286\common_gis\figC-13b.mxd 10/31/2012

Image Source: Aerials Express (flown March 2010)



0 Feet 2,500

Project Boundary
West Sycamore Area

CAGN Habitat Evaluation Model

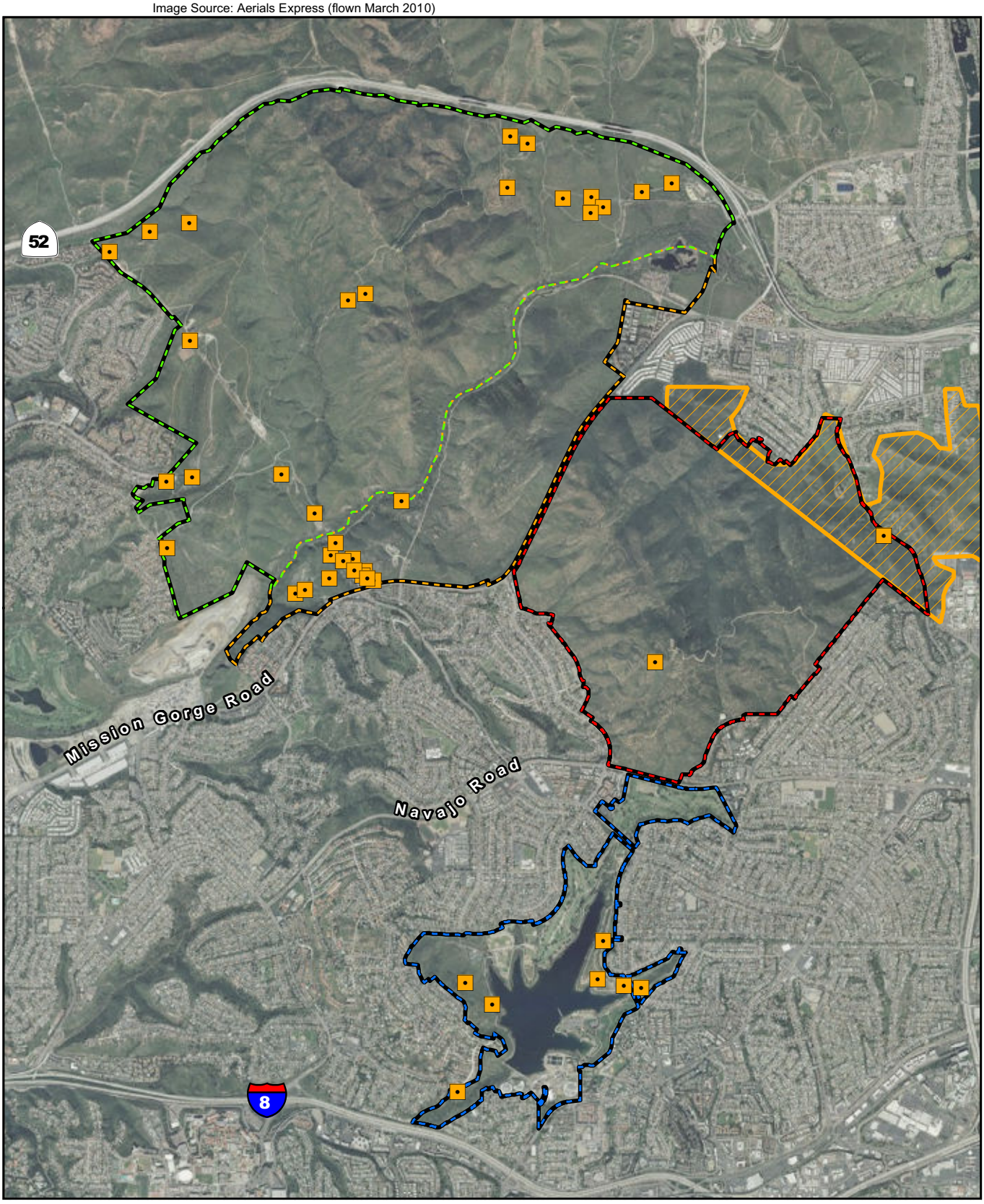
Low or none
Moderate
High
Very High
Other
Developed

FIGURE C-13c
Coastal California gnatcatcher
(*Polioptila californica californica*)
Habitat Evaluation Model: MTRP West Sycamore Area

RECON

M:\JOBS3\5286\common_gis\figC-13c.mxd 10/15/2012

Image Source: Aerials Express (flown March 2010)



Project Boundary

Coastal California Gnatcatcher
(Polioptila californica californica)

Coastal California Gnatcatcher
Final Critical Habitat

Cowles Mountain Area

Fortuna Mountain Area

Lake Murray Area

Mission Gorge Area

0 Miles 1

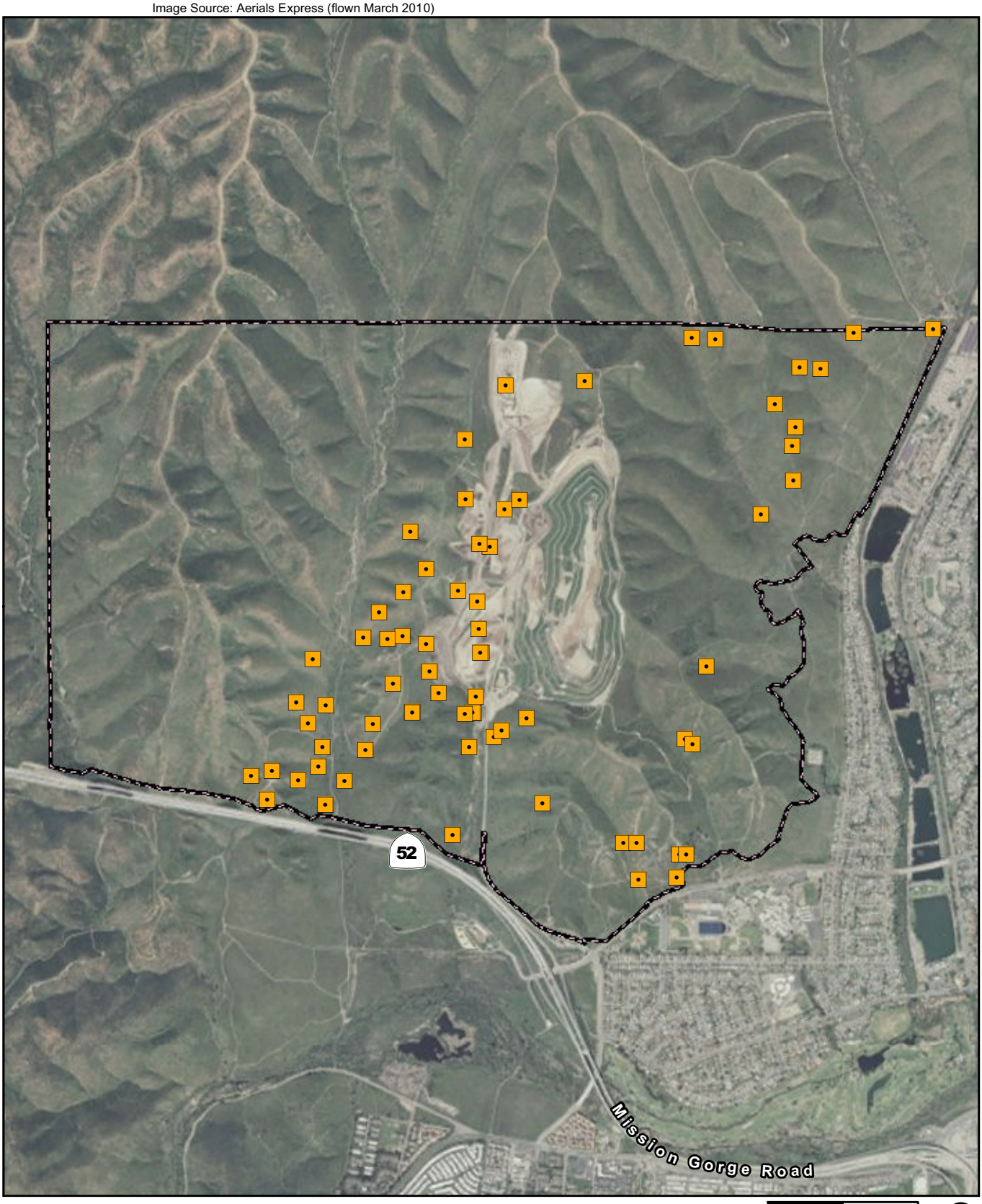
FIGURE C-14a

Coastal California Gnatcatcher *(Polioptila californica californica)*
Detected Occurrences: Mission Trails Regional Park

RECON

M:\JOBS3\5286\common_gis\figC-14a.mxd 10/15/2012

Image Source: Aerials Express (flown March 2010)



Project Boundary

East Elliott Area

Coastal California Gnatcatcher *(Polioptila californica californica)*

0 Feet 2,500

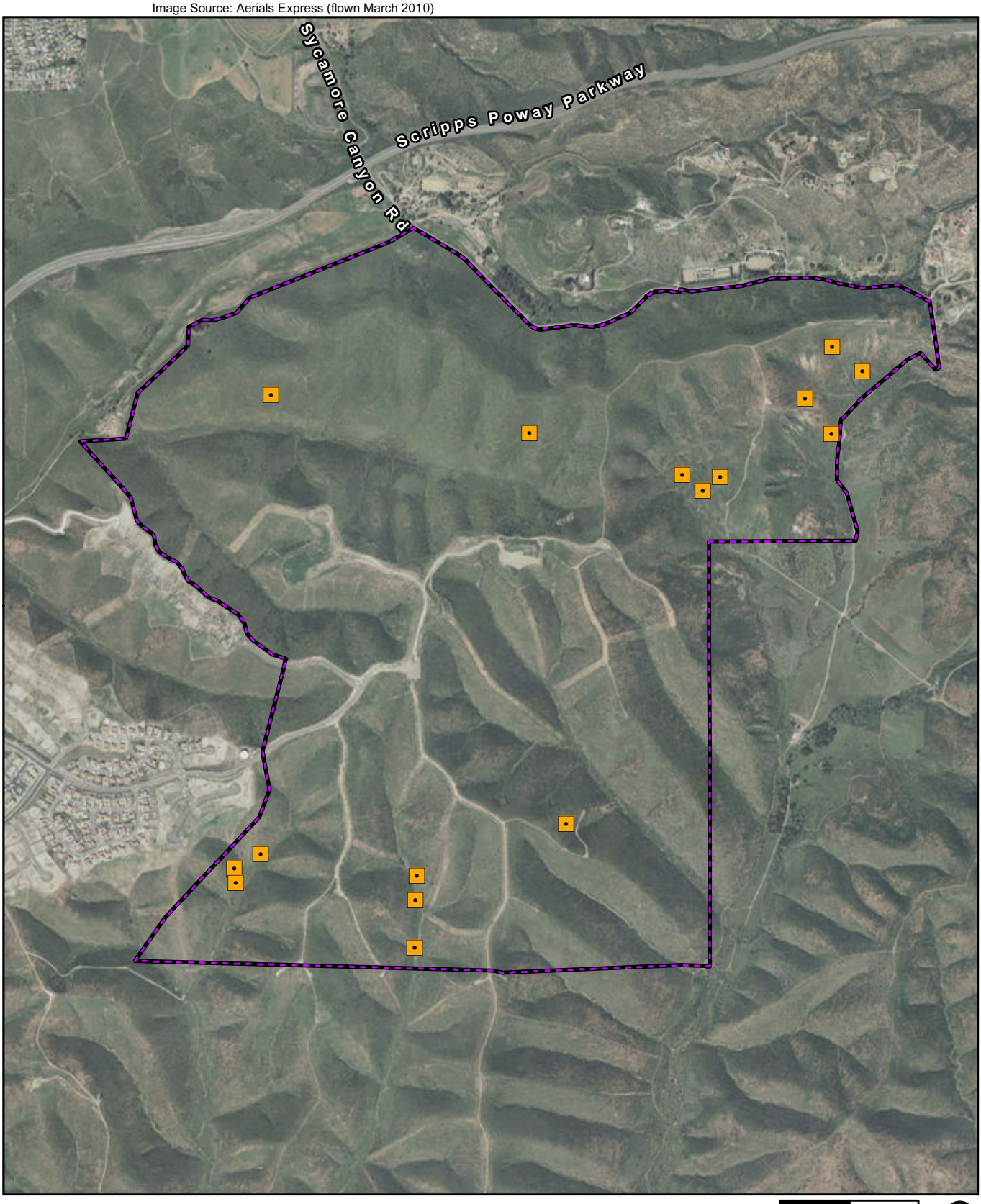
FIGURE C-14b

Coastal California Gnatcatcher *(Polioptila californica californica)*
Detected Occurrences: East Elliott

RECON

M:\JOBS3\5286\common_gis\figC-14b.mxd 10/31/2012

Image Source: Aerials Express (flown March 2010)



0 Feet 1,700

Project Boundary

West Sycamore Area

Coastal California Gnatcatcher *(Polioptila californica californica)*

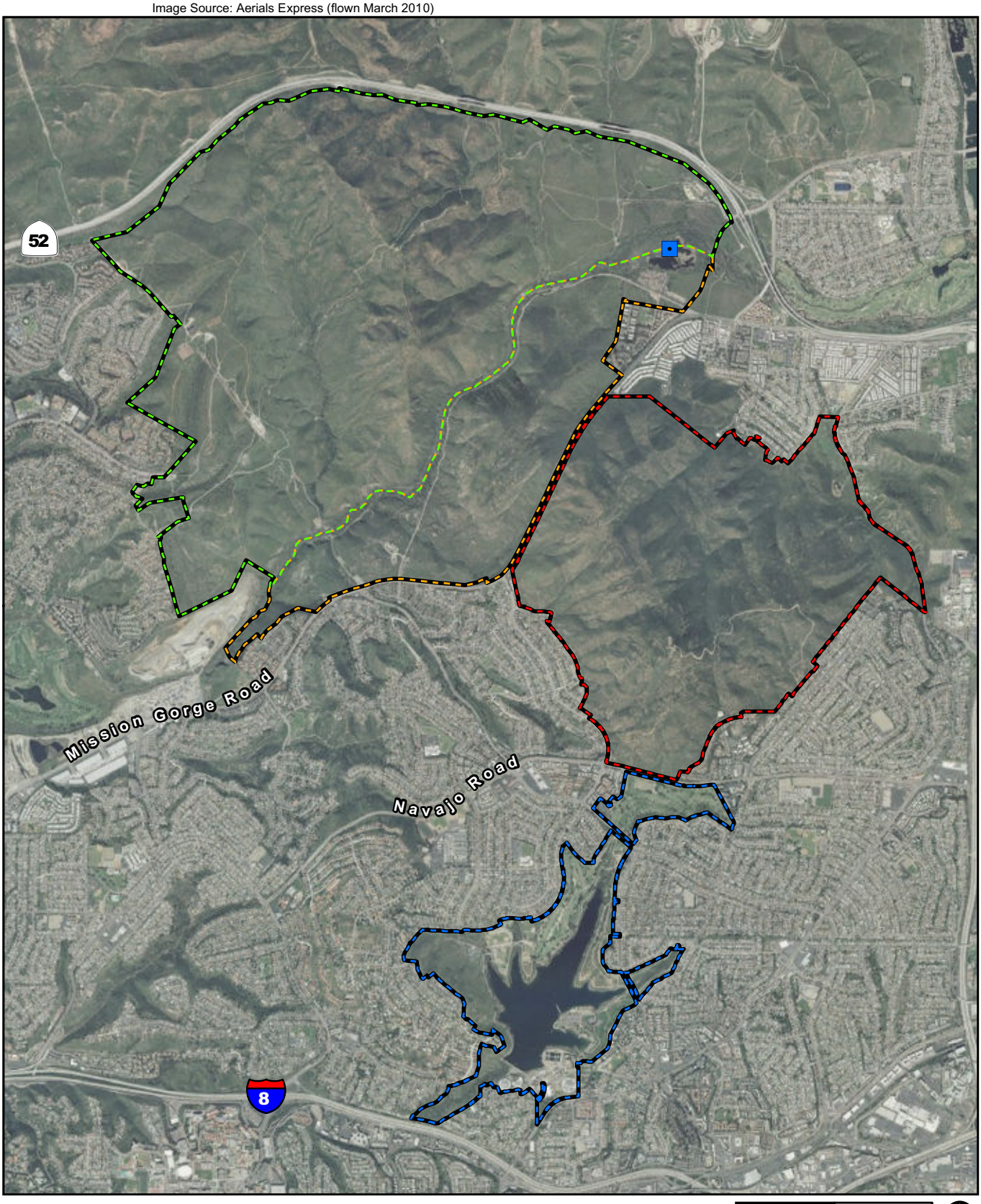
FIGURE C-14c

Coastal California Gnatcatcher *(Polioptila californica californica)*
Detected Occurrences: West Sycamore

RECON

M:\JOBS3\5286\common_gis\figC-14c.mxd 10/15/2012

Image Source: Aerials Express (flown March 2010)



0 Miles 1

Project Boundary

Light-footed Clapper Rail
(Rallus longirostris levipes)

Cowles Mountain Area

Fortuna Mountain Area

Lake Murray Area

Mission Gorge Area

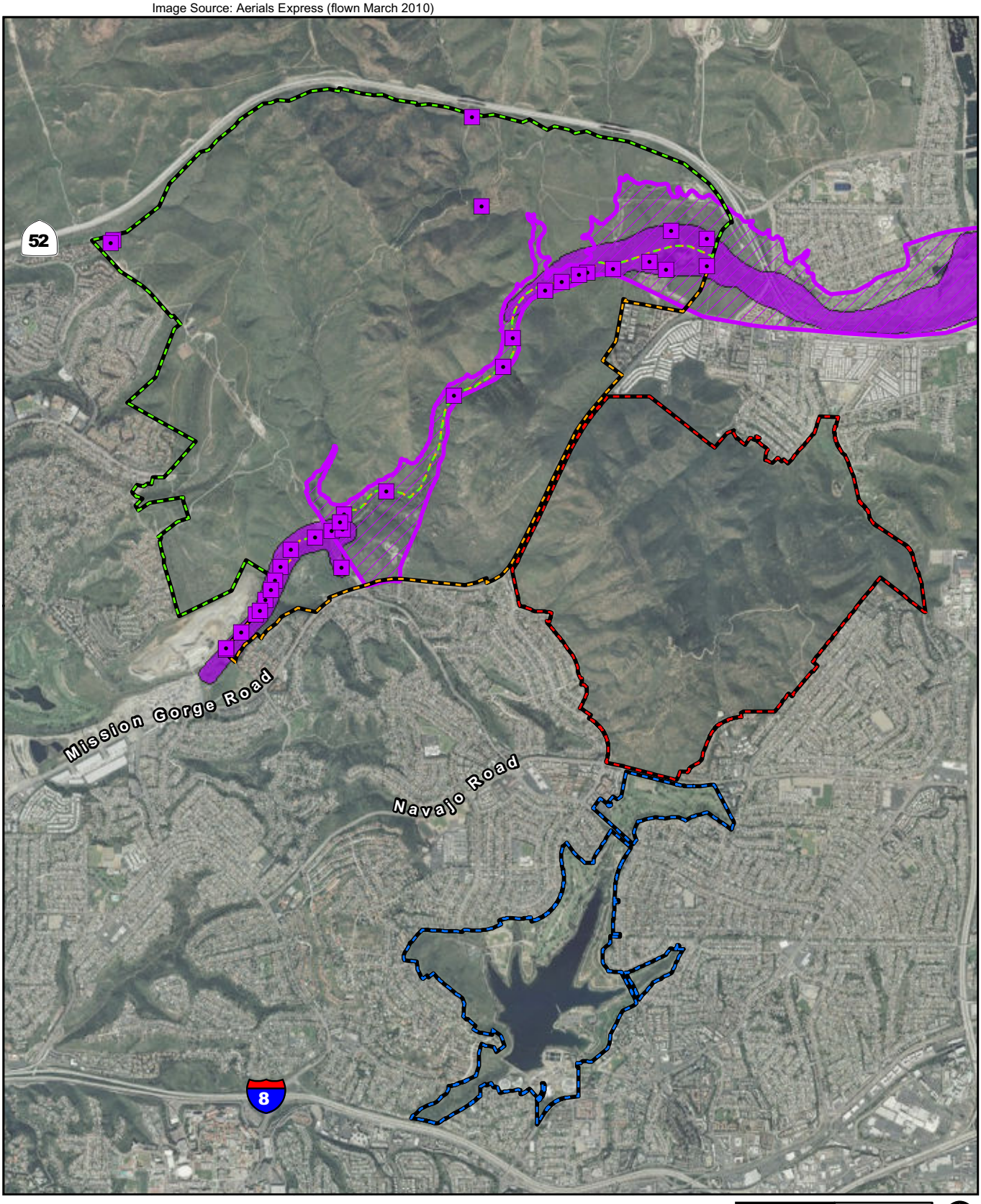
FIGURE C-15

Light-footed Clapper Rail *(Rallus longirostris levipes)*
Detected Occurrences: Mission Trails Regional Park

RECON

M:\JOBS3\5286\common_gis\figC-15.mxd 10/15/2012

Image Source: Aerials Express (flown March 2010)



0 Miles 1

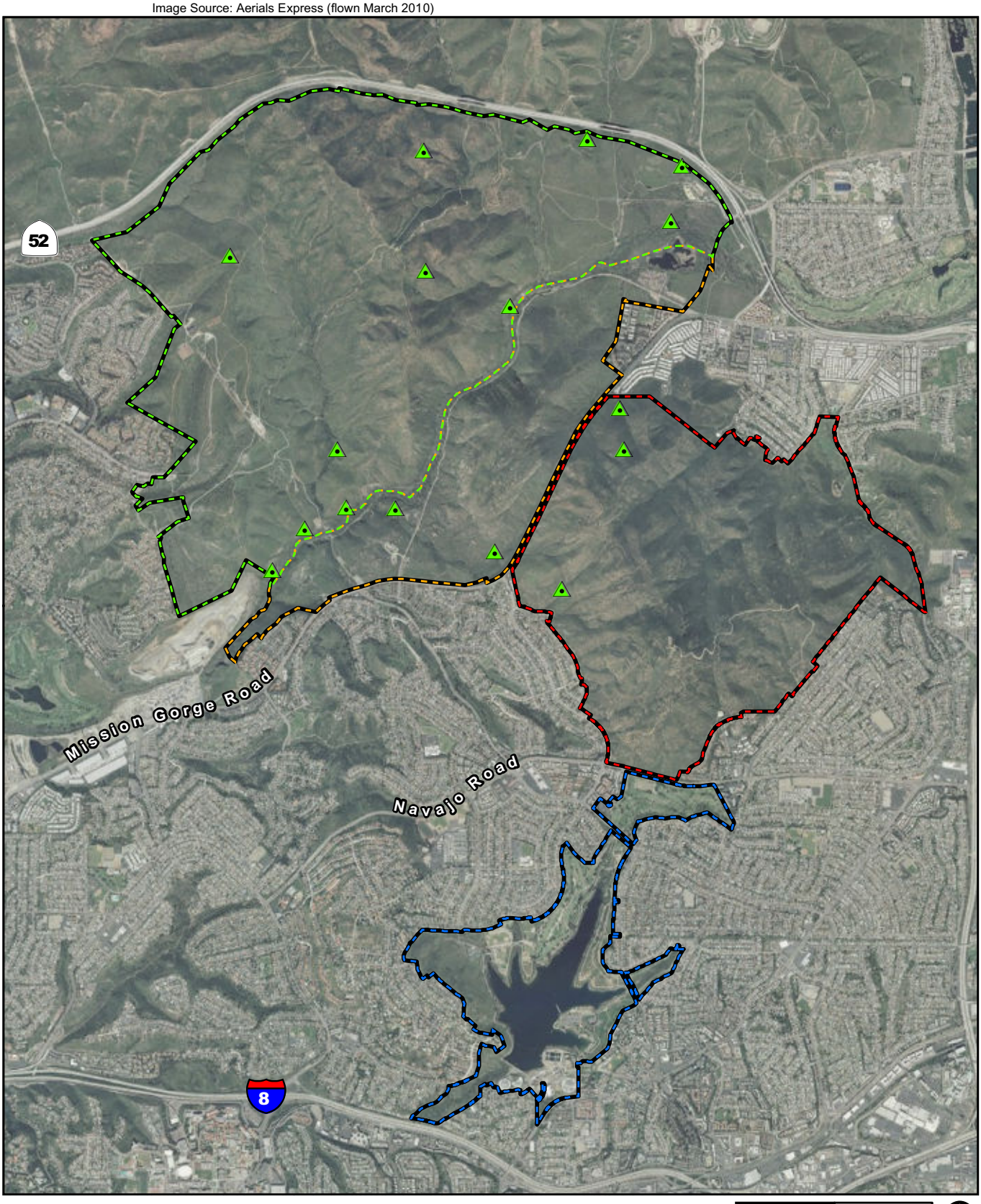
Project Boundary
Least Bell's Vireo *(Vireo bellii pusillus)*
Least Bell's Vireo Final Critical Habitat
Cowles Mountain Area
Fortuna Mountain Area
Lake Murray Area
Mission Gorge Area

FIGURE C-16
Least Bell's Vireo *(Vireo bellii pusillus)*
Detected Occurrences: Mission Trails Regional Park

RECON

M:\JOBS3\5286\common_gis\figC-16.mxd 10/15/2012

Image Source: Aerials Express (flown March 2010)



0 Miles 1

Project Boundary

Mule Deer *(Odocoileus hemionus)*

Cowles Mountain Subarea

Fortuna Mountain Subarea

Lake Murray Subarea

Mission Gorge Subarea

FIGURE C-17a

Mule Deer *(Odocoileus hemionus)*

Detected Occurrences: Mission Trails Regional Park

RECON

M:\JOBS3\5286\common_gis\figC-17a.mxd 10/15/2012

Image Source: Aerials Express (flown March 2010)

Project Boundary

East Elliott Area

Mule Deer *(Odocoileus hemionus)*

0 Feet 2,500

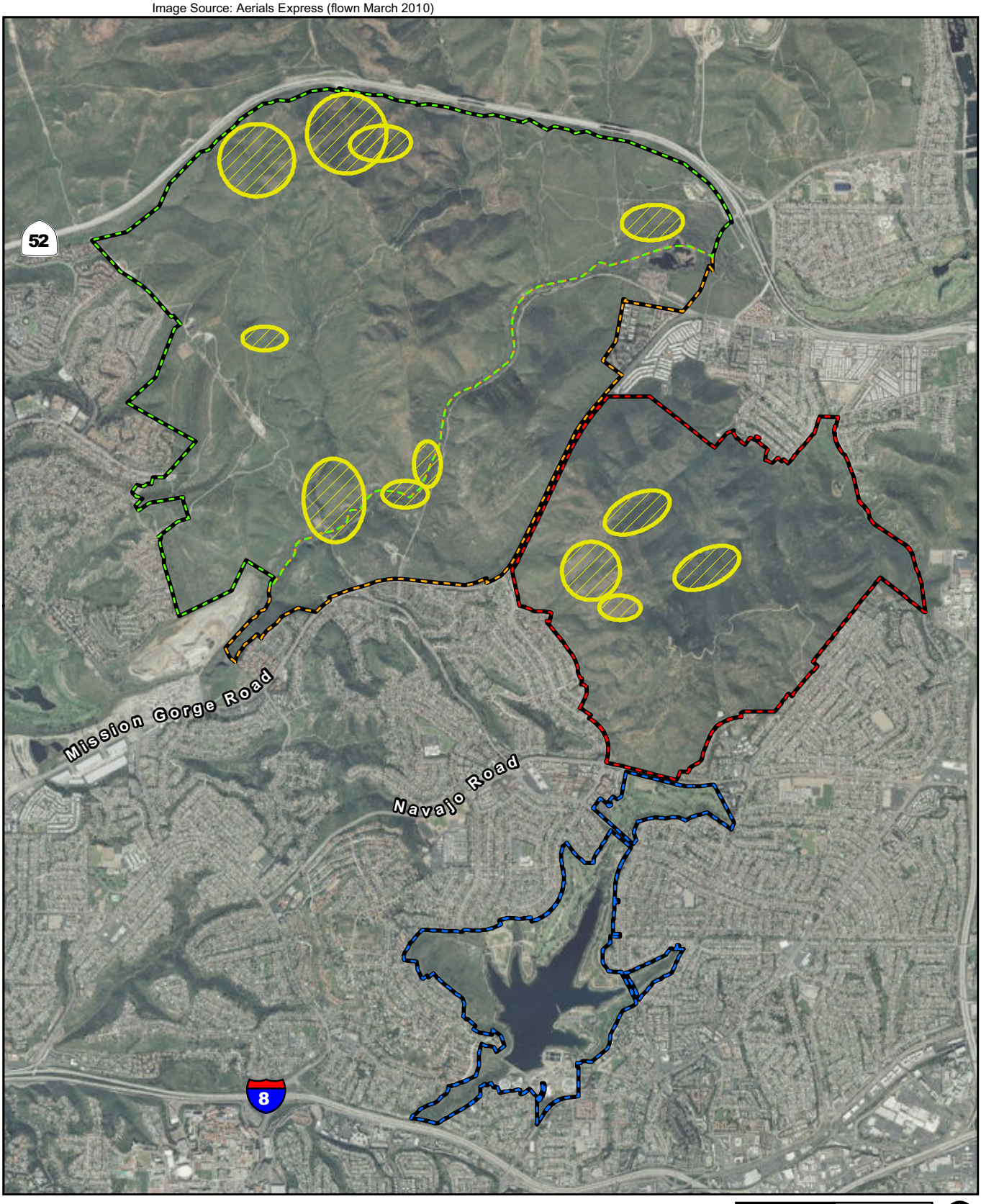
FIGURE C-17b

Mule Deer *(Odocoileus hemionus)*
Detected Occurrences: East Elliott

RECON

M:\JOBS3\5286\common_gis\figC-17b.mxd 10/31/2012

Image Source: Aerials Express (flown March 2010)



0 Miles 1

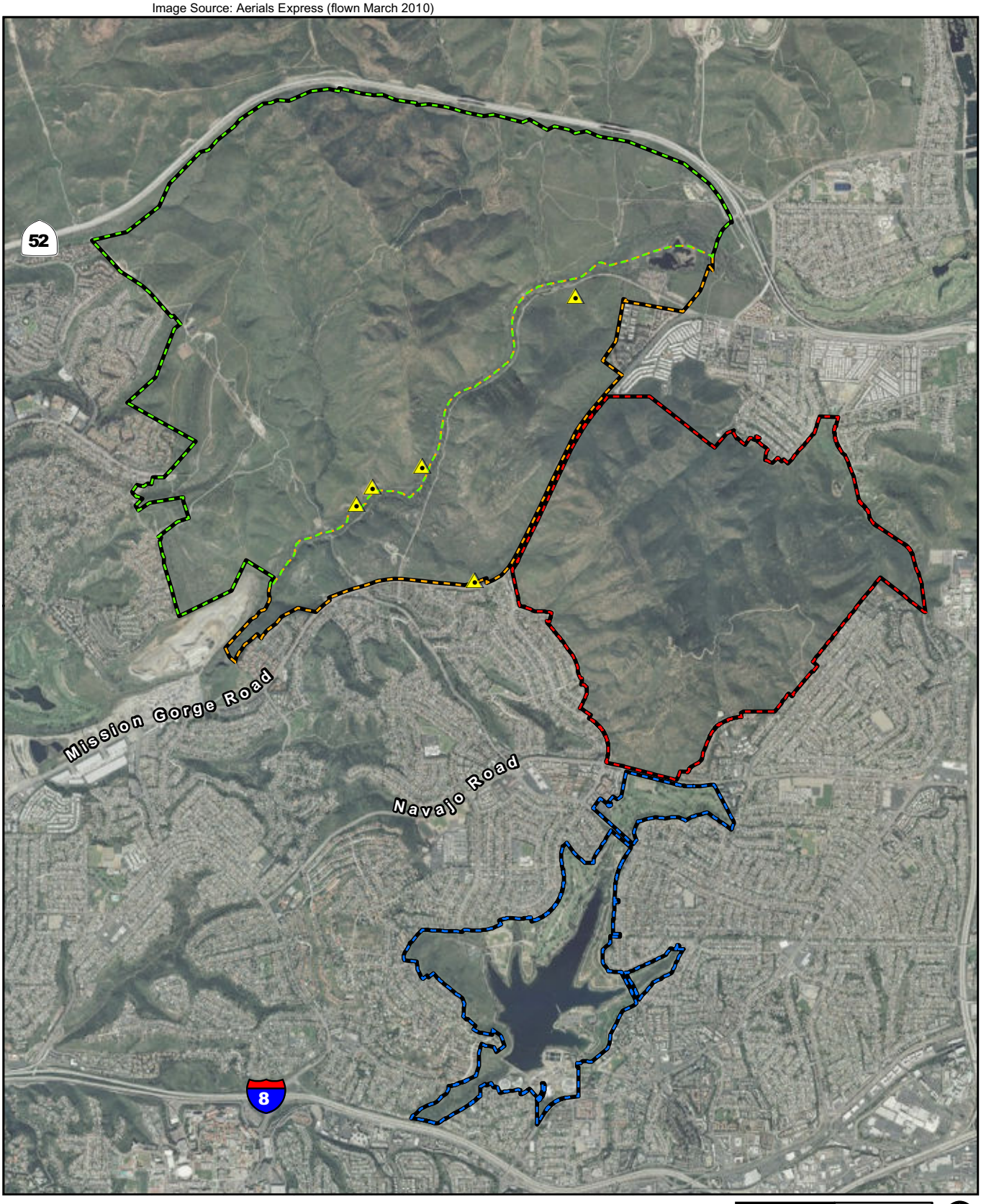
Project Boundary
Southern Mule Deer Safe Harbor Zones
Cowles Mountain Area
Fortuna Mountain Area
Lake Murray Area
Mission GorgeArea

RECON

M:\JOBS3\5286\common_gis\figC-18.mxd 10/15/2012

FIGURE C-18
Southern Mule Deer Safe Harbor Zones: MTRP

Image Source: Aerials Express (flown March 2010)



0 Miles 1

Project Boundary
Mountain Lion *(Puma concolor)*
Cowles Mountain Area
Fortuna Mountain Area
Lake Murray Area
Mission GorgeArea

FIGURE C-19
Mountain Lion *(Puma concolor)*
Detected Occurrences: Mission Trails Regional Park

RECON

M:\JOBS3\5286\common_gis\figC-19.mxd 10/15/2012

APPENDIX A-D

Fire Management Plan

Fire Management Plan

A-D.1 Fire Management at MTRP

A-D.1.1 The Wildland/Urban Interface

Much of the land surrounding MTRP has been converted to residential and commercial development. The interface between wildlands at MTRP and the urban development creates fire, sensitive species, and habitat-related issues, and exposes a conflict between ecosystem preservation of and protection of homes and personal property.

Wildland fire plays a major role in the natural ecology of southern California and the MTRP. There have been 12 fires within the Park since 1939 (Figure D-1). San Diego County experienced widespread fires in October 2003 and October 2007 that led fire managers to reassess their approach to fire management. These wildfires illustrated that suppression strategies are often insufficient for the wind-driven fires during Santa Ana weather conditions.

Wildfire risk in the wildland/urban interface is often mitigated by reduction of fuel load by thinning or removing vegetation near and adjacent to buildings. Although prescribed burning is effective for reducing fuel load and controlling wildfires, it is not permitted within City limits. Fire management is discussed in this section and are in accordance with the MSCP and adopted City regulations.

Fire management strategies should focus on factors that can be controlled at a local level and minimize fire risk. Local factors that affect fire risk include climate change, urban development and agriculture (e.g., irrigation that increases local humidity and fuel moisture), and long-term effects of burning and fire suppression.

A-D.1.2 Wildland Fire Management Condition

All of the areas at MTRP (except the eastern half of Lake Murray) have been mapped within a Very High Fire Hazard Severity Zone established by the San Diego Fire-Rescue Department. This classification identifies areas with a high hazard of fire damage based on vegetation density, slopes, and fire weather (see Santa Ana winds below).

Dominant vegetation types within MTRP include chaparral, coastal sage scrub, and grassland, all of which are highly combustible. Coastal sage scrub and chaparral shrubs are adapted to the Mediterranean climate of southern California. The shrubs survive dry summer conditions by being either drought-deciduous (dropping their leaves during the dry season), or sclerophyllous (having thick leaves that resist desiccation). Other plant

species survive by annually germinating, maturing, and setting seed before the dry season, or by having succulent, thick-skinned stems, such as cacti.

Wildfires are most frequent in these vegetation types in late summer and fall when vegetation is extremely dry. Non-native annual grasses that often compose the understory can help spread fire along the ground, and Santa Ana winds can spread the fire by fanning and dropping hot embers onto dry vegetation. High winds can also cause wildfire to spread so rapidly it evades effective control or suppression.

Santa Ana weather conditions are characterized by dry, sometimes hot and dusty winds that blow westward from the high desert plateaus toward the coastal areas. Santa Ana conditions, occur mostly during fall, winter, and spring (University of California San Diego [UCSD] 2005), but fall is the time of greatest concern because fuel moisture is lowest at this time, allowing Santa Ana winds to spread wildfires more rapidly.

A-D.2 Fire Effects on Resources

A-D.2.1 Vegetation and Plant Species

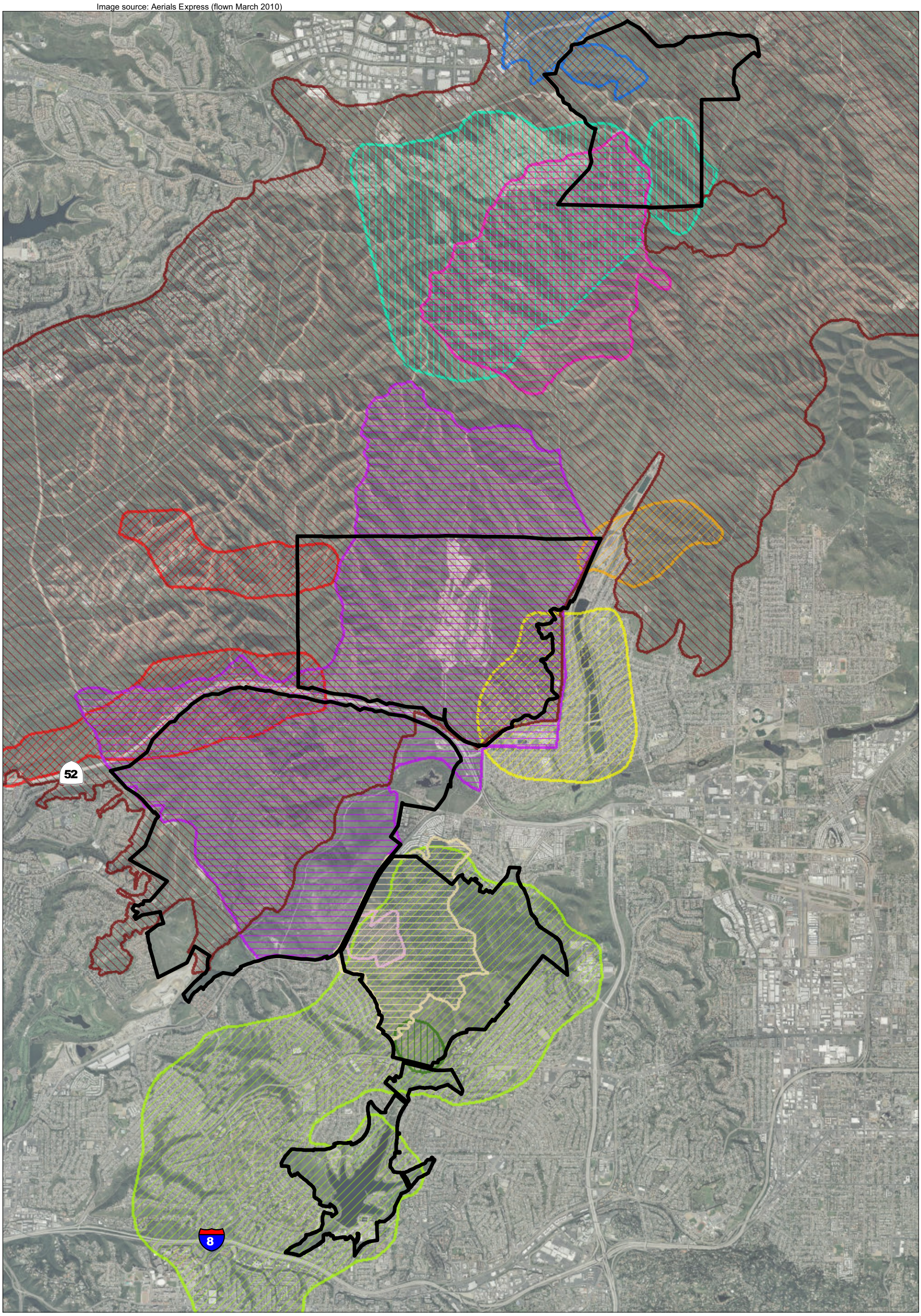
Wildfire is an ecological disturbance that affects composition, structure, and pattern of vegetation on a landscape. Disturbances like wildfire are necessary to maintain high species diversity. The concept of vegetation communities and their broader ecological systems reaching equilibrium or a climax community has been rejected by modern scientists (Botkin 1990; Morgan et al. 1994; Brown 2000) in favor of a theory of dynamic equilibrium in which communities are constantly in flux due to changing environmental conditions (fire, drought, or any other disturbance).

The rate of recovery, injury, and mortality of plants are generally determined by fire behavior, fire duration, patterns of fuel consumption, and the magnitude of subsurface heating. Success of post-fire recovery also depends on characteristics of the plant species such as their susceptibility and the means by which they recover after fire.

A-D.2.1.1 Chaparral and Coastal Sage Scrub

In Mediterranean vegetation communities such as chaparral and coastal sage scrub, fire and decomposition are the two ways carbon and nutrients are recycled. Since microbes that decompose plant material generally require moist conditions, in dry summer areas, decomposition is reduced, and fire plays a more dominant role in recycling plant debris (Harvey 1994).

Image source: Aerials Express (flown March 2010)



Project Boundary

Fire Burn History

1939	1981
1941	1983
1942	1986
1944	1988
1950	1995
1968	2003

0 Miles 1

RECON

M:\JOBS3\5286\common_gis\figD-1.mxd 10/31/2012

FIGURE D-1
Fire History at Mission Trails Regional Park

Broad, thick-leaved chaparral shrubs are well-adapted to fire. In southern California, chaparral is notorious for frequent, fast-spreading, stand-replacing fires. Many chaparral species resprout and also establish vigorously from seed, often germinating best after being heated by fire. Stand-replacing chaparral fires have occurred every 20 to 40 years for hundreds of years (Kilgore 1981) in southern California. Annual and perennial herbs in chaparral also flourish after fire.

Chaparral and coastal sage scrub have a “stand-replacement” fire regime, in which fires kill aboveground parts of the plants, which then regrow from underground parts or from seed. For a decade or two after a fire, the chaparral is quite fire resistant (Wright 1986). A burn frequency of once every 20 to 30 years maintains a high species diversity, but if fires are suppressed beyond that period, mature shrubs will dominate and plant diversity will decrease.

In San Diego County, wildfires can result in type conversion, as vegetation communities and wildlife species compositions are shifted from shrub (chaparral and coastal sage scrub) to grasslands. These new grasslands are generally dominated by non-native species (Rochester et al. 2010). Extrapolated over time, this effect may cause large scale vegetation community change from scrub to grasslands at MTRP.

A-D.2.1.2 Grasslands

Grasslands recover quickly from fire damage. Fires burn through grasslands very quickly, often leaving root systems unharmed, so grass can sometimes regenerate from surviving root systems. The density of forbs increases during the first or second year after a fire and the grassland structure is reestablished within about three years (Bock and Bock 1990). A lack of fire can allow shrub seedlings to become established, eventually converting grassland to shrubland.

A-D.2.1.3 Riparian Forests

Many riparian forest species have evolved to resprout following disturbance by periodic flooding. This ability to regrow quickly following disturbance also allows many riparian forest systems to recover quickly after a fire. Occasional fires in wildland riparian forests may actually increase habitat health by clearing out vegetative debris and stimulating clonal species (such as western cottonwood) to expand into freshly burned areas (Kauffman and Dwire 2003). Although riparian forests tend to recover quickly after wildfires, the high density of sensitive species which utilize mature riparian forests at MTRP make them a priority for fire suppression.

A-D.2.1.4 Soil Surface and Microbiotic Soil Crusts

Much of the ground on exposed clay ridges and clay lenses at MTRP are covered with microbiotic crusts, which are biologically active, living layers of organisms in an intimate association between soil particles and cyanobacteria, algae, lichens, fungi, and bryophytes (Hawk 2003). These microbes can be pioneer organisms, nitrogen fixers, and contributors to soil stabilization and erosion control. Lichens on bark, rock, and soil are important biological indicators of air quality, soil quality and ecosystem health.

Fire can have a devastating impact on soil crusts. Wildfires of uneven intensity and duration often leave behind a mosaic of biological soil crust patches, some of which survive unharmed (Johansen 1993). Wildfires fanned by hot Santa Ana winds can race quickly through vegetation, leaving the soil crusts unscathed. In extremely hot or slow fires, the soil fabric can be altered and microbiotic soil crusts damaged.

A-D.2.2 Wildlife

The effects of wildfire on wildlife populations are influenced by season, as well as by the intensity and severity, rate of spread, uniformity, and size of fire. Animals with limited mobility, such as young, are more vulnerable to injury and mortality than mature animals. Most fires kill or injure a relatively small proportion of animal populations, though major fires such as those in San Diego County in October 2003 can kill a large proportion of animals.

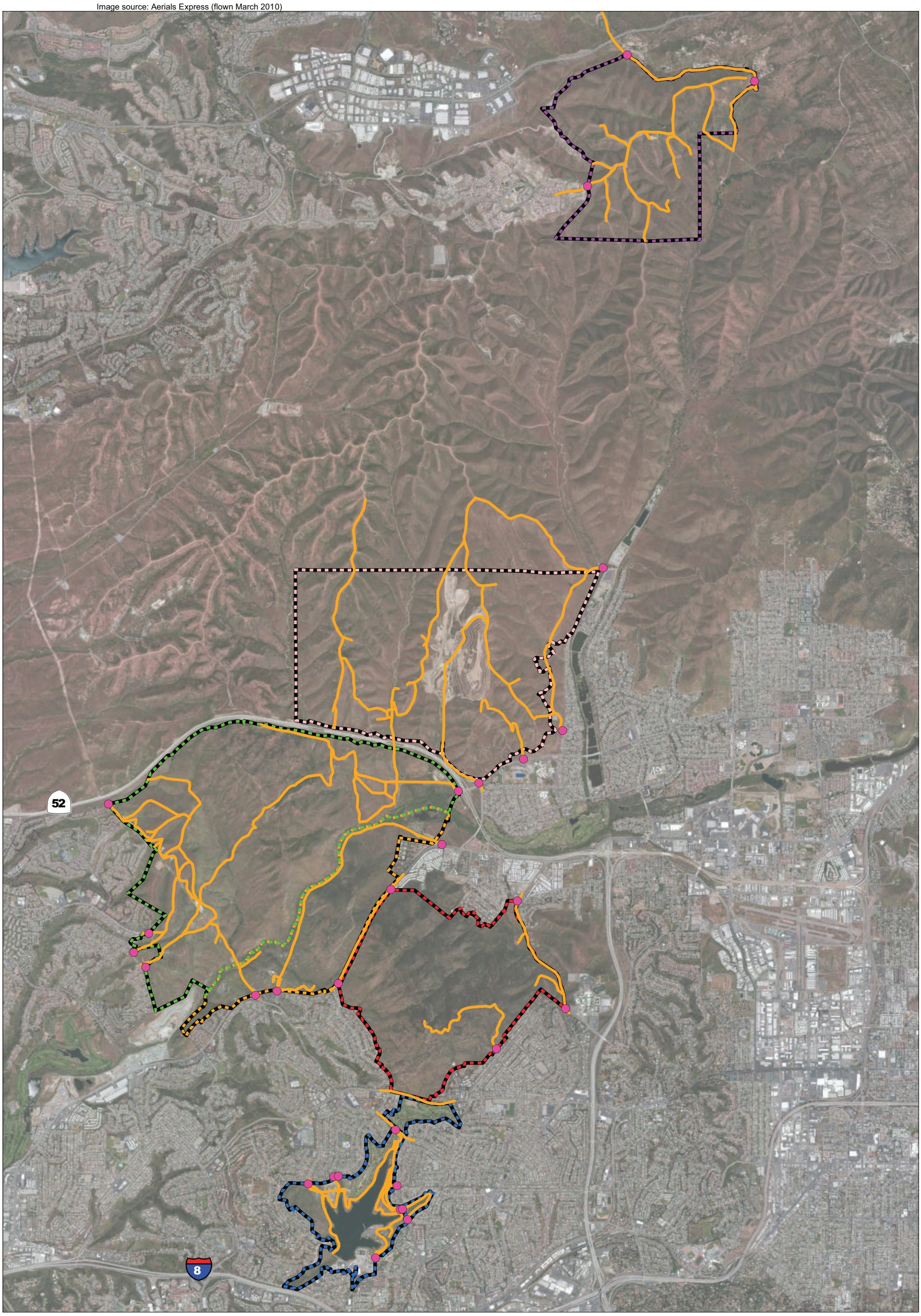
Habitat changes caused by wildfire have a significant impact on wildlife. A wildfire will alter the spatial arrangement of resources, including food, shelter, and hiding cover. Some fires alter the vegetation structure in relatively subtle ways by reducing litter and dead herbs. Other fires change nearly every aspect of vegetation structure: woody plants may be stripped of foliage or killed, litter and duff may be eliminated, exposing mineral soil, and underground structures such as roots and rhizomes may be killed or rejuvenated.

A-D.3 Fire Response

A-D.3.1 Recommended Access Routes

In order to preserve existing natural and cultural resources within MTRP, fire response equipment should remain on existing roads whenever possible. Grading and soil disturbance outside of existing road boundaries should be avoided to prevent impacts to biological and archeological resources. Recommended access routes into the six areas at MTRP include both paved and unpaved existing roads and disturbed vegetation for overland travel (Figure D-2).

Image source: Aerials Express (flown March 2010)



RECON

M:\JOBS3\5286\common_gis\figD-2.mxd 7/2/2014

FIGURE D-2
Preferred Fire Response Access Routes

A-D.3.2 Resource Avoidance Areas

Figure D-3 shows areas within the Park that contain natural resources with a high sensitivity to disturbance from firefighting activities. These disturbances include trampling of vegetation from equipment, grading activities associated with fire breaks, erosion and caused by increased water flows, and potential deleterious effects of fire retardant on aquatic resources. Natural resources at MTRP with sensitivity to equipment staging and overland access include federally endangered plants, high-priority MSCP covered plant species, exposed archaeological and paleontological sites, historical structures, and habitat types such as riparian forest and vernal pools. Whenever possible, these areas should be avoided when setting up staging areas and access routes to fight wildfires within the Park.

A-D.3.3 Fire Suppression Priority Areas (Habitats)

Although some habitats and vegetation types have evolved a tolerance for a moderate frequency of wildfires (chamise chaparral), other habitats and vegetation types are less resilient to fire disturbance (Figure D-4). These high priority areas include relatively small habitats containing highly fire sensitive wildlife species (riparian forests), highly localized sensitive plant populations (San Diego ambrosia, willowy monardella), and known historic archaeological sites (Old Mission Dam and flume). Moderate priority fire suppression sites include areas which have burned at a frequency too high for normal successional processes to occur and habitats containing moderately fire sensitive species. These include the disturbed coastal sage scrub on the eastern flank of the East Elliot area.

A-D.4 Post-fire Best Management Practices and Revegetation Efforts

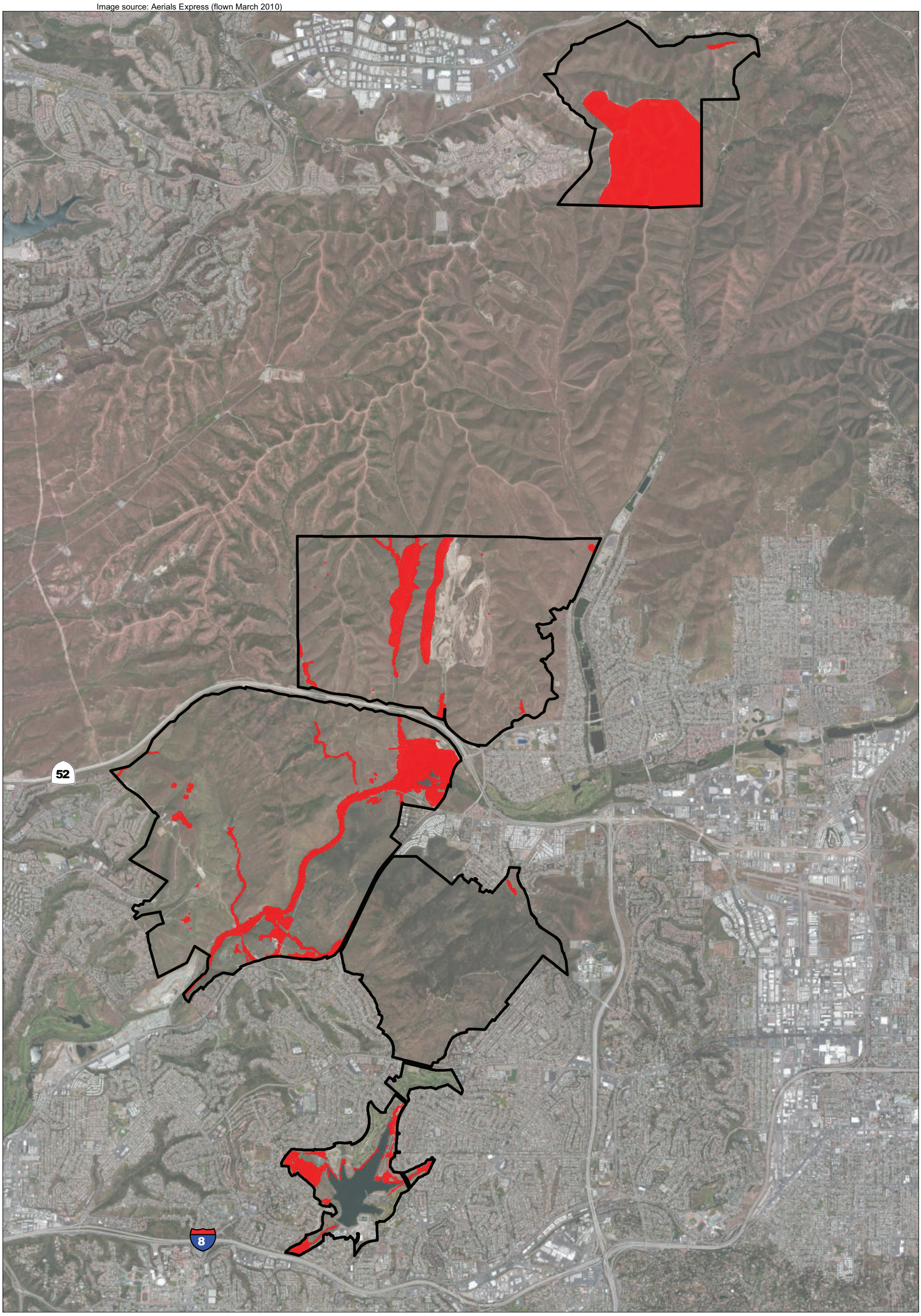
To minimize excessive runoff and siltation into sensitive habitat and areas affected by fire, these areas should be monitored for erosion during the subsequent rainy season. If erosion problems occur, best management practices such as fiber roles should be installed, as needed, to slow the flow of water.

Post-fire weed control may also be necessary in areas subject to invasion by non-natives. When uncontrolled, non-native grasses and other weedy annuals provide flash fuels that increase the probability of repeat fires.

In cases where all or most of native vegetation has been removed by fire, habitat restoration with native species may be recommended by the Habitat Manager. If post-fire seeding is necessary, all seeds should be native and collected from adjacent open space to maintain the local population genetics. Under no circumstances should non-

native grasses (or other CAL-IPC High species) be used in erosion control seed mixes for MTRP.

Image source: Aerials Express (flown March 2010)



0 Miles 1

Project Boundary

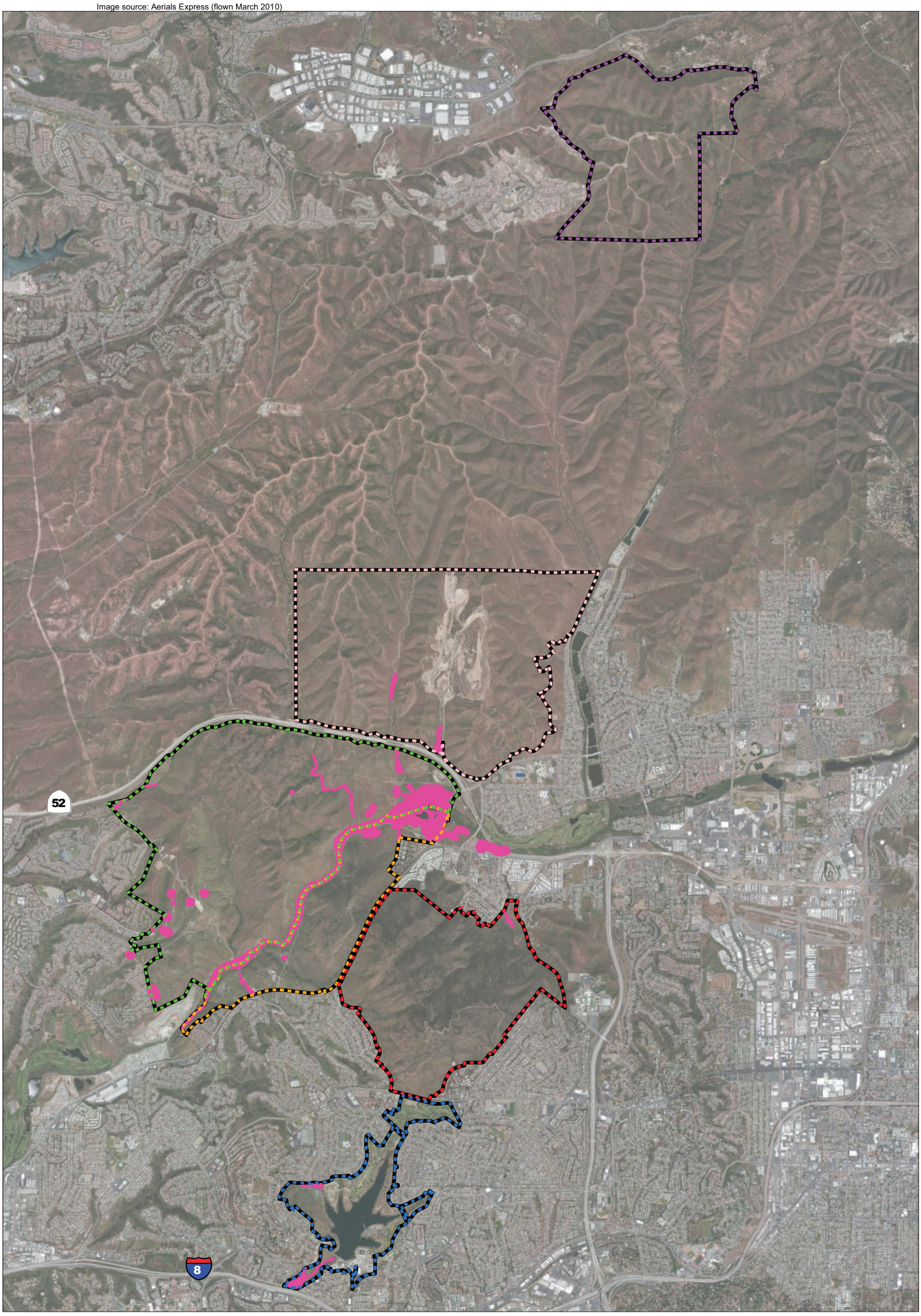
Fire Response Resource Avoidance Areas

RECON

M:\JOBS3\5286\common_gis\figD-3.mxd 7/2/2014

FIGURE D-3
Fire Response Resource Avoidance Areas

Image source: Aerials Express (flown March 2010)



RECON

M:\JOBS3\5286\common_gis\figD-4.mxd 7/2/2014

FIGURE D-4
Fire Suppression Priority Areas

D.8 References

Bock, C. E. and J. H. Bock
1990 Effects of fire on wildlife in southwestern lowland habitats. General Technical Report RM-191. US Department of Agriculture, Forest Service, pp. 50-64.

Botkin, D.
Discordant Harmonies. New York: Oxford University Press.

Brown, J.K. and J.K. Smith
Wildland Fire in Ecosystems: Effects of Fire on Flora. Rocky Mountain Research Station, General Technical Report RMRS-GTR-42-Volume 2. December.

Harvey, A.E.
1994 Integrated roles for insects, diseases, and decomposers in fire dominated forests of the inland western United States: Past, present, and future forest health. *Journal of Sustainable Forestry* 2: 211-220.

Hawk, M.A.
2003 Biological Soil Crusts. In: *A Summary of Affected Flora and Fauna in the San Diego County Fires of 2003.* San Diego County Biological Resource Researchers. November 14.

Johansen, J.R.
1993 Crytogamic crusts of semiarid and arid lands of North America. *Journal of Phycology* 29:140-147.

Kauffman, J.B. and K.A. Dwire
2003 Fire and riparian ecosystems in landscapes of the western USA. *Forest Ecology and Management* 178 (1-2): 61-74

Kilgore, B.M.
1981. Fire in ecosystem distribution and structure: western forests and scrublands. p. 58–89. *In* H.A. Mooney, T.M. Bonnicksen, N.L. Christensen, J.E. Lotan, and W.A. Reiners (eds.) Fire regimes and ecosystem properties. U.S. For. Serv. Wash. Off. Gen. Tech. Rep. WO-26.

Morgan, P., G.H. Aplet, J.B. Houfler, H.C. Humphries, M.M. Moore, and W. Dale
1994 Historical range of variability: a useful tool for evaluating ecosystem change. *Journal of Sustainable Forestry* 2(1/2):87-112.

Rochester, C.J., M.J. Mitrovich, D.R. Clark, M.B. Mendelsohn, D.C. Stokes, and R.N. Fisher.

2010 Plant community responses to large-scale wildfires in southern California. US Geological Survey Data Summary prepared for San Diego Association of Governments, San Diego, California, USA.

Wright, H.A.

1986 Effect of Fire on Arid and Semi-arid Ecosystems—North American continent. In: Rangelands Under Siege; Proceedings, International Rangeland Congress; 1984; Adelaide, Australia. Joss, P.J.; Lynch, D.W.; Williams, D.B., eds. New York, NY: Cambridge University Press: 575-576.