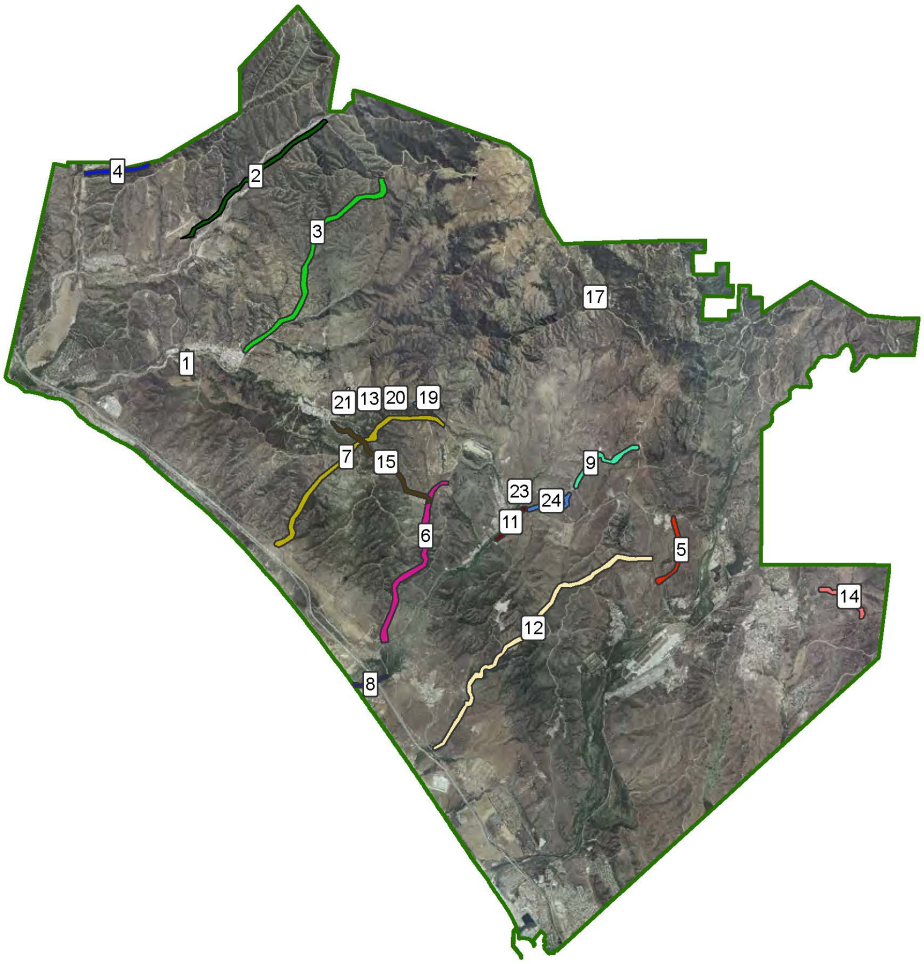
Final

ENVIRONMENTAL ASSESSMENT FOR THE REPAIR OF ACCESS ROADS AT MARINE CORPS BASE CAMP PENDLETON SAN DIEGO COUNTY, CALIFORNIA



April 2016

ENVIRONMENTAL ASSESSMENT FOR THE REPAIR OF ACCESS ROADS AT MARINE CORPS BASE CAMP PENDLETON

ABSTRACT

Lead Agency for the EA: United States Marine Corps

Title of Proposed Action: Repair of Access Roads at Marine Corps Base Camp Pendleton, California

Affected Jurisdiction: San Diego County

Designation: Environmental Assessment

The United States Marine Corps (USMC) has prepared this Environmental Assessment (EA) in compliance with the National Environmental Policy Act (NEPA) of 1969 (42 United States Code sections 4321-4370h), as implemented by the Council on Environmental Quality implementing regulations (40 Code of Federal Regulations Parts 1500-1508), and Marine Corps Order P5090.2A, Change 3, dated 26 August 2013, *Environmental Compliance and Protection Manual*, that establishes USMC procedures for implementing NEPA. The USMC proposes to make numerous relatively minor road repairs and enhancements to improve safety, minimize erosion, and lessen the need for maintenance on and adjacent to paved and unpaved training area access roads throughout Marine Corps Base Camp Pendleton, California. This EA evaluates the potential environmental consequences resulting from the Proposed Action/Alternative 1, Alternative 2, and the No Action Alternative on Topography, Geology, and Soils; Hydrology; Biological Resources (vegetation/wetlands, wildlife, and threatened/endangered species); Cultural Resources; and Air Quality.

Prepared By: United States Marine Corps

Point of Contact: United States Marine Corps

MCB Camp Pendleton
Attn: John Biondolillo, Project Manager
Building 22165
Camp Pendleton, California 92055-5008

Email: John.Biondollio@usmc.mil
Telephone (760) 763-7946

April 2016

DEPARTMENT OF DEFENSE
UNITED STATES MARINE CORPS

FINDING OF NO SIGNIFICANT IMPACT

FOR THE REPAIR OF ACCESS ROADS AT MARINE CORPS BASE CAMP PENDLETON, SAN DIEGO COUNTY, CALIFORNIA

Pursuant to the National Environmental Policy Act (NEPA)(42 U.S.C. §§ 4321-4370h); the Council on Environmental Quality (CEQ) Regulations implementing procedural provisions of NEPA (40 C.F.R. Parts 1500-1508); and the Marine Corps Environmental Compliance and Protection Manual (Marine Corps Order P5090.2A, Change 3), the Marine Corps gives notice that an Environmental Assessment (EA) has been prepared and an Environmental Impact Statement (EIS) will not be prepared for the Repair of Access Roads at Marine Corps Base Camp Pendleton (MCB CamPen), California. I find that the Proposed Action, including adherence to the special conservation measures set forth in detail in the EA, will not have an adverse impact on the human or natural environment. Therefore, an EIS is not required.

Background: Primary access to the inland training areas and ranges is through a distributed network of dirt or gravel roads covering the extensive backcountry of MCB CamPen. These access roads currently exhibit poor drainage and moderate to extensive erosion damage as the soils are prone to erosion. Furthermore, steep and highly eroded side slopes border several of the access roads. The lack of ditches and swales along the access roads has created a continuous erosion problem that dictates the need for constant maintenance. In addition, the intensive use of this area has exacerbated erosion damage that creates a serious safety hazard to personnel and vehicles, especially during periods of inclement weather. Deteriorated roads also reduce vehicle longevity.

Proposed Action: The Preferred Alternative (Action 1) would repair and stabilize existing paved and unpaved training area access roads throughout MCB CamPen's training ranges that provide access to ranges in support of amphibious and inland training activities. Action 1 would relieve several construction restrictions and seasonal limitations of the current programmatic CATEX used for access road maintenance that makes more substantial access road repair projects difficult to schedule around range training activities.

Purpose and Need: The purpose of the Proposed Action is to: (1) improve access for both range users and emergency vehicles; (2) reduce the frequency of access road maintenance; and (3) increase user safety by improving the access roads. The USMC needs to repair and stabilize this road network as current erosion and maintenance problems have seriously degraded the condition of the training area access roads.

Alternatives: The Preferred Alternative (Action 1) would repair and stabilize existing paved and unpaved training area access roads throughout MCB CamPen's training ranges (382 projects total). The roads provide access to ranges in support of amphibious and inland training activities. An estimated 48 miles (68 km) of access roads are involved in the Proposed Action. The roads proposed

for repair are in various conditions of maintenance. The actual improvements would not take place along the entire length of the roads; only intermittent pockets of construction activity would occur.

Alternative Action 2 is the same as Alternative Action 1; however, it allows repair and stabilization to 15 additional project sites that require archeological investigations, engineering design plans and SHPO notifications of anticipated effect before construction (397 projects total).

Under the No-Action Alternative, the USMC would not conduct repairs of the training area access roads. The access roads would continue to suffer erosion damage, potentially leading to personnel injuries and vehicle accidents. MCB CamPen would continue to perform temporary access road maintenance activities as authorized under the existing programmatic CATEX. The CATEX includes several construction restrictions and seasonal limitations that make more substantial access road repair projects difficult to schedule around range training activities. The No-Action Alternative is not considered a reasonable alternative because it does not meet the purpose and need of the Proposed Action.

Selected Alternative: Based on the analysis in the EA, I have selected Alternative 1 for implementation.

Summary of Environmental Effects: The EA analyzed the potential environmental impacts resulting from implementation of the Proposed Action. The resources most likely to be affected by this action are air quality, cultural resources, biological resources, water resources, and topography, geology and soils. Impacts to the following resources were considered to be negligible or non-existent and were not further analyzed in the EA: land use, socioeconomics, environmental justice, transportation, hazardous materials and wastes, noise, public health and safety, aesthetics, and public services and utilities. Implementation of Alternative 1 will not result in significant impacts to any resource area and will comply with all regulatory requirements. There are no significant cumulative impacts associated with this project.

Findings: There will not be any disproportionately high and adverse human health or environmental effects from Alternative 1 on minority or low-income populations. Nor will there be any impacts associated with the protection of children from environmental health and safety risks.

The EA and Finding of No Significant Impact addressing this action are on file and may be reviewed at the place of origin: Commanding General, Attn: Director, Environmental Security, MCIWEST-MCB CAMPEN, Box 555008 Camp Pendleton, California 92055-5008, telephone (760) 725-4512.

25 JUNE 2016

Edward D. Banta
Brigadier General, U.S. Marine Corps
Commanding General
Marine Corps Installations West-Marine Corps Base Camp Pendleton

Date

ACRONYMS AND ABBREVIATIONS

ac	acre(s)
ADI	Area of Direct Impact
APE	Area of Potential Effect
AQMD	Air Quality Management District
ARTO	arroyo toad
AWC	all weather crossing
BA	Biological Assessment
BEQ	Bachelors Enlisted Quarters
BEVI	least Bell's vireo
BMP	best management practices
BO	Biological Opinion
BRFI	thread-leaved Brodiaea
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
CAGN	California gnatcatcher
CARB	California Air Resources Board
CATEX	Categorical Exclusion
CDFW	California Department of Fish and Wildlife
CDMG	California Division of Mines and Geology
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CH_4	methane
cm	centimeter(s)
CNPS	California Native Plant Society
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
CSS	Coastal sage scrub
CWA	Clean Water Act
EA	Environmental Assessment
EIS	Environmental Impact Statement
EO	Executive Order
EOD	Explosive Ordnance Division
ES	Environmental Security
ESA	Endangered Species Act
°F	Fahrenheit
FONSI	Finding of No Significant Impact
ft	foot/feet
General Permit	General Construction Stormwater Permit
GHG	greenhouse gas(s)
GIS	geographic information systems
GWP	global warming potential
ha	hectare(s)
HW	hazardous waste
I-5	Interstate 5
INRMP	Integrated Natural Resources Management Plan
IR	Installation Restoration
km	kilometer(s)
kV	kilovolt
LETE	California least tern
m	meter(s)
$\mu g/m^3$	micrograms per cubic meter
mg/m^3	milligrams per cubic meter
MBTA	Migratory Bird Treaty Act
MCB	Marine Corps Base
MCO	Marine Corps Order
MILCON	Military Construction
NAAQS	National Ambient Air Quality Standards
NAVFAC SW	Naval Facilities Engineering Command Southwest
Navy	Department of the Navy
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
N_2O	nitrous oxide
NO_2	nitrogen dioxide
NO_x	nitrogen oxides
NRHP	National Register of Historic Places
O_3	ozone
$PM_{2.5}$	particulate matter less than 2.5 microns in diameter
PM_{10}	particulate matter less than 10 microns in diameter
PPM	Pacific pocket mouse
ppm	parts per million
RBF	Robert Bein, William Frost & Associates
RFS	Riverside fairy shrimp
ROD	Record of Decision
SCM	Special Conservation Measure
SDAB	San Diego Air Basin
SDCAPCD	San Diego County Air Pollution Control District
SDFS	San Diego fairy shrimp
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SKR	Stephens' kangaroo rat
SNPL	western snowy plover
SO_2	sulfur dioxide
SO_X	sulfur oxides
SWRCB	State Water Resources Control Board
SWPPP	Storm Water Pollution Prevention Plan
TWG	tidewater goby
U.S.	United States
USACE	U.S. Army Corps of Engineers
USC	U.S. Code
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USMC	U.S. Marine Corps
UST	Underground Storage Tank
VOC	volatile organic compound(s)
WIFL	southwestern willow flycatcher

EXECUTIVE SUMMARY

The United States Marine Corps (USMC) has prepared this Environmental Assessment (EA) in compliance with the National Environmental Policy Act (NEPA) of 1969 (42 United States Code Sections 4321-4370h), as implemented by the Council on Environmental Quality (CEQ) implementing regulations (40 Code of Federal Regulations Parts 1500-1508), and Marine Corps Order P5090.2A, Change 3, dated 26 August 2013, *Environmental Compliance and Protection Manual*, that establishes USMC procedures for implementing NEPA.

This EA describes the potential environmental consequences resulting from the USMC proposal to make numerous relatively minor road repairs and enhancements to improve safety, minimize erosion, and lessen the need for maintenance on and adjacent to paved and unpaved training area access roads throughout Marine Corps Base (MCB) Camp Pendleton, California.

The purpose of the Proposed Action is to: (1) improve access for both range users and emergency vehicles; (2) reduce the frequency of access road maintenance; and (3) increase user safety by improving the access roads. MCB Camp Pendleton needs to repair and stabilize this road network as worsening erosion and insufficient maintenance have seriously degraded the condition of training area access roads. Erosion damage creates a safety hazard to personnel, especially during periods of inclement weather. Deteriorated access roads also increase vehicle maintenance and reduce vehicle longevity. Proposed improvements to the access roads would ensure safe, reliable access for training units to various training ranges, which is critical to the development of combat readiness skills. These repairs would also improve the safety of tactical vehicle operations during and after rain events and facilitate the transit of emergency vehicles.

This EA evaluates the implementation of the Proposed Action/Alternative 1, Alternative 2, and the No Action Alternative. The scope of this EA provides a detailed analysis of the potential impacts on the following resource areas due to implementation of the Proposed Action/Alternative 1, Alternative 2, and the No Action Alternative: Topography, Geology, and Soils; Hydrology; Biological Resources (vegetation/wetlands, wildlife, and threatened/endangered species); Cultural Resources; and Air Quality. In compliance with NEPA, CEQ regulations, Department of the Navy, and USMC procedures for implementing NEPA, the USMC determined that potential impacts to the following resource areas would be negligible or non-existent and therefore were not analyzed in detail: land use, socioeconomics, environmental justice, transportation, hazardous materials and wastes, noise, public health and safety, aesthetics, and public services and utilities.

Implementation of the Proposed Action/Alternative 1, Alternative 2, or the No Action Alternative would not result in significant impacts to any resource area. The No Action Alternative would, however, not meet the purpose of and need for the Proposed Action. Based on the analysis presented in this EA, the USMC has identified the Proposed Action/Alternative 1 as the preferred alternative.

Table ES-1. Summary of Environmental Consequences

Resource Area	*Proposed Action/ Alternative 1*	*Alternative 2*	*No Action Alternative*
Topography, Geology, Soils	•	•	•
Hydrology	•	•	•
Biological Resources	•	•	•
Cultural Resources	•	•	•
Air Quality	•	•	•

Note: • indicates no significant impact

Final

ENVIRONMENTAL ASSESSMENT

FOR THE REPAIR OF ACCESS ROADS AT
MARINE CORPS CAMP PENDLETON
SAN DIEGO COUNTY, CALIFORNIA

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1 PURPOSE OF AND NEED FOR PROPOSED ACTION

1.1 INTRODUCTION

The United States (U.S.) Marine Corps (USMC) has prepared this Environmental Assessment (EA) in compliance with the National Environmental Policy Act (NEPA) of 1969 (42 United States Code [USC] Sections 4321-4370h), as implemented by the Council on Environmental Quality implementing regulations (40 Code of Federal Regulations Parts 1500-1508), and Marine Corps Order P5090.2A, Change 3, dated 26 August 2013, *Environmental Compliance and Protection Manual*, that establishes USMC procedures for implementing NEPA.

This EA describes the potential environmental consequences resulting from a proposal to repair existing training area access roads located throughout Marine Corps Base (MCB) Camp Pendleton, California. The proposal consists of a variety of repair designs including regrading/resurfacing, slope stabilization, signage, culverts, drainage ditches, riprap protection, and all weather crossings (AWCs).

1.2 PROJECT LOCATION

The proposed project area is located at MCB Camp Pendleton, the USMC's major amphibious training center for the west coast. MCB Camp Pendleton encompasses over 125,000 acres (ac) (50,585 hectares [ha]) within the northern portion of San Diego County, approximately 40 miles (64 kilometers [km]) north of the City of San Diego. MCB Camp Pendleton is bordered to the northwest by Orange County, to the north and east by the City of San Clemente and the Cleveland National Forest, to the east by the community of Fallbrook and the Naval Weapons Station Seal Beach Detachment Fallbrook, to the south by the City of Oceanside, and to the west by the Pacific Ocean. MCB Camp Pendleton is primarily accessed by Interstate 5 (I-5) and State Route 76 (Figure 1-1).

1.3 BACKGROUND

The mission of MCB Camp Pendleton is to operate an amphibious training base that promotes the combat readiness of operating forces by providing facilities, services, and support responsive to the needs of Marines, Sailors, and their families. MCB Camp Pendleton is the only west coast installation that has the unique and complete combination of space that can support multi-organizational, multi-dimensional amphibious training exercises. The USMC requires that troops are trained and combat-ready for global deployment. Mandated training activities must include, but are not limited to: amphibious landings, use of tracked vehicles, personnel maneuvers, artillery and small arms firing, aerial weapons delivery, engineer support operations, logistics support, field combat service support, communications, airlift support (re-supply) of troops and weapons, equipment maintenance, and field medical treatment.

Ranges and training areas at MCB Camp Pendleton provide a realistic training setting in extensive and diverse coastal and inland environments. MCB Camp Pendleton provides training and weapons testing facilities for military personnel, other federal, state, and local agencies, and private research firms. Approximately 45,000 training events occur each year in 31 training areas at MCB Camp Pendleton.

Figure 1-1
Regional Location of MCB Camp Pendleton

Source: MCB Camp Pendleton 2012

Primary access to the inland training areas and ranges is through a distributed network of dirt or gravel roads covering the extensive backcountry of MCB Camp Pendleton. These access roads currently exhibit poor drainage and moderate to extensive erosion damage as the soils are prone to erosion. Furthermore, steep and highly eroded side slopes border several of the access roads. The lack of ditches and swales along the access roads has created a continuous erosion problem that dictates the need for constant maintenance. In addition, the intensive use of this area has exacerbated erosion damage that creates a serious safety hazard to personnel and vehicles, especially during periods of inclement weather. Deteriorated roads also reduce vehicle longevity.

1.3.1 NEPA History

From fall of 2004 to spring of 2005, MCB Camp Pendleton experienced exceptionally heavy rain from several storms. Runoff damaged many of the access roads, and caused extensive erosion of the roads as well as many of the slopes bordering the roads. Erosion and maintenance problems are likely to become worse with time, and may eventually render the access roads inaccessible if uncorrected. To address these on-going erosion challenges, MCB Camp Pendleton performs frequent maintenance of a temporary nature under a programmatic Categorical Exclusion (CATEX) 980075 (USMC 1998).

The Proposed Action described in this EA is for the USMC to conduct several types of engineered road repairs that would improve safety, minimize erosion, and that would lessen the need for as much ongoing maintenance on and adjacent to paved and unpaved training area access roads throughout MCB Camp Pendleton. Improvements to the access roads would facilitate the transit of emergency vehicles and training units to various training areas and ranges that are critical to the development of combat readiness.

Specific recommendations regarding repair on each access road alignment is included in the *Engineering Design Investigation Report for the Repair to Access Roads to Training Ranges, Camp Pendleton*, prepared by Robert Bein, William Frost & Associates (RBF) (RBF 2000). In general, the study recommended improvements in road surfaces (i.e., gravel roads), drainage (i.e., culverts with headwalls), and road delineation (i.e., signs). MCB Camp Pendleton and Naval Facilities Engineering Command Southwest (NAVFAC SW) personnel toured the access roads in 2005 and 2006 and subsequently updated the repair plan based on conditions they observed.

Between the start of this EA (2008) and the present, the number of access roads analyzed was reduced from 24 to 20 as repairs to roads (16 and 18) were completed as part of another action. Furthermore, segments of two roads (10 and 22) had repairs done as part of other projects. As these repairs were covered under separate NEPA documentation, they were removed from this proposed action in 2012. In 2015, a short segment of Access Road 2 was eliminated from the EA, although the majority of the road remains in the Proposed Action. In 2016, 15 sites requiring cultural resource testing were eliminated from the Proposed Action/Alternative 1 and placed into Alternative 2. Completed reference documents and supporting studies may still reference “24 Access Roads;” however, this EA has been updated to only analyze repairs to those roads and road segments still needing to be completed.

1.4 Purpose of and Need for the Proposed Action

The purpose of the Proposed Action is to: (1) improve access for both range users and emergency vehicles; (2) reduce the frequency of access road maintenance; and (3) increase user safety by improving the access roads. The USMC needs to repair and stabilize this road network as current erosion and maintenance problems have seriously degraded the condition of the training area access roads.

Erosion damage creates a safety hazard to personnel, especially during periods of inclement weather. Deteriorated access roads also increase vehicle maintenance and decrease vehicle longevity. Proposed improvements to the access roads would ensure safe, reliable access for training units to various training ranges, which is critical to the development of combat readiness skills. These repairs would also improve the safety of tactical vehicle operations during and after rain events and facilitate the transit of emergency vehicles.

1.5 Scope of Environmental Review

The first step in defining the scope of the EA was to classify resources into two categories: (1) resources that were analyzed in previous NEPA documents, (discussed in Section 1.3.1 and in Section 1.5.1 below) and; (2) all resources that could be impacted by the Proposed Action. The scope of this EA provides a detailed analysis of the potential impacts on the following resource areas due to implementation of the Proposed Action/Alternative 1, Alternative 2, and the No Action Alternative: Topography, Geology, and Soils; Hydrology; Biological Resources (vegetation/wetlands, wildlife, and threatened/endangered species); Cultural Resources; and Air Quality.

1.5.1 Resource Areas Eliminated from Detailed Analysis

Several other resource areas typically assessed in environmental documents were considered but not carried forward for detailed analysis in this EA. This is because any potential impacts to these resource areas from the action alternatives would be either non-existent or considered negligible at most. The reasons for not analyzing the following resources in detail are presented below:

Land Use. Proposed access road repair activities would take place within MCB Camp Pendleton boundaries in accordance with all applicable land use restrictions, and would not change existing land uses or alter the training tempo of the ranges. Therefore, impacts to land use would not occur.

***Socioeconomics*.** The Proposed Action would not result in the displacement of people or businesses and would not change the economic character or stability of the surroundings. Workers would come from neighboring communities. There would be no net population change due to the project. Therefore, impacts to socioeconomics would not occur.

***Environmental Justice*.** Executive Order (EO) 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, requires federal agencies to consider human health and environmental conditions in minority and low-income communities. MCB Camp Pendleton is not in or surrounded by a community populated by census-defined minority and low-income populations. The Proposed Action would not result in a permanent change to population ethnicities or age distributions. There would be no human

health or adverse environmental conditions placed upon minority and/or low-income populations.

EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, helps ensure that federal agencies' policies, programs, activities, and standards address environmental health and safety risks to children. As the Proposed Action would occur in isolated areas on a military installation with restricted access to the public, it would not result in a disproportionate impact to minority populations or low-income populations nor would it result in environmental health risks or safety risks to children. Standard job site safety measures would be implemented, which include securing equipment, materials, and vehicles, as well as neutralizing potential safety hazards, should unauthorized persons visit the site during non-working hours. Therefore, there would be no disproportionate impact to the health and safety of children.

Transportation. MCB Camp Pendleton uses the roads in the project area for training purposes only and the roads do not link to local or regional transportation networks. The USMC would not construct new roadways nor demolish existing roadways. Therefore, impacts to transportation would not occur.

Hazardous Materials and Wastes. An analysis of all known Underground Storage Tanks (USTs), Installation Restoration (IR), Hazardous Waste (HW), and petroleum-related sites compared to the proposed project area, revealed that all known IR and HW sites are located at least 370 feet (ft) (112 meter [m]) from the project area, except for Access Road 23 (USMC 2009). Access Road 23 overlaps two known IR sites (Sites 1F and 2D) and is adjacent to IR Site 20. Contractors would use this portion of the Access Road 23 project area as staging area (no ground disturbing activities would occur in this area). In addition, no known UST sites are located in the project area (USMC 1998). Therefore, no impacts to known UST, IR, and HW sites would occur.

All known petroleum-related sites (i.e., fuel pipelines) are located at least 475 ft (144 m) from the proposed repair areas, except for Access Roads 4, 7, 11, 12, 13, 21, and 24. Some portions of these access roads overlap a known jet fuel line (USMC 2009). Thus, contractors would appropriately flag or stake, before repair activities, all known petroleum related sites. The contractor would avoid these areas throughout all proposed access road repair activities. In the unlikely event of a hazardous material spill, the contractor and response teams would enact the procedures as specified in the Resource Conservation and Recovery Act Division Spill Response planning program to contain and clean-up the spill as directed by MCB Camp Pendleton.

Noise. Noise associated with construction would be temporary and would be consistent with the existing noise environment on MCB Camp Pendleton. Noise generated by proposed repair activities would not extend off MCB Camp Pendleton. Therefore, noise impacts to MCB Camp Pendleton and surrounding areas would not occur.

Public Health and Safety. Proposed access road repair activities would occur within a military installation with restricted access. Therefore, impacts to public health and safety would not occur.

Aesthetics. The resulting access road improvements would be consistent with the existing landscape and aesthetics. Therefore, aesthetic impacts would not occur.

Public Services and Utilities. The Proposed Action would not construct new facilities and would not interrupt existing public services and utilities. Therefore, impacts to public services or utilities would not occur.

1.6 Summary of Key Environmental Compliance Requirements

1.6.1 National Environmental Policy Act

NEPA (42 USC sections 4321–4370h) is a federal statute requiring the identification and analysis of potential environmental impacts associated with proposed major federal actions before those actions are taken. NEPA established the CEQ, which was charged with the development of implementing regulations and ensuring Federal agency compliance with NEPA. The process for implementing NEPA is codified in 40 Code of Federal Regulations [CFR], Parts 1500–1508, *Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act* (CEQ Regulations). The USMC implements NEPA through Marine Corps Order P5090.2A, *Environmental Compliance and Protection Manual, Chapter 12*.

1.6.2 Integration of Other Environmental Statutes and Regulations

According to CEQ regulations, the requirements of NEPA must be integrated "with other planning and environmental review procedures required by law or by agency so that all such procedures run concurrently rather than consecutively" (40 CFR 1500.2). Statutes, regulations, instructions, ordinances, rules, and policies applicable to the analysis in this EA are provided below. The NEPA process does not replace procedural or substantive requirements of other environmental statutes and regulations; it addresses them collectively, which enables the decision-maker to have a comprehensive view of key environmental issues and requirements associated with a proposed action.

The USMC has prepared this EA based upon federal and state laws, statutes, regulations, and policies that are pertinent to the implementation of the Proposed Action, including the following:

- NEPA (42 USC sections 4321-4370h), which requires an environmental analysis for major federal actions that have the potential to significantly impact the quality of the human environment
- CEQ Regulations for Implementing the Procedural Provisions of NEPA (40 CFR parts 1500-1508)
- Department of the Navy (Navy) regulations for implementing NEPA (32 CFR part 775), which provides Navy policy for implementing CEQ regulations and NEPA
- Clean Air Act (CAA) (42 USC section 7401 et seq.)
- Clean Water Act (CWA) (33 USC section 1251 et seq.)
- Coastal Zone Management Act (16 USC section 1451 et seq.)
- National Historic Preservation Act (NHPA) (54 USC section 306108 et seq.)
- Endangered Species Act (ESA) (16 USC section 1531 et seq.)
- Magnuson-Stevens Fishery Conservation and Management Reauthorization Act (16 USC section 1801 et seq.)
- Marine Mammal Protection Act (16 USC section 1361 et seq.)
- Migratory Bird Treaty Act (MBTA) (16 USC section 703-712)

- Bald and Golden Eagle Protection Act (16 USC section 668-668d)
- EO 11988, Floodplain Management
- EO 12088, Federal Compliance with Pollution Control Standards
- EO 12114, Environmental Effects Abroad of Major Federal Actions
- EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations
- EO 13045, Protection of Children from Environmental Health Risks and Safety Risks
- EO 13089, Coral Reef Protection
- EO 13175, Consultation and Coordination with Indian Tribal Governments
- EO 13693, Planning for Federal Sustainability in the Next Decade

1.6.3 Public Involvement

Materials relating to public involvement are included in Appendix A of this EA.

1.7 Organization of This Environmental Assessment

Chapter 1 of this EA describes the background and purpose of and need for the Proposed Action. Chapter 2 describes the Proposed Action/Alternative 1, Alternative 2, and the No Action Alternative. Chapter 3 provides a description of the affected environment and the environmental consequences with the implementation of each alternative for each environmental resource area. Chapter 4 addresses the cumulative impacts of the Proposed Action/Alternative 1, Alternative 2, and other projects in the area. Chapter 5 provides other analyses required by NEPA. Chapter 6 presents the references. Chapter 7 presents the agencies and persons contacted in the development of this EA. Chapter 8 presents the list of preparers and their qualifications. Appendices A through J contain specialized survey reports and analyses prepared in support of the Proposed Action.

2 PROPOSED ACTION AND ALTERNATIVES

2.1 Proposed Action/Alternative 1

The Proposed Action/Alternative 1 is to repair and stabilize existing paved and unpaved training area access roads throughout MCB Camp Pendleton's training ranges. The roads provide access to ranges in support of amphibious and inland training activities. An estimated 48 miles (68 km) of access roads are involved in the Proposed Action. The roads proposed for repair contain surfaces of compacted dirt, gravel, and sand in varying conditions of maintenance. The actual improvements would not take place along the entire length of the roads; only intermittent access road segments would be subject to repairs. The improvement projects would involve pockets of construction activity along the roadways (Figures 2-1 through 2-9).

The access roads are located on sloping coastal terraces, hillsides, and valleys dissected by gullies, ravines, and swales. The soils underlying the roads are susceptible to erosion. Episodes of heavy rain cause loose soil on the roads to erode each year, making many access road sections impassable to vehicles and treacherous for foot traffic. Short-term repairs consisting of regrading and the placement of fill soils within the existing roadbeds typically occurs each year, sometimes repeatedly within a year, to allow safe and effective use of the roads.

2.1.1 Proposed Repair Types

The USMC proposes to conduct several types of road repairs and enhancements to improve safety, minimize erosion, and to lessen the need for maintenance on and adjacent to paved and unpaved training area access roads throughout MCB Camp Pendleton. These proposed repair activities would provide erosion protection for several years (under normal weather conditions), thereby greatly reducing annual maintenance costs. Proposed engineering solutions to access road erosion problems include road improvements, drainage improvements, stabilization, and delineation (Table 2-1). The following sections present descriptions of these types of access road repair projects.

Table 2-1. Proposed Access Road Repair Projects

Repair Type	*Project*	*Count*
Road Improvements	Regrade	33
	Resurface	39
	Road realignment	3
	AWCs	30
Drainage Improvements	Ditch/Swale	58
	Culverts/Headwalls	155
	Other	8
Stabilization	Slope stabilization/riprap	27
	Revetment/retaining wall	3
Delineation	Signage	26
	Vegetation maintenance	13
	Guardrail	2

Note: AWC = all weather crossing.

Road Improvements

Proposed road improvements would include regrading and resurfacing the access roads, filling road ruts, and constructing AWCs (also known as Arizona Crossings). Portions of access roads that are subject to severe erosion and that support a high amount of foot and vehicle traffic would receive new asphalt or concrete pavement surfaces. The paved parts of the AWCs would not block or channelize the flow but would be flush with the bed of the respective channel. Proposed road improvements include grading a slight crown in the roads to direct runoff laterally, further reducing the potential for erosion. To provide a smooth transition to existing topography and minimize erosion potential, proposed repair activities include slight side grading (less than a 2:1 slope) of roadway edges.

Proposed road improvements would also involve a limited number of small road realignments to smooth out sharp corners and to cross severely eroded drainages on steep slopes. Road realignments would require minor amounts of cut and fill of soil to establish new road platforms.

Where access roads cross wide, shallow drainage features, MCB Camp Pendleton would construct a concrete AWC across the length of the crossing. The AWC would facilitate the movement of runoff across the road surface, reducing the potential for erosion.

Drainage Improvements

During storms, access roads that cross drainages frequently become impassable because culverts are under-sized, damaged, or lacking entirely, or because certain roads are located within areas that have the potential to flood and become completely inundated. Under the Proposed Action, culverts, headwalls, ditches and swales, and erosion control measures would be installed to divert runoff and storm water off of roadways and into nearby drainage conveyances. New or replacement culverts would be designed and installed to convey floodwaters under the roads, where deemed necessary to reduce undercutting and erosion. Culverts would be aligned with the direction of stream flow to minimize channel bank erosion. In addition, the new or replacement culverts would be installed at or just below the existing grade to reduce the potential for undercutting or erosion around the culverts.

Ditches and drainage swales would convey runoff into natural drainage features and culverts. Where necessary, the drainage area up- and down-stream of the culvert would be cleared and re-contoured with riprap and/or headwalls to provide a stable drainage under the road. The riprap would consist of variously sized stone to prevent spacing which could lead to undercutting or scouring over time. Drainage outfalls into channels would be placed as close as possible to the base of the channel to prevent “waterfall” erosion. MCB Camp Pendleton would install energy dissipaters (riprap or similar hard materials) to absorb the energy of flowing water and reduce erosion.

Stabilization

Several of the training area access roads pass through canyons, cliffs, or gullies containing unstable banks and slopes that can degrade the roads. Proposed stabilization projects would include the use of retaining walls, riprap, revetments, hydroseed, terracing of slopes, brow ditches, geotextile fabric, sandbags, straw wattles, cut and fill of soil, and other permanent erosion control measures to create more stable grades and headwalls. Theses slope stabilization projects would preserve or restore the existing slopes and prevent future erosion by decreasing runoff intensities.

Road Delineation

Proposed road delineation projects include installing signs indicating upcoming turns and speed limits, installing guardrails along curves with narrow and/or steep road segments, and trimming vegetation from blind corners and overgrown areas. Signage would also be installed at AWCs to deter tactical vehicles from driving into channels. These road delineation actions would improve visibility, vehicle access, and safety along the roadways.

2.1.2 Proposed Repair Activities

Repair Timing

Proposed construction would likely commence in fiscal year 2016 and finish in fiscal year 2019. Repair activities would not occur simultaneously throughout the project area; rather, at any given time only a portion of the access roads would undergo repairs. Construction activity would occur primarily during normal daylight hours (7 AM to 7 PM), 5 days a week. Construction equipment and materials would move to and from the site on existing roads.

Repair Equipment

Proposed access road repair activities would use typical road construction equipment including excavators, compactors, motor graders, dump trucks and concrete mixers, trucks for hauling equipment and materials, and personal (contractor) vehicles.

Construction Area

Construction areas include an additional 100-ft (30-m) wide buffer. The buffer area would enclose potential incidental effects and would accommodate any potential future design modifications. While the actual limits of construction and disturbance may be smaller due to topography, geology, hydrologic conditions, or vegetation surrounding the project sites, the 100-ft (30-m) wide buffer is acceptable for planning and environmental impact analysis purposes.

Staging Areas

The RBF study and subsequent site investigations identified suitable areas for construction staging and incidental work. Staging areas would be located in previously disturbed areas with relatively flat topography and easy access to construction areas. Construction activities would use the staging areas to park vehicles, heavy equipment, and construction trailers and conduct general construction-related activities such as storage of materials, soil stockpiling, vehicle refueling, and general personnel support.

Long-Term Maintenance

Ongoing maintenance of training area access roads on MCB Camp Pendleton would be implemented in accordance with this EA and Biological Opinion (BO).

The repair projects would reduce, but not eliminate, the necessity for frequent maintenance. Following implementation of the Proposed Action, training area access road maintenance would continue as authorized.

2.2 ALTERNATIVE 2

Alternative 2 is the same as the Proposed Action/Alternative 1; however, Alternative 2 includes 15 additional cultural resource sites.

Figures 2-1 through 2-9 illustrate each access road and the repair actions proposed for both action alternatives, as well as the staging areas and 100-ft (30-m) wide buffers surrounding the construction areas. The figures depict the access roads with a trinomial system showing the access road number, repair number, and repair type (e.g., 1-1-Sg). The access road numbers and repair numbers are arbitrary and do not represent the order or priority for proposed access road repair activities.

2.3 No Action Alternative

Under the No Action Alternative, the USMC would not conduct repairs of the training area access roads. The access roads would continue to suffer erosion damage, potentially leading to personnel injuries and vehicle accidents. MCB Camp Pendleton would continue to perform temporary access road maintenance activities as authorized under their programmatic CATEX (USMC 1998). The CATEX includes several construction restrictions and seasonal limitations that make more substantial access road repair projects difficult to schedule around range training activities.

Although the No Action Alternative is not considered a reasonable alternative because it does not meet the purpose of and need for the Proposed Action as required under CEQ regulations (40 CFR section 1502.14[d]), it does provide a measure of the baseline conditions against which the impacts of the Proposed Action can be compared. In this EA, the No Action Alternative represents the baseline conditions described in Chapter 3, Affected Environment and Environmental Consequences.

Figure 2-1
Access Roads Overview

Source: MCB Camp Pendleton 2012b

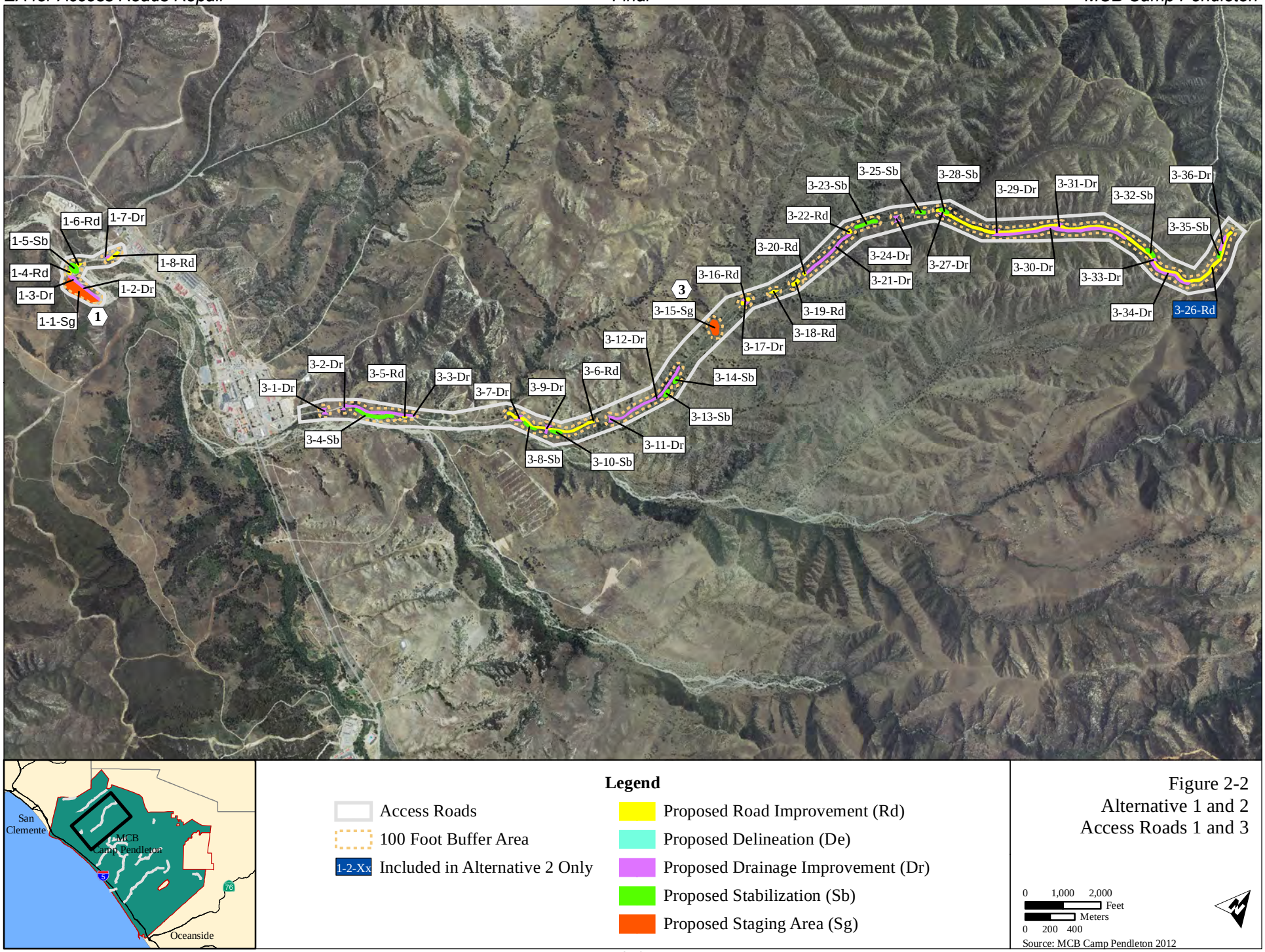


Figure 2-2
Alternative 1 and 2
Access Roads 1 and 3

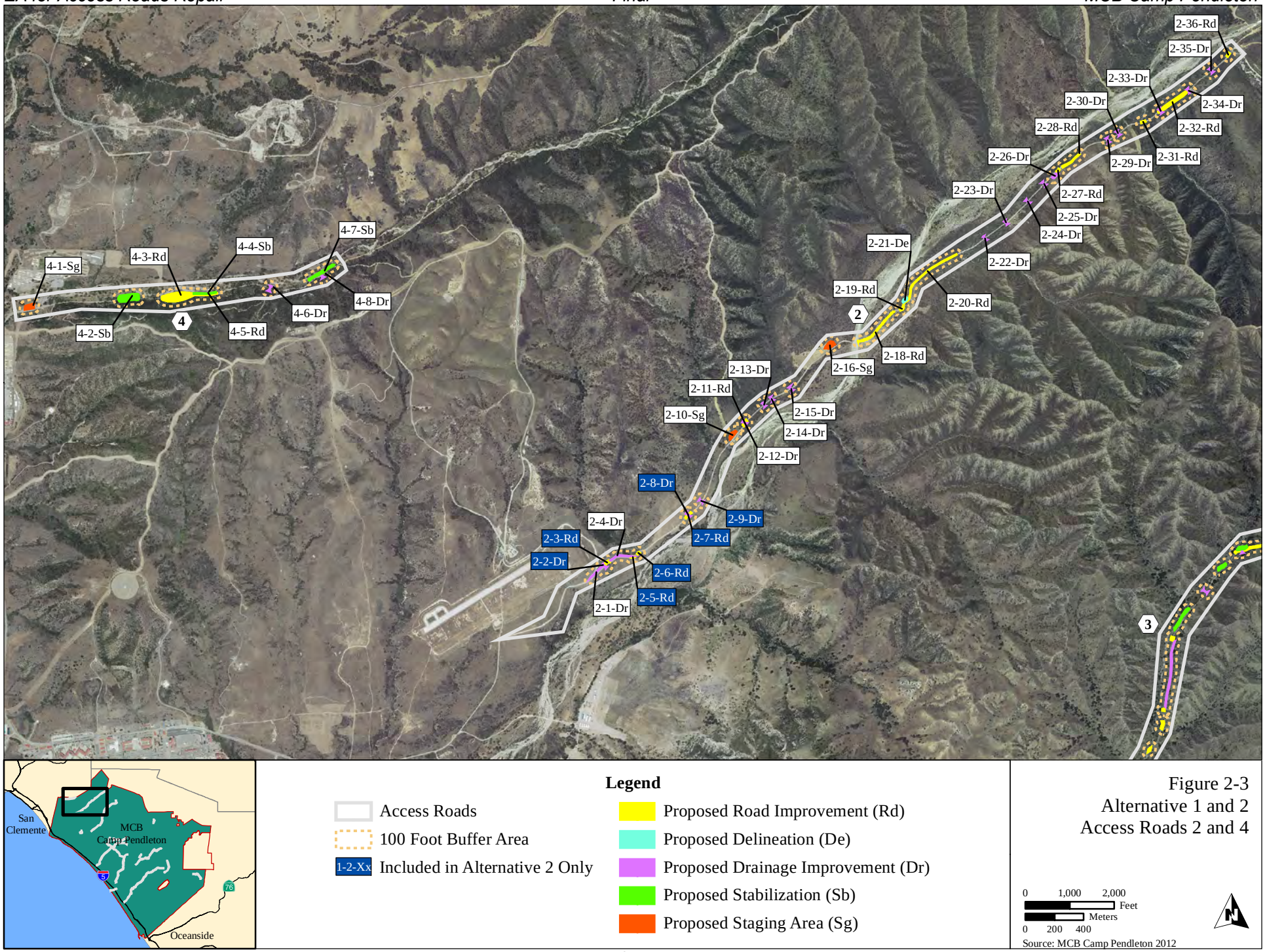
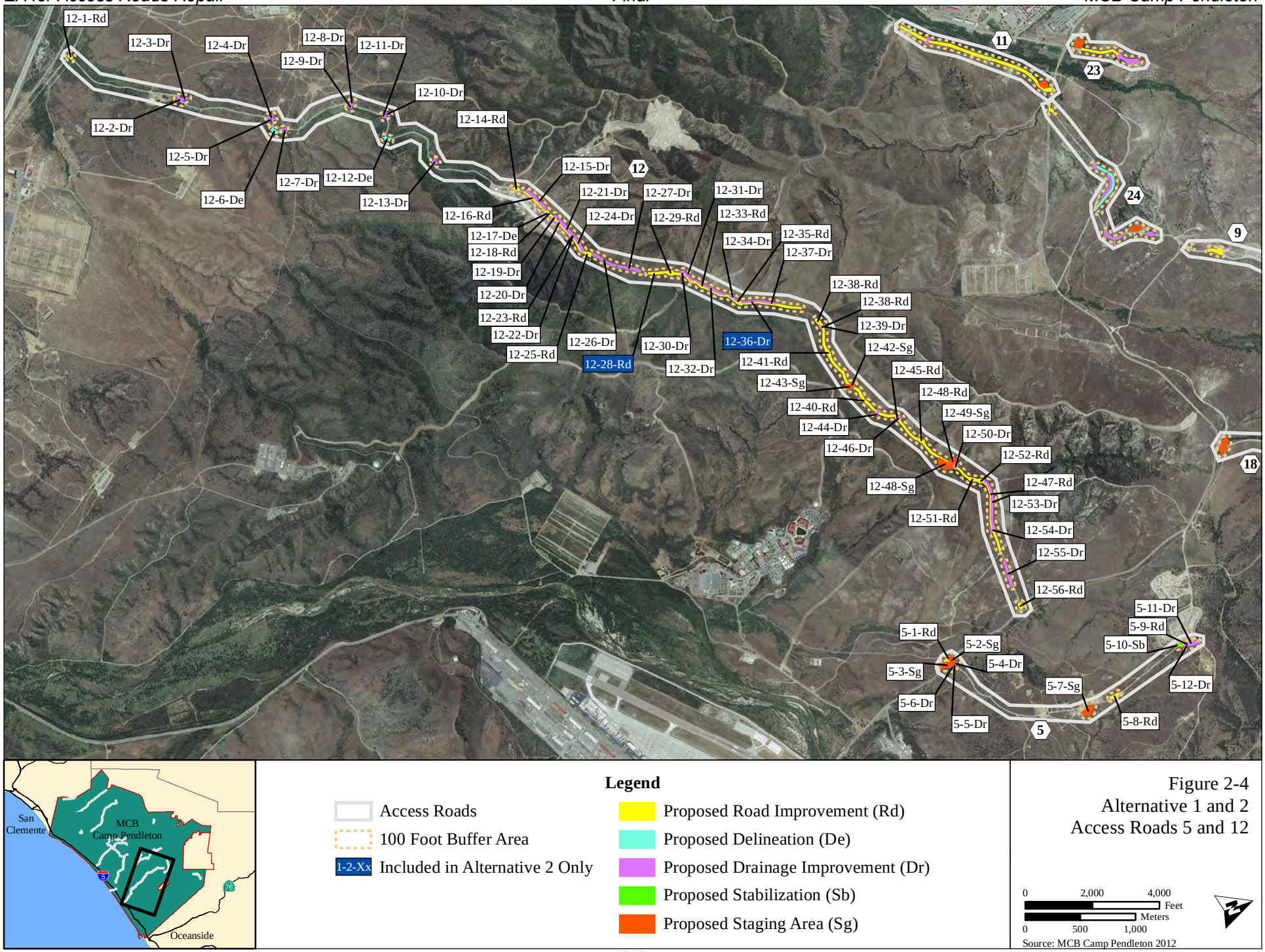


Figure 2-3
Alternative 1 and 2
Access Roads 2 and 4



Legend

- Access Roads
- 100 Foot Buffer Area
- 1-2-Xx Included in Alternative 2 Only
- Proposed Road Improvement (Rd)
- Proposed Delineation (De)
- Proposed Drainage Improvement (Dr)
- Proposed Stabilization (Sb)
- Proposed Staging Area (Sg)

Figure 2-4
Alternative 1 and 2
Access Roads 5 and 12

0 2,000 4,000 Feet
0 500 1,000 Meters

Source: MCB Camp Pendleton 2012

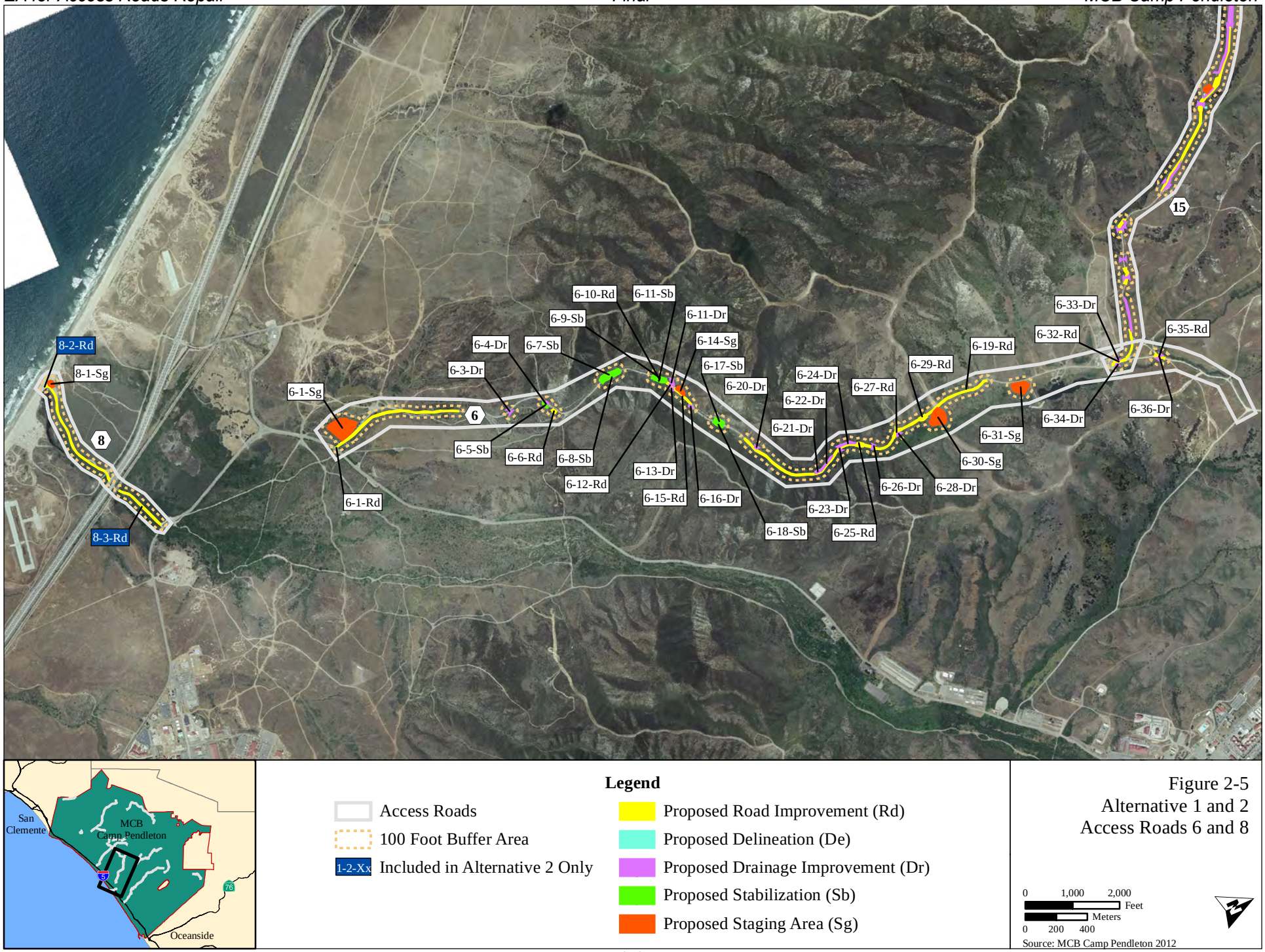


Figure 2-5
Alternative 1 and 2
Access Roads 6 and 8

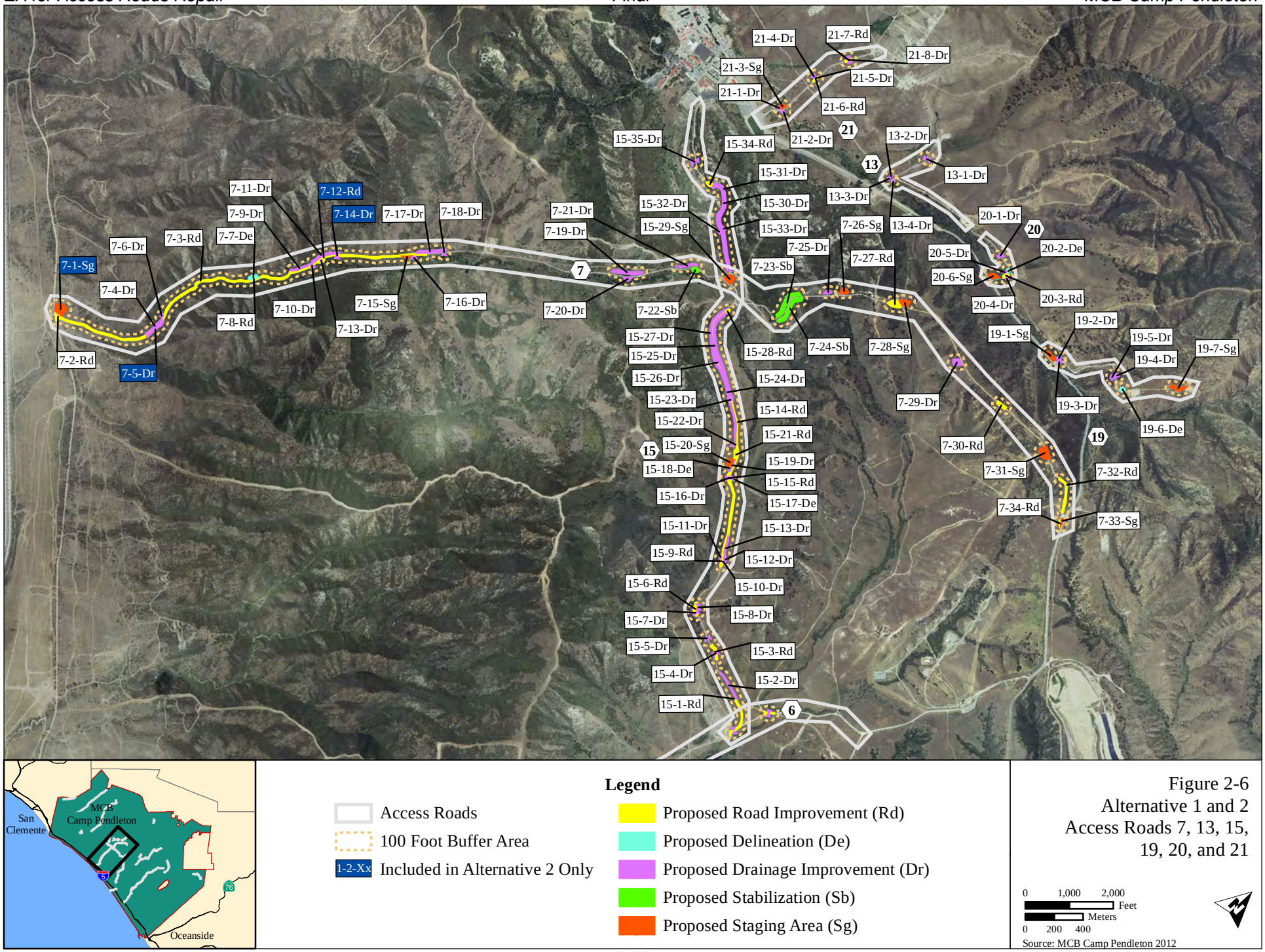


Figure 2-6
Alternative 1 and 2
Access Roads 7, 13, 15, 19, 20, and 21

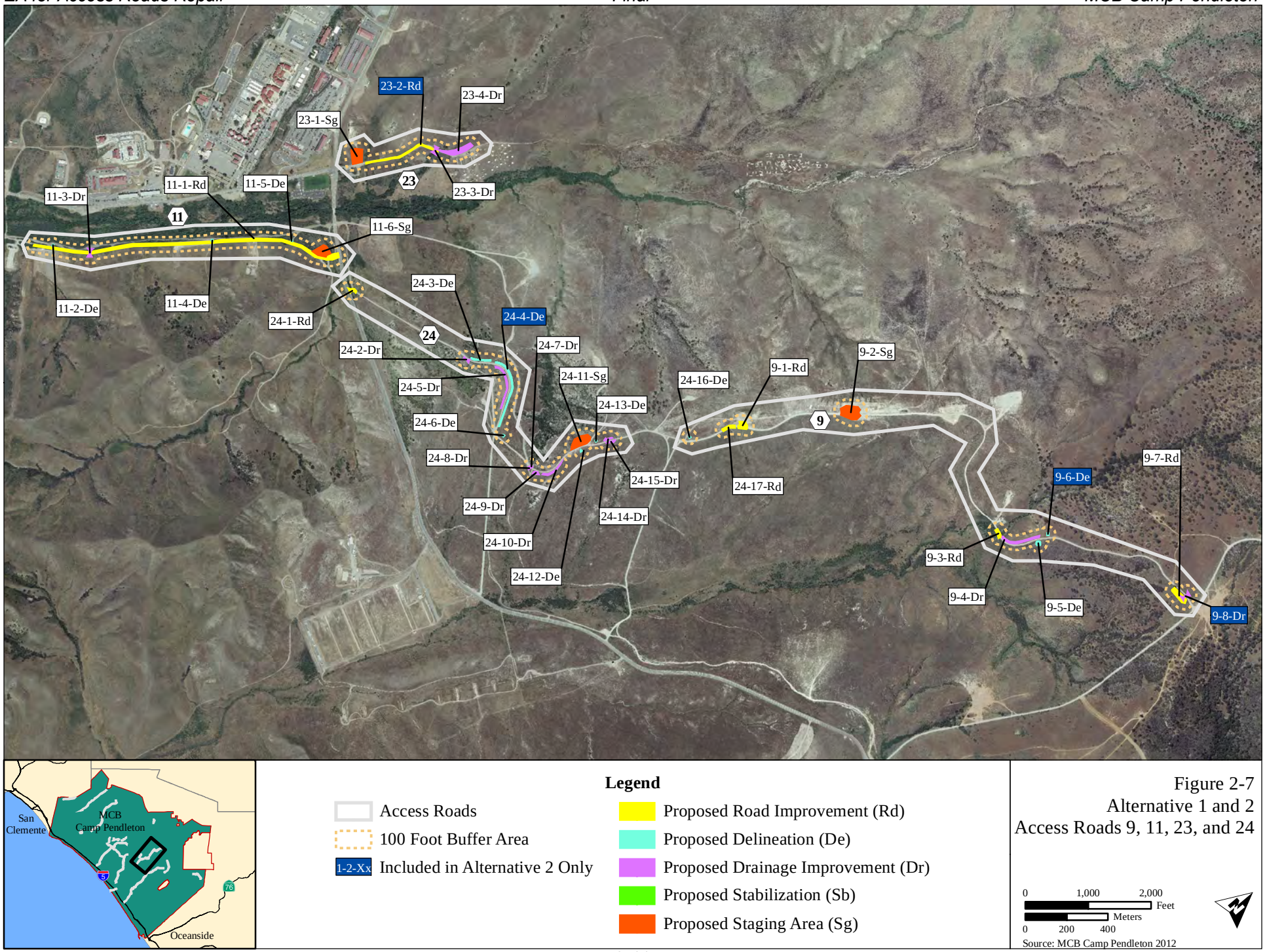


Figure 2-7
Alternative 1 and 2
Access Roads 9, 11, 23, and 24

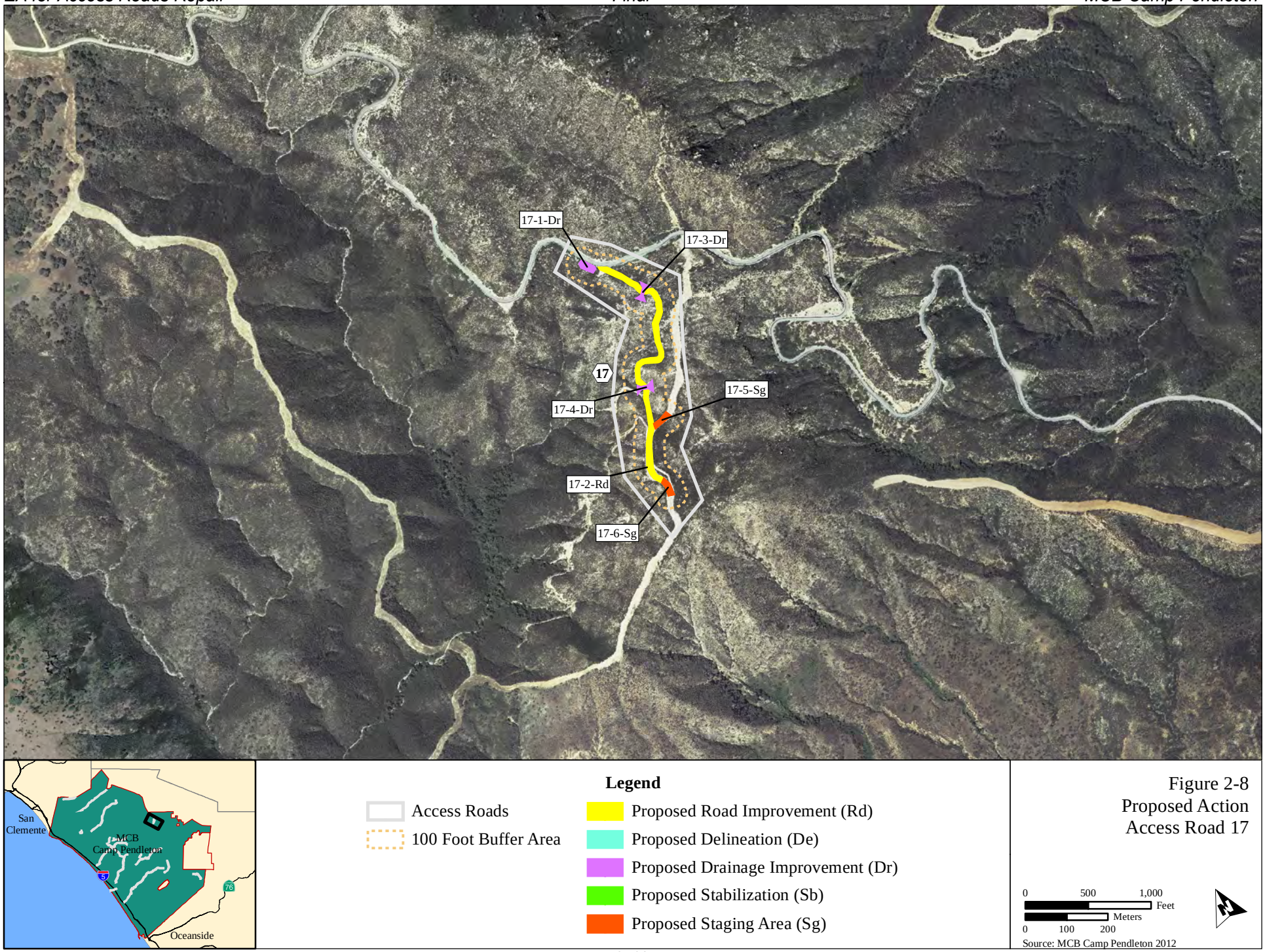


Figure 2-8
Proposed Action
Access Road 17

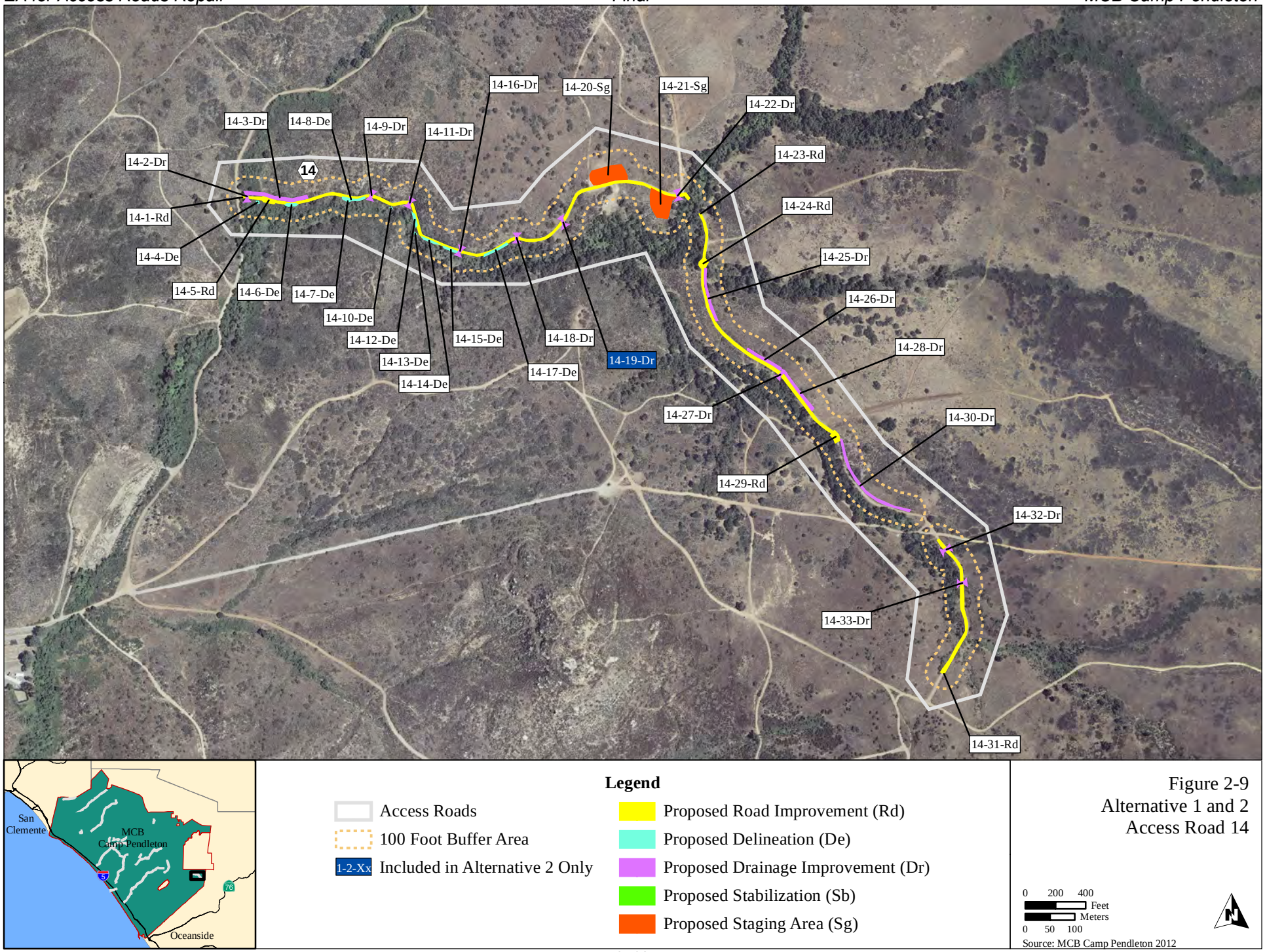


Figure 2-9
Alternative 1 and 2
Access Road 14

2.4 Alternatives Considered but Eliminated

As part of the project planning process, MCB Camp Pendleton identified and then eliminated potential alternatives as presented in the following paragraphs. There are no geographic alternatives (i.e., relocate the roads) because the roads are already in place and provide specific training area access.

2.4.1 Pave All Roads

Under this alternative, MCB Camp Pendleton would pave all of the access roads considered for repair. Based on discussions with the range operators and users of the project area, this is not a viable alternative because tracked vehicles would likely damage the resulting paved roads. Additionally, some training operations require, to the maximum extent practicable, a natural environment in which to train. The training curriculum/guidance recommends avoiding paved roads. The natural environment provides the appropriate “field mindset.” Furthermore, pavement would not fully address the erosion, sedimentation, and drainage issues.

2.4.2 Minimal Design

A minimal design alternative would include a subset of the component activities listed in Table 2-1. The considered minimal design alternative is a smaller, less expensive option with a corresponding smaller area of impact. Developing the minimal design would require that certain activities be eliminated from the scope of the project. Under this potential alternative, repair activities would address only the most severe or significant road issues.

This option is not viable because of the interacting effects of the road problems. Repair activities must address the collective components of culverts, slope stabilization, road resurfacing, and delineation projects. A minimal design alternative would not result in a functional repair, but may lead to a piece-meal approach with several road repair projects required every few years. Recurring minimal repairs would be costly and inefficient when compared to the Proposed Action, which addresses all of the necessary repairs collectively.

2.5 Preferred Alternative

The USMC identifies the Proposed Action/Alternative 1 as the preferred alternative for the repair and stabilization of existing training area access roads at MCB Camp Pendleton.

2.6 Special Conservation Measures

MCB Camp Pendleton would incorporate the following special conservation measures (SCM) into the final design and implementation of the Proposed Action.

2.6.1 General Special Conservation Measures

1. Before the bidding process, the construction contractor(s) would be informed of the biological constraints for this project by MCB Camp Pendleton. All areas to be avoided would be clearly marked on project maps provided to the contractor. These areas would be designated as “no construction” zones. These areas would be flagged before the onset of construction activities. The contractor(s) would be responsible for compensation for direct impacts to biological resources that occur as a direct result of construction activities outside the limits of construction, at a rate determined by the U.S. Fish and Wildlife (USFWS).

2. The contractor would obtain coverage under the General Construction Storm Water Permit (General Permit), State Water Resources Control Board (SWRCB) Order No. 2009-0009-DWQ and would comply with the provisions described below. Soil disturbance includes, but is not limited to, clearing, grading, excavation, stockpiling, demolition, paving, trenching, laydown areas, and construction of access roads.
    a. Prepare a Storm Water Pollution Prevention Plan (SWPPP) in accordance with the General Permit and complete the SWPPP checklist developed by the SWRCB. The SWPPP and the SWPPP checklist would be submitted to the Resident Officer In Charge of Construction before initiation of any soil disturbance.
    b. Obtain coverage under the General Permit by submitting a Notice of Intent, Risk Assessment, Site Map, SWPPP, Signed Certification Statement, and the annual fee. A Waste Discharge Identification number would be received from the SWRCB before initiation of any soil disturbance.
    c. The project would comply with all provisions described in the General Permit and would strictly follow the SWPPP. The SWPPP would be maintained at the project site and updated as necessary to track modifications, Best Management Practice (BMP) location and implementation, training, etc.
    d. After completion of construction activities, a Notice of Termination would be submitted to the SWRCB. To terminate coverage, the project would meet permanent stabilization requirements specified within the General Permit.
3. All disturbed soils would be immediately stabilized following the completion of work, and re-planted with native grass and shrub species that are consistent with pre-existing vegetation. Acceptable plant species are listed in the Base Exterior Architecture Plan. Seed stock would originate within one county of MCB Camp Pendleton. Before approval of the final design, the contractor would obtain MCB Camp Pendleton Environmental Security (ES) approval of seed mixes, container plants, planting/seeding, and monitoring methods proposed for use in revegetation. MCB Camp Pendleton ES would specify minimum performance and success criterion.
4. Noxious weeds (as listed by the federal and California state noxious weed lists) would be controlled by hand weeding or herbicide application in accordance with MCB Camp Pendleton's Integrated Pest Management Plan in disturbed areas as necessary to prevent their establishment.
5. Construction equipment would be washed down when it first arrives on the project site from another construction site to remove any weedy plant seeds. In addition, the biological monitor would also look for invasive species within and immediately adjacent to the project area. If the biological monitor encounters new weedy populations within and immediately adjacent to the project area, he/she would report these populations to ES Land Management Branch.
6. Grading during the rainy season (1 November to 1 May) would be minimized. Where it is impractical to avoid grading during the rainy season, erosion- and sediment-reducing BMPs would be installed and maintained immediately downslope of work areas until work is completed and graded areas have been re-contoured, physically stabilized, and

planted. See species-specific avoidance, minimization, and compensation measures for additional measures during the rainy season.

7. Erosion and sedimentation controls would be monitored and maintained during construction and until disturbed areas are stabilized and not too susceptible to further erosion, as approved by MCB Camp Pendleton ES.
8. In conjunction with the SWPPP, dust in, or adjacent to, riparian areas would be minimized by reducing vehicle speeds and traffic in newly cleared areas and covering or lightly spraying exposed soil piles with water when weather conditions warrant.
9. Concrete discharge would not reach surrounding water bodies or pools unless specifically authorized in a CWA discharge permit.
10. All mechanized clearing and grading, vehicle traffic, equipment staging, and the deposition of soil would be confined to the footprints analyzed in this EA or to other disturbed or developed land designated for such use. Construction site boundaries would be clearly delineated by flagging, stakes, survey laths, or fencing.
11. Heavy equipment and construction activities would be restricted to existing roads and disturbed areas to the maximum extent practicable. Staging areas would be located in previously disturbed areas and would be delineated on the grading plans. Vehicle operation and staging areas would be defined by staking and flagging between stakes to prevent operations outside these areas. All trash would be disposed of properly. All equipment and waste would be removed from the site. The site would be restored to as near the original biological condition as possible once the project is completed. If MCB Camp Pendleton's hazardous waste generator identification number is utilized on the manifest for hazardous waste disposal, then the manifest must come through the MCB Camp Pendleton ES Hazardous Waste Branch office for signature.
12. To minimize wildfire risk, construction crews would exercise care when driving on unpaved roads and not park vehicles where they could ignite dry vegetation. In times of high fire hazard, trucks may need to carry water and shovels or fire extinguishers to the project site. The use of shields, protective mats, or other fire prevention equipment would be used during grinding and welding to prevent or minimize the potential for fire. No smoking or disposal of cigarette butts would take place within vegetated areas.
13. Fueling of equipment would be allowed only in designated areas specified on the construction maps and would not occur within 100 ft (30 m) of drainages. Emergency provisions would be in place at all crossings before the onset of construction to prevent accidental spills from contaminating downstream habitats.
14. No excavated or fill material would be placed in a delineated CWA Section 404 water of the U.S. except as authorized by a permit from the U.S. Army Corps of Engineers (USACE).
15. A contractor education program would be conducted by a qualified biologist with oversight by MCB Camp Pendleton ES personnel. It would be conducted during all project phases and cover the potential presence of listed species, the requirements and boundaries of the project; the importance of complying with avoidance, minimization,

and compensation measures; and problem reporting and resolution methods. MCB Camp Pendleton would place signs restricting construction activities to the project site.

16. All project related activities would comply with the MBTA. Active nests (i.e., nests with eggs and chicks) are protected year-round by the MBTA. Project related activities that would require disturbance, removal of an active nest, or cause a breeding bird to leave the nest for prolonged lengths of time are not permitted. Trimming or removal of vegetation during the peak-breeding season (15 February to 31 August) requires a pre-activity survey by a qualified wildlife biologist to determine that active nests would not be affected. If an active nest is found at any time, actions that could harm the nest would cease and MCB Camp Pendleton ES, Wildlife Management Branch would be contacted.

2.6.2 Species-Specific Special Conservation Measures

The Proposed Action would employ protective SCMs for the coastal California gnatcatcher (CAGN), least Bell's vireo (BEVI), southwestern willow flycatcher (WIFL), Stephens' kangaroo rat (SKR), arroyo toad (ARTO), San Diego fairy shrimp (SDFS), Riverside fairy shrimp (RFS), tidewater goby (TWG), thread-leaved brodiaea (BRFI), and the habitats that support these species. SCMs for the Pacific Pocket mouse (PPM), western snowy plover (SNPL), and California least tern (LETE) are not included, as these species have not been documented in the project area.

The USMC would implement the project in accordance with BO FWS-MCBCP-09B0334-09F0946 issued specifically for the Proposed Action (refer to Appendix B). Where inconsistencies or potential conflict exist between the BO and proposed SCMs, the BO would take precedence. The programmatic Riparian/Estuarine BO (USFWS 1995a) also applies. The SCMs listed in this EA are based upon review of potential project effects and relevant measures from other projects on MCB Camp Pendleton, particularly the 2004 BO regarding CAGN at the Tertiary Treatment Plant and Associated Facilities (USFWS 2004a) and the Integrated Natural Resources Management Plan (INRMP) (USMC 2011).

2.6.2.1 Coastal California Gnatcatcher, Least Bell's Vireo, and Southwestern Willow Flycatcher

1. A qualified biologist would monitor all construction activities in and adjacent to coastal sage scrub (CSS) and riparian habitats to ensure compliance with the avoidance, minimization, and compensation measures in the aforementioned general conservation measures, and would keep the MCB Camp Pendleton ES project engineer informed of construction activities that may threaten significant biological resources. The monitor would ensure that incidental disturbance is minimized and limited to activities essential to the project.

2. Final designs for construction would minimize the removal of CSS that could support CAGN breeding, foraging, or dispersal, and hence would be considered CAGN-occupied CSS, based on occurrences documented in basewide or project-specific surveys during the last 3-6 years. Any permanent removal of CAGN-occupied CSS would be recorded and compensated. Temporary effects to all CSS would be restored on-site. Permanent impacts to CAGN-occupied CSS would be compensated at a 2:1 ratio and outlined in a CSS Restoration Plan in place before initiation of construction. The CSS Restoration Plan would be approved by ES Land Management before ground disturbing activity on

any site within this project. This plan would follow the guidance established in the Conceptual Coastal Sage Scrub Restoration Plan for MCB Camp Pendleton. Locations for the planned CSS mitigation would be approved before any ground disturbing activity on any site within this project.

3. Clearing of CSS vegetation would take place only outside of the CAGN breeding season (15 February to 31 August) (USFWS 2004a).
4. Final designs for construction would minimize the removal of riparian habitat that could support listed species. Any unavoidable removal or temporary disturbance of riparian habitat would be compensated in accordance with the MCB Camp Pendleton Riparian/Estuarine BO (USFWS 1995a). All temporarily disturbed riparian areas would be restored to original or better condition, including performing a combination of exotic vegetation control and vegetation management (including replanting if necessary) that would permit native species to regenerate in a timely manner (approximately 3 to 8 years). This restoration would include weeding and monitoring of affected areas for a minimum of three years. Non-native plants, including noxious weeds (as listed by the California Invasive Plant Council), would be prevented from establishing in disturbed sites, either by hand weeding or the selective application of herbicide to the target species. The use of herbicide would include an U.S. Environmental Protection Agency (USEPA)-approved herbicide and manner of application, which would not have toxic effects on fish and wildlife or non-target plant species. The control of noxious weeds in temporarily disturbed areas of this riparian ground is mandated by the Riparian/Estuarine BO (USFWS 1995a). Rehabilitation of natural (non-weedy) areas disturbed by construction would use the original topsoil to the maximum extent practical. Salvaging of native vegetation would be implemented where feasible.
5. Clearing of woody riparian vegetation would take place only outside of the BEVI and WIFL breeding season (15 March to 31 August) (USFWS 2004a).
6. The final acreages of riparian vegetation that are cleared (woody or herbaceous) would be reported to MCB Camp Pendleton's ES, Wildlife and Land Management Branch's biologists for recording into the Riparian BO annual report.
7. After the initial site clearing, ongoing construction activities in or adjacent to CSS and riparian habitats would occur outside of the breeding season when practicable. When breeding season avoidance is not practicable, then the following additional measures would be applied for CAGN, BEVI, and WIFL, and would be subject to review through consultation:
    a. If construction cannot occur outside of the breeding season, then pre-construction surveys would be conducted by a qualified biologist for all individual CAGNs, BEVIs, WIFLs, and active nests in all suitable habitats within 300 ft (91 m) of the proposed construction area (USMC 2011).
    b. If an active CAGN, BEVI, or WIFL nest occurs within 300 ft (91 m) of the proposed construction corridor, construction activities within that distance of the nest location, other than the use of existing roads, would be delayed until the nest fails or until at least 10 days after young fledge from the nest, unless the

USMC and USFWS evaluate the circumstances and mutually agree that disturbance is not likely (USFWS 2004a).

c. A qualified biologist would monitor nest progress and construction activities in and adjacent to CSS and riparian habitats to ensure compliance with the SCMs and would keep the project engineer and MCB Camp Pendleton ES informed of the construction activities that may threaten significant biological resources.

2.6.2.2 Stephens' Kangaroo Rat

1. A USFWS 10(a)(1)(A)-permitted biologist, authorized to handle SKR when necessary to reduce the possibility of harm and mortality, would inspect the construction area each morning before the start of construction, and monitor subsequent construction in potential SKR habitat. Any harm to SKR would be reported to MCB Camp Pendleton ES before reporting to the USFWS. Subject to pre-approval by USFWS, torpid or injured animals (unable to flee) may be temporarily held and transported to an approved location for care and/or rehabilitation. Recovered animals would be returned to a MCB Camp Pendleton ES and USFWS-approved release site.
2. The schedule and final design of access road repairs in potential SKR habitat would be reviewed and approved by MCB Camp Pendleton ES and USFWS before construction. Road repairs in SKR habitat, based on previous trapping results and habitat evaluations, would utilize a minimal design strategy, with minimal cut and fill, ditches on only one side of the road, little or no base material application in ditches, and gaps of natural soil (with no ditching), where runoff is naturally diverted away from the road. No parking zones would be marked along roadside berms that are not proposed for modification.
3. The destruction of potential SKR burrows that show signs of current use or occupancy would be avoided except where such avoidance would preclude repair and result in either (a) additional habitat disturbance by vehicles going around the damaged area of the road; or (b) ultimate closure of the road. The status of burrows potentially in areas of construction would be determined by the onsite SKR permitted biologist. If a potential active SKR burrow cannot be avoided, it would be excavated with hand tools under direction of the SKR biologist, who would either (a) confirm the absence of the animal from the burrow, allowing construction to proceed in the area; or (b) capture and move the animal to a MCB Camp Pendleton ES and USFWS-approved release site. All areas to be avoided would be clearly marked on project maps and provided to the construction contractor. Patches of occupied habitat would also be flagged by a qualified biologist before the onset of construction activities. In some cases, suitable habitat and occupied sites would need to be fenced or otherwise protected from any potential impacts.
4. When project activities are in and/or adjacent to habitat occupied by SKR, all night construction would be prohibited. This includes transportation to and from the project site when the route passes through or adjacent to habitat occupied by SKR.
5. No construction within occupied SKR habitat would occur during rainy periods when burrows may be more susceptible to collapse and degradation from vehicular and foot traffic.
6. For the Access Roads 5 (25 Area Combat Town), 9 (Range 407), and 12 (Aliso Canyon) populations, the rehabilitation of occupied and unoccupied potential habitat would be

pursued. In this regard, a vegetation management plan would be developed in conjunction with an SKR management plan. Examples of vegetation management options include the mowing of exotic grasses (e.g., Bromus diandrus) when their seed heads are up and still immature. All cut grasses would be windrowed and removed or otherwise collected during mowing. In addition, the aerial portion of the sweet fennel (*Foeniculum vulgare*) should be mechanically removed and the base spot treated with an appropriate aquatic use herbicide approved for use near creeks and potential ARTO habitat.

7. For the Access Road 12 (Aliso Canyon) population, the distribution and abundance of this population would be determined and managed accordingly (e.g., preclude habitat-degrading activities at core population areas).
8. A qualified biologist would inspect all excavated soil not replaced within the same day within 120 ft (37 m) of occupied SKR habitat. If SKR sign is found within the temporarily stockpiled soil, the area would be left undisturbed until MCB Camp Pendleton ES and USFWS jointly assess the situation to determine further actions. All excavated soil not replaced within the same day would be completely covered with a tarp and sealed with sandbags or other materials at the end of the day
9. The onsite SKR biologist would advise construction personnel with fine scale recommendations during construction in areas of particular SKR habitat sensitivity. This level of guidance would provide additional protection beyond what can be reasonably foreseen in the coarse-scale diagrams and design plans presented in this EA. Site-specific measures would be developed through the USFWS consultation.
10. Because small mammal populations are not static temporally or spatially, all including the most current SKR survey data for MCB Camp Pendleton would be compiled and used in identifying areas to be potentially avoided during construction activities.
11. Permanent impacts to occupied SKR habitat would be offset at a 2:1 ratio. The contractor would be responsible for an offset at a ratio of 5:1 for unauthorized impacts to occupied SKR habitat outside the limits of the project footprint. Impacted occupied habitat would be compensated for by the enhancement or creation of habitat adjacent to the project through mowing and sweet fennel removal and other weeds. The areas to be enhanced would be selected by the qualified biologist in coordination with the MCB Camp Pendleton ES Wildlife Management Branch.

2.6.2.3 Arroyo Toad

Standard ARTO avoidance and minimization measures listed below would be implemented in or adjacent to occupied ARTO habitat (defined as 1,640 ft [500 m] from any individual known ARTO location).

1. Approved, qualified biologist(s) familiar with ARTO biology would be present during all phases of project related activities in breeding or uplands ARTO habitat. Resume(s) of biologist(s) selected would be provided to ES Wildlife Management Branch, (760) 725-0377 or (760) 725-9729, and must include relevant qualifications, references, and permit number, if applicable. The approved biologist(s) would create a Toad Avoidance and Minimization Plan based on *final* project design, and submit it to ES Wildlife Management Branch for review at least two weeks before the onset of the project to

ensure standard ARTO avoidance measures are incorporated. The Toad Avoidance and Minimization Plan would include an education program to be implemented before construction activities, and the following measures.

2. Temporary silt fencing would be installed around the perimeter of all work areas within potential ARTO habitat.
    a. Such fencing would consist of woven nylon netting approximately 3 ft (1 m) in height attached to wooden stakes.
    b. Before installing the fencing, a narrow trench approximately 1 to 2 inches (2.5 to 5 centimeters [cm]) deep would be excavated and the fence buried to prevent burrowing beneath the fence.
    c. If trenching is not possible or if fencing would be installed in sandy terraces or creek beds, the bottom lip of the fence would have sand bags laid against it sufficient to deter ARTOs from breaching the fence.
    d. All fencing materials (i.e., mesh stakes) would be removed following construction.
    e. Ingress and egress of construction equipment and personnel would be kept to a minimum, but when necessary, equipment and personnel would use a single access point to the site. This access point would be as narrow as possible and be closed off by exclusionary fencing when personnel are not on the project site.
    f. Photographs of the fencing would be submitted to ES after installation and immediately before initiating project activity.
    g. Excavation units and trenches that have not been backfilled at the end of the day would be completely covered with rigid and durable materials to exclude ARTOs and avoid ARTO entrapment.
    h. The excavated soil materials/stockpiles would be completely covered with a tarp and secured with sandbags to deter ARTOs from burrowing under the tarps at the end of the day and would be checked by a qualified biologist.
3. Before construction activities, but after exclusionary fencing has been installed, at least two surveys for ARTOs would be conducted within the fenced areas.
    a. Surveys would be conducted during appropriate climatic conditions and during the appropriate time of day or night to maximize the likelihood of encountering ARTOs.
    b. If ARTOs are found within the project area, they would be captured and translocated, by the qualified biologist, to the closest area of suitable habitat outside the project area, in the same watershed.
    c. Each morning, the qualified biologist would monitor the perimeter inside the fence to ensure no ARTOs have breached the fence, the ingress/egress area before vehicular movement, and the removal of excavation unit covers and soil stockpile tarps. In the event soil piles have not been covered properly, the qualified biologist would sift through the top eight inches of soil to ensure ARTOs are not present.

d. The qualified biologist would survey areas just before ground disturbing activities and would monitor during excavation.

e. A qualified biologist would be present at the end of the day to ensure that the excavations are properly covered to prevent ARTOs from entering any open excavations.

f. The qualified biologist would also be on call and available as needed at other times in the event that an ARTO is encountered during the activities. The qualified biologist would be present on site full-time, for two days to three days, following any measurable rain.

g. Upon notification of an ARTO sighting, the qualified biologist would contact the MCB Camp Pendleton ES who would subsequently contact the USFWS directly. Any type of "take" of ARTOs, which includes: digging up, handling (i.e., relocating the ARTO), injury, or death would be reported immediately to MCB Camp Pendleton ES.

h. The application of BMPs for dust control would be monitored to ensure that only the minimum necessary amount of watering is done, and that such watering does not create runoff or puddles that might attract ARTOs.

i. The qualified biologist would immediately report any ineffective BMPs to MCB Camp Pendleton ES that may affect breeding ARTO habitat.

j. The qualified biologist would document and submit a report on all ARTO related activities and actions taken.

2.6.2.4 San Diego Fairy Shrimp and Riverside Fairy Shrimp

1. To minimize effects on listed fairy shrimp and its habitat, the vernal pool known to contain SDFS on the northwest side of Access Road 8 would be avoided, as the pool is located outside of boundaries of the staging area. The pool would be identified with a fence or markers, and a biological monitor would be present during construction activities to ensure that it is avoided.

2.6.2.5 Tidewater Goby

The following design objectives developed by MCB Camp Pendleton ES would be incorporated into the engineering design to protect Las Flores Creek (adjacent to Access Road 8) and TWG from potential indirect environmental impacts:

1. Construction BMPs would be implemented as part of the SWPPP mentioned previously to limit sediment transport from disturbed soils and substrate.
2. Construction equipment, vehicles, and workers would be required to stay outside of the stream channel estuarine habitat (downstream of the railroad bridge) that could support TWG. A qualified biological monitor under direction of ES would oversee construction near the creek to ensure that erosion and sediment controls are functioning and that there would be no unnecessary disturbance to pools and shallows where TWG might occur.
3. Bank stabilization methods would be used to reduce runoff speed and erosion from the project site. The reduction in floodwater flows would limit bank erosion downstream,

retain embankments along Las Flores Creek, and decrease erosion and sedimentation. Erosion control measures would be reviewed by MCB Camp Pendleton ES personnel.

2.6.2.6 Thread-Leaved Brodiaea

1. Drainage improvements within 100 ft (30 m) of any previously documented BRFI would be confined to existing eroded drainage areas that do not support BRFI. Construction equipment and vehicles would not be parked or driven in areas where BRFI has been documented.

2.6.3 Cultural Resources

1. Avoidance of all eligible and assumed eligible archaeological sites in the Area for Potential Effect (APE).
2. Monitoring of all sites in the APE.
3. Development and implementation of a monitoring program for ensuring avoidance of direct impacts to sites from repair.
4. Development and implementation of a discovery plan.
5. Monitoring of all repair activities will be conducted by a qualified archaeologist and Native American Monitor.
6. A monitoring report will be submitted to the State Historic Preservation Officer (SHPO) upon completion.

2.7 Summary of Environmental Consequences

Table 2-2 provides a summary of impacts, by resource, for the Proposed Action/Alternative 1, Alternative 2, and the No Action Alternative.

Table 2-2. Summary of Environmental Consequences

Resource Area	*Proposed Action/ Alternative 1*	*Alternative 2*	*No Action Alternative*
Topography, Geology, Soils	•	•	•
Hydrology	•	•	•
Biological Resources	•	•	•
Cultural Resources	•	•	•
Air Quality	•	•	•

Note: • indicates no significant impact

3 Affected Environment and Environmental Consequences

This chapter represents baseline conditions and an evaluation of potential impacts resulting from implementation of the Proposed Action/Alternative 1, Alternative 2, and the No Action Alternative.

In compliance with NEPA, CEQ regulations, Navy, and USMC procedures for implementing NEPA, the description of the affected environment focuses only on those resources potentially subject to impacts. In addition, the level of analysis should be appropriate with the anticipated level of impact. Accordingly, the discussion of the affected environment focuses on topography, geology, and soils; hydrology; biological resources; cultural resources; and air quality within the affected area.

3.1 Topography, Geology, and Soils

3.1.1 Definition of Resource

Geologic resources include mineral deposits, significant landforms, tectonic features, and paleontological (fossil) remains. Topography describes the surface characteristics of the land such as slope and elevation. Elevation, slope, aspect, and surface features define topography for a given area. The principal geologic factors influencing the stability of structures are soil and bedrock depth, stability and seismic properties. Bedrock refers to consolidated material composed of interlocking crystals (igneous or metamorphic rocks) or sedimentary rocks consisting of particles compacted and cemented together over time (sandstone, shale). Soil refers to unconsolidated earthen materials overlying bedrock (sand, silt, clay). Loam is a soil composed of equal parts of clay, silt, and sand. Soil structure relates to soil elasticity, strength, shrink-swell potential, liquefaction potential, and its potential to erode. Each of these determine the ability of the ground to support structures and facilities.

3.1.2 Existing Conditions

3.1.2.1 Topography

MCB Camp Pendleton is located within the Peninsular Ranges Geomorphic Province, which is separated into two distinct topographic components. The Peninsular Ranges include: (1) the northwest-trending mountain ranges, foothills, and intervening valleys that comprise the eastern and central portions of the province, and (2) the coastal plain that occupies the western portion of the province. The coastal plain consists of numerous marine and nonmarine terraces, dissected by stream valleys. MCB Camp Pendleton straddles both topographic components of this geomorphic province. The eastern landforms are moderately to highly dissected and steep; with the majority of the MCB Camp Pendleton area exceeding a 15 percent slope (USMC 2011).

Access roads range in elevation from 10 ft (3 m) above sea level at Access Road 8 to nearly 2,400 ft (732 m) at Access Road 10. The slope of the roads is typically 0 to 5 percent, while some road segments are steeper (USMC 2011).

3.1.2.2 Geology

In general, Holocene to late Pleistocene sedimentary rock of marine and non-marine origin underlie the coastal plain, and Cretaceous to Triassic bedrock that includes highly consolidated

and cemented sedimentary rock and plutonic and metamorphic crystalline rock, underlie the foothill regions. Landslides are widespread on MCB Camp Pendleton partly due to the steepness of slopes, in combination with soil type and climate. The MCB Camp Pendleton coastline has the greatest number and size of landslides in San Diego County. The tertiary sedimentary rocks are most subject to large-scale sliding (Soil Conservation Service 1973).

3.1.2.3 Seismicity

The California Division of Mines and Geology (CDMG) classify faults as active or potentially active, according to the Alquist-Priolo Special Studies Zone Act of 1972 (Hart 1977). CDMG defines an active fault as a fault that exhibits sediment displacement within the Holocene Epoch (the last 11,000 years). Geologists define faults that exhibit sediment displacement during the Pleistocene Epoch (which began about 1.6 million years ago and ended about 11,000 years ago) as potentially active. The Richter scale describes earthquake magnitude.

Fault activity causes damage in a variety of ways. Hazards can include landslides, ground shaking, surface displacement and rupture, and the triggering of tsunamis. In general, the type of damage caused at a particular location depends on (a) proximity to an active fault, (b) the frequency and severity of the earthquake, (c) the potential for surface rupture, (d) the composition of the surface and subsurface materials, and (e) topography. Numerous active faults that may cause ground motion or produce secondary effects are located within 60 miles (97 km) of MCB Camp Pendleton (Table 3.1-1).

Table 3.1-1. Major Active Faults within 60 miles (97 km) of MCB Camp Pendleton

Major Active Fault	*Distance from MCB Camp Pendleton (miles [km])*	*Maximum Creditable Earthquake (Richter Scale)*
Offshore Zone of Deformation	7 (11)	7.5
Rose Canyon	25 (40)	7.2
Whittier-Elsinore	8 (13)	7.5
Coronado Bank	21 (34)	6.75
Palos Verdes	24 (38)	7.0
Newport-Inglewood	25 (40)	7.0
San Jacinto	32 (52)	7.5
San Andreas	49 (78)	7.0
San Clemente	10 (6)	7.7

Sources: Jennings 1994; Woodward-Clyde Consultants 1998.

3.1.2.4 Soils

The project area contains a wide range of soil types representing varying slopes and erosion potential. In general, soil material on the coastal plain consists primarily of poorly consolidated marine sediments (e.g., Olivenhain cobbly loam), while the foothill soils tend to be comprised of more granitic, metasedimentary (metamorphic rock formed from sedimentary rock), and metavolcanic (rock first produced by a volcano, then subject to high pressures and temperatures causing the rock to re-crystallize) sources (e.g., Cieneba coarse sandy loam). Tujunga soils are found in the alluvial fans and plains and come from granitic rocks in the foothills. Huerhuero soil is associated with the Coastal Plain Terraces province and derived from

marine sediment material. In addition, Fallbrook soil is associated with the Foothill Upland province and derived from granitic parent material.

The access roads proposed for repair are located on sloping coastal terraces, hillsides, and valleys dissected by gullies, ravines, and swales. Table 3.1-2 presents the major soil types in the project area and their associated erodibility by access road. Certain soils at the proposed project area are classified as having a rating of severe erodibility by water, indicating that protective and corrective measures are needed before and during the time the soil is disturbed (Soil Conservation Service 1973). All access road locations have at least one soil type with severe erodibility. Episodes of heavy rain cause loose soil on the roads to erode each year, making many road sections impassable to vehicles and treacherous for foot traffic.

Current soil erosion and sediment control measures at MCB Camp Pendleton (USMC 2000) include road maintenance, grading, culvert maintenance and installation, stormwater runoff control, installation of storm drain inlet protection devices, placement of berms along the tops of sea cliffs, traffic control in erosion damaged areas, use of erosion control blankets and soil stabilizers, use of hay bales and sand bags, and mulching areas with a protective cover of organic material such as wood chips or vegetation.

3.1.3 Environmental Consequences

3.1.4 Proposed Action/Alternative 1

As discussed in Chapter 2, proposed engineering solutions to access road erosion problems include road improvements, drainage improvements, stabilization activities, and roadway delineations (refer to Table 2-1). The following paragraphs analyze potential impacts to geological resources resulting from implementation of the Proposed Action/Alternative 1.

According to the California General Permit for Stormwater Discharges Associated with Construction Activity (2009-0009-DWQ), construction projects disturbing more than 1 acre (ac) are required to implement BMPs as incorporated into a SWPPP, which the contractor must submit to the San Diego Regional Water Quality Control Board for approval. Therefore, before starting proposed access road repair activities, the contractor would prepare, submit, and enact the provisions contained in the SWPPP. MCB Camp Pendleton ES would oversee implementation and enforcement of the SWPPP. The SWPPP would incorporate BMPs for erosion and sediment control. Potential BMPs include using silt curtains, installing fencing, and sediment traps, spraying water on areas of disturbed dirt, and revegetation of disturbed areas.

<u>Topography</u>

Under the Proposed Action/Alternative 1, minor site-specific alterations to topography would occur where designed to facilitate drainage (i.e., installing culverts in low spots); however, proposed access road repair activities would not alter the existing overall topography at MCB Camp Pendleton. Therefore, implementation of the Proposed Action/Alternative 1 would have no significant impact on topography.

Table 3.1-2. Project Area Soil Types by Road

		Access Road																			
Soil Description	***Erodibility[1,2]***	***1***	***2***	***3***	***4***	***5***	***6***	***7***	***8***	***9***	***11***	***12***	***13***	***14***	***15***	***17***	***19***	***20***	***21***	***23***	***24***
Acid igneous rock land	**Severe 1**		**X**																		
Altamont clay, 5-9% slopes	Slight																X	X			
Altamont clay, 15-30% slopes	Moderate 1		X																		
Altamont clay, 30-50%	**Severe 1**		**X**		**X**																
Bonsall sandy loam, 2-9% slopes	**Severe 9**													**X**							
Cieneba coarse sandy loam, 15-65% slopes	Severe					X[a]								X[b]							
Cieneba rocky coarse sandy loam, 9-30% slopes	**Severe 16**									**X**											
Cieneba very rocky coarse sandy loam, 30-75% slopes	**Severe 1**					**X**										**X**	**X**				
Cieneba-Fallbrook rocky sand loams	**Severe 1**					**X**															
Diablo clay	Severe 1							X													
Elder shaly fine sandy loam	Moderate 1							X													
Escondido very fine sandy loam, 15-30% slopes	**Severe 16**													**X**							
Fallbrook sandy loam, 2-30% slopes	**Severe 16**					**X**				**X**		**X**		**X**							
Fallbrook rocky sandy loam, 9-30% slopes	**Severe 16**									**X**				**X**							
Gaviota fine sandy loam, 30-50% slopes	**Severe 1**			**X**	**X**		**X**	**X**			**X**	**X**			**X**						
Hambright gravelly clay loam, 30-75% slopes	**Severe 1**						**X**	**X**													
Huerhuero loam, 2-15% slopes	**Severe 9**				**X**			**X**				**X**	**X**								
Las Flores loamy fine sand, 2-30% slopes	**Severe 2**	**X**	**X**	**X**			**X**	**X**		**X**	**X**	**X**			**X**				**X**	**X**	**X**
Marina loamy coarse sand, 2-9% slopes	**Severe 2**											**X**									
Olivenhain cobbly loam, 2-50% slopes	Severe		X[b]	X[a]			X[a]					X[a]									
Placentia sandy loam, thick surface, 2-9% slopes	**Severe 16**													**X**							
Reiff fine sandy loam, 2-5% slopes	Severe 16			X	X																
Riverwash	**Severe 2**	**X**	**X**	**X**																**X**	
Rough broken land	**Severe 1**		**X**	**X**				**X**													
Salinas clay loam, 0-9% slopes	Moderate 2									X	X	X	X				X	X	X	X	X
Salinas clay, 0-2% slopes	Slight								X												
Steep gullied land	**Severe 1**			**X**			**X**		**X**				**X**		**X**			**X**	**X**		
Stony land	**Severe 1**		**X**	**X**			**X**					**X**									
Terrace escarpments	**Severe 1**			**X**				**X**				**X**			**X**						**X**
Tujunga sand, 0-5% slopes	**Severe 2**								**X**					**X**							
Visalia sandy loam, 0-15% slopes	**Severe 16**	**X**			**X**	**X**	**X**								**X**						
Vista course sandy loam, 5-9% slopes	Moderate 2											X									
Vista rocky coarse sandy loam, 15-30% slopes	Moderate 2													X							

Source: Soil Conservation Service 1973.

Notes: [1] Erodibility rating system: *Slight* indicates that water erosion is a minor problem and the soil is suitable for intensive use if other factors are favorable. *Moderate* and *severe* indicate that activities need to include protective and corrective measures before and during disturbance.

[2] Numerals indicate soil properties or qualities that affect erodibility: 1) Refers to slope; 2) indicates surface layer texture; 9) refers to depth to hard rock, or a hardpan, or any layer that restricts permeability; (16) refers to grade of structure in the surface layer. An absence of rating indicates one is not available.

[a] = erodibility of 1; [b] = erodibility of 16.

Bold text indicates highly erodible soils.

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Geology

Under the Proposed Action/Alternative 1, minor site-specific alterations to geology would occur where designed to facilitate access road stability (e.g., moving earth/rocks as part of slope stabilization activities); however, proposed access road repair activities would not alter the existing overall geology at MCB Camp Pendleton. The Proposed Action/Alternative 1 would not involve further disturbance to topography after the completion of proposed access road repair activities. Therefore, implementation of the Proposed Action/Alternative 1 would have no significant impact on geology.

Seismicity

Proposed access road repairs would comply with all federal, state, local, and MCB Camp Pendleton requirements for slope and seismic stability. The Proposed Action/Alternative 1 does not include constructing any structures or facilities that may be subject to seismic activity. Therefore, implementation of the Proposed Action/Alternative 1 would have no significant impact due to seismicity.

Soils

Under the Proposed Action/Alternative 1, the contractor would develop and implement a SWPPP and associated BMPs to minimize erosion and sedimentation in the project area. At the conclusion of proposed access road repair activities, MCB Camp Pendleton would manage stormwater runoff to minimize erosion.

Proposed road improvements to portions of access roads subject to severe erosion that also support a high amount of foot and vehicle traffic would, in the long term, reduce the potential for soil erosion from areas of highly erodible soil. Other road improvements including slight crown grading, side grading (less than a 2:1 slope) of roadways, and the construction of AWCs would facilitate the movement of stormwater runoff across the road surface. Proposed slope stabilization projects would stabilize existing slopes and minimize the potential for future erosion. Similarly, the installation of energy dissipaters (e.g., riprap) would absorb the energy of stormwater and reduce the potential for erosion.

Proposed access road repair activities would provide erosion protection for several years (under normal weather conditions), resulting in beneficial impacts to soils as the repair would reduce the potential for erosion. The Proposed Action/Alternative 1 would not involve further disturbance to soils after the completion of road and drainage improvements, stabilization, and road delineation construction. Therefore, implementation of the Proposed Action/Alternative 1 would have no significant impact on soils.

3.1.4.1 Mitigation Measures

With the inclusion of the applicable SCMs described in Section 2.6, including the development and application of provisions contained in the SWPPP, implementation of the Proposed Action/Alternative 1 would have no significant impact on topography, geology, and soils; therefore, no mitigation measures would be required.

3.1.5 Alternative 2

Impacts under Alternative 2 would be similar to Alternative 1. The same SCMs described in Section 2.6 would apply. Therefore, implementation of Alternative 2 would have no significant impact on topography, geology, and soils and no mitigation measures would be required.

3.1.6 No Action Alternative

Under the No Action Alternative, MCB Camp Pendleton would not implement proposed access road repairs. Therefore, existing conditions (as described in Section 3.1.2) would remain unchanged. Training area access roads subject to erosion would continue to erode due to lack of repair. Therefore, implementation of the No Action Alternative would have no significant impact on topography, geology, and soils.

3.2 Hydrology

3.2.1 Definition of Resource

This section provides a discussion of general hydrology, water supply, water quality, and flooding with respect to the project area. Hydrology is the science that deals with global water, its properties, circulation, and distribution, on and under the surface of the earth and in the atmosphere, from the moment of precipitation until it returns to the atmosphere through evapo-transpiration or flows to the ocean. Water supply includes surface and groundwater resources that are potentially available for consumption. Water quality describes the chemical and physical composition of water as affected by natural conditions and human activities. For the purposes of this analysis, freshwater quality is of concern with respect to potential erosion-induced sedimentation and releases of hazardous materials resulting from implementation of the Proposed Action/Alternative 1, Alternative 2, or No Action Alternative. Floodplains are located adjacent to rivers and other bodies of water and in low-lying areas near a water source. A 100-year floodplain represents that portion of topography that would be inundated during a flood event, which has a one percent chance of occurring in any given year.

3.2.2 Existing Conditions

3.2.2.1 Surface Water Resources

Southwest to northeast trending mountain ranges divide MCB Camp Pendleton into four main watersheds: San Mateo, San Onofre, Las Flores, and Santa Margarita. Water flows southwestward via streams to the Pacific Ocean. A small portion of a fifth watershed, the San Luis Rey basin, covers the southern tip of the Base, and drains to the Pacific Ocean south of MCB Camp Pendleton. The Las Flores watershed, which is contained entirely within the boundaries of MCB Camp Pendleton, contains four component subbasins: coastal drainage, Aliso Creek, French Creek, and Cockleburr Creek (USMC 2011). The access roads are located in all four main watersheds (Figure 3-1).

As part of this NEPA document, Cardno staff performed a jurisdictional waters of the U.S. survey (Appendix C). The survey determined that there are several drainages, creeks, and tributaries in the project area. In most cases, the drainages represent jurisdictional waters of the U.S. Prominent bed-and-bank topography is evident in the drainage channels with scoured banks and sediment deposits. The roadside ditches and channels run downstream to larger water bodies. The drainages showed evidence of flow and hydrologic connectivity with downstream water bodies, but very few sites had standing water.

Figure 3-1
Access Roads and Watersheds at
MCB Camp Pendleton

Source: MCB Camp Pendleton 2012b

The eroded ditches and roadside culverts provide conveyance and drainage with little chance to retain water. A majority of the access roads cross over ephemeral and intermittent stream channels that drain downstream. Ephemeral streams are defined as streams which flow only in direct response to precipitation in the immediate watershed, and which has a channel bottom that is always above the local groundwater table. Intermittent streams are defined as a stream or reach of a stream that is below the local groundwater table for at least some part of the year, and obtains its flow from both surface runoff and groundwater discharge. A description of the surface water features associated with each access road follows.

Access Road 1. Access Road 1 is located in the lower reaches of the San Onofre Watershed. The road crosses the main stem of San Onofre Creek, which at the road crossing, is an intermittent stream.

Access Road 2. Access Road 2 is located within the San Mateo Watershed. The road crosses over several intermittent upland tributaries and ephemeral drainage ditches that drain downstream to San Mateo Creek.

Access Road 3. Access Road 3 is located within the San Onofre Watershed. The road crosses over ephemeral upland tributaries and drainage ditches.

Access Road 4. Access Road 4 is located in the San Mateo Watershed. The road runs along Talega Creek, an intermittent stream that drains to Cristianitos Creek, a major tributary to San Mateo Creek. An unnamed creek washed out a portion of the road crossing.

Access Road 5. Access Road 5 is located in the Santa Margarita Watershed. The road crosses an intermittent drainage that flows parallel to Basilone Road and contains several culverts.

Access Road 6. Access Road 6 is located in the Las Flores Watershed. The road crosses an ephemeral creek bed and drainage ditches.

Access Road 7. The lower portion of Access Road 7 is located in the Coastal Drainage Subbasin of the Las Flores Watershed. Portions of the road cross the adjacent ephemeral creek bed and several drainage ditches found in the canyon. The upper portion of Access Road 7 runs along a ridge that separates the Las Flores and San Onofre Watersheds; the road crosses no drainages in this area.

Access Road 8. Access Road 8 is located in the Las Flores Watershed and runs adjacent to, but does not cross, Las Flores Creek.

Access Road 9. Access Road 9 is located in the Aliso Creek Subbasin of the Las Flores Watershed. The road crosses over a culvert.

Access Road 11. Access Road 11 is located in the Las Flores Watershed. The road runs parallel to Las Flores Creek channel. A single culvert drains under the road at Basilone Road.

Access Road 12. Access Road 12 is located in the Aliso Creek Subbasin of the Las Flores Watershed. The road crosses Aliso Creek and ephemeral drainage ditches within the canyon.

Access Road 13. Access Road 13 is located in the San Onofre Watershed. The road is located adjacent to and crosses an ephemeral tributary to San Onofre Creek.

Access Road 14. Access Road 14 is located in the San Luis Rey Watershed. A roadway bridge crosses Pilgrim Creek and the road runs along a tributary channel to Pilgrim Creek.

Access Road 15. Access Road 15 travels through the San Onofre and Las Flores Creek Watersheds. The northwest portion of the road runs northeast from Pulgas Lake and crosses several small ephemeral waters. The southeastern end of the road crosses several ephemeral tributaries that drain to Pulgas Lake and Las Flores Creek.

Access Road 17. Access Road 17 runs along a high ridge in the upper reaches of the Las Flores Watershed. The road crosses no major stream channels or ephemeral water bodies as surface drainage flows off the roadway into the surrounding landscape via overland flow.

Access Road 19. Access Road 19 is located in the San Onofre Watershed. The road runs adjacent to and crosses an ephemeral tributary to San Onofre Creek.

Access Road 20. Access Road 20 is located in the San Onofre Watershed. The road runs adjacent to and crosses an ephemeral tributary to San Onofre Creek.

Access Road 21. Access Road 21 is located in the San Onofre Watershed. The road runs along a tributary to the south fork of San Mateo Creek.

Access Road 23. Access Road 23 is located in Las Flores Watershed. The road crosses several ephemeral upland tributaries and drainage ditches that eventually drain to Las Flores Creek.

Access Road 24. Access Road 24 is located in the Las Flores Watershed. The road runs adjacent to two ephemeral drainages.

Surface Water Quality

Water quality has always been a high priority for MCB Camp Pendleton as nearly all of the drinking water comes from local aquifers. The quality of MCB Camp Pendleton's drinking water generally meets or exceeds State of California and federal health-related drinking water standards (USMC 2011).

Upstream users and the Base greatly affect the water quality of surface waters on MCB Camp Pendleton, as MCB Camp Pendleton is the last water user on the extensive Santa Margarita River system and San Mateo Creek. On the Santa Margarita River, nutrient levels, particularly nitrogen, have increased in recent years due to intensive agricultural use of fertilizers in the upper watersheds. In addition, the dramatic expansion of residential, commercial, and industrial development during the past decade in the upper part of this drainage has produced more urban runoff and wastewater discharges (USMC 2011).

3.2.2.2 Groundwater Resources

MCB Camp Pendleton has four groundwater basins that correspond to the four main watersheds. Percolation from overlying streams and rivers recharges the aquifers (USMC 2011). Most of the groundwater at MCB Camp Pendleton is contained in the alluvial materials and shallow sedimentary rock units of the four major groundwater basins. The regional flow of groundwater likely trends southwest, from the slopes of the mountains toward the ocean (Navy 1998).

Water Supply

MCB Camp Pendleton's domestic, agricultural, and industrial water supply comes from underground aquifers that are recharged by percolation from overlying rivers and streams. At present, MCB Camp Pendleton does not rely on imported water, other than the San Mateo Point Housing area, which purchases less than 100 acre-feet per year (USMC 2011).

Groundwater Quality

MCB Camp Pendleton monitors groundwater from the water supply wells in accordance with California Department of Health Services requirements and USEPA standards. In 2003, analysis of over 17,000 samples for 200 water quality parameters indicated that groundwater from southern water system sources generally meets drinking water standards. Two samples from the Santa Margarita wells exceeded the notification level for a chlorinated solvent (1, 2, 3-trichloropropane), and approximately 50 samples exceeded secondary (taste/odor/color) drinking water standards for iron, manganese, and turbidity (USMC 2005).

3.2.3 Environmental Consequences

3.2.4 Proposed Action/Alternative 1

Surface Water Resources

Proposed road repair and associated drainage improvement activities would be conducted in accordance with all federal, state and MCB Camp Pendleton requirements for proper drainage and sedimentation control. Before implementing the Proposed Action/Alternative 1, the construction contractor would prepare and implement a SWPPP to minimize impacts to surface water resulting from repair and stabilization activities. The SWPPP would include site-specific BMPs that the contractor would follow to minimize sedimentation and erosion of downstream aquatic features and protect surface water quality.

Under the Proposed Action/Alternative 1, MCB Camp Pendleton would repair or improve numerous drainages that cross the access roads. Culverts, headwalls, ditches and swales, and erosion control measures would be installed to divert runoff and storm water off of roadways and into nearby drainage conveyances.

New or replacement culverts would be designed and installed to convey floodwaters under the roads, where deemed necessary to reduce undercutting and erosion. Culverts would be aligned with the direction of stream flow to minimize channel bank erosion. The new or replacement culverts would be installed at or just below the existing grade to reduce the potential for undercutting or erosion around the culverts. Since many of the streams are subject to high erosion and scouring, where necessary, the drainage area up- and down-stream of the culvert would be cleared and re-contoured with riprap and/or headwalls to provide a stable drainage under the road. Riprap in the drainages would dissipate runoff velocity protecting erosive soils along the channel or banks from concentrated flow.

The AWCs would include erosion control features and be properly sized to accommodate the calculated peak flow volumes at the crossing points during the design storm event conditions. Portions of access roads that are subject to severe erosion and that support a high amount of foot and vehicle traffic would receive new asphalt or concrete pavement surfaces. Any paved parts of the AWCs would be flush with the bed of the channel as not to serve as levees and block or channelize the flow. Approaches and adjacent slopes would be designed and constructed with engineering controls to ensure proper drainage from the surfaces, side slopes, and in the surrounding area. There would be no significant impact to existing natural drainage flow patterns.

Proposed repair activities would require small-scale excavation and/or fill to complete proposed access road improvements. Repair construction could cause minor sedimentation and erosion

due to clearing and soil disturbance. Construction activities would incorporate site-specific BMPs to reduce the potential for erosion.

The proposed road repair activities would, in the long term, reduce the potential for sediment loading from these areas of highly erodible soil. The small drainage tributaries that are currently subject to erosion due to poor drainage would improve from the above repairs, likely stabilizing the surrounding area and reducing erosion and sediment loading to drainages. Therefore, implementation of the Proposed Action/Alternative 1 would have no significant impact on surface water resources.

Groundwater Resources

Proposed repair activities would be limited to the near surface region and would not reach existing groundwater basins; thus, the Proposed Action/Alternative 1 would not affect the quantity or quality of groundwater resources. The Proposed Action/Alternative 1 would not create a new water demand and thus would not affect the existing MCB Camp Pendleton water supply. Therefore, implementation of the Proposed Action/Alternative 1 would have no significant impact on groundwater resources.

3.2.4.1 Mitigation Measures

Implementation of the Proposed Action/Alternative 1 would result in no significant impacts to hydrology (surface water and groundwater resources); therefore, no mitigation measures would be required.

3.2.5 Alternative 2

Impacts under Alternative 2 would be similar to Alternative 1. The construction contractor would prepare and implement a SWPPP to minimize impacts to surface water resulting from repair and stabilization activities. The SWPPP would include site-specific BMPs that the contractor would follow to minimize sedimentation and erosion of downstream aquatic features and protect surface water quality. Therefore, implementation of Alternative 2 would have no significant impact on hydrology and no mitigation measures would be required.

3.2.6 No Action Alternative

Under the No Action Alternative, MCB Camp Pendleton would not implement proposed access road repairs. Existing conditions (as described in Section 3.2.2) would remain unchanged. Therefore, implementation of the No Action Alternative would have no significant impact on hydrology.

3.3 Biological Resources

3.3.1 Definition of Resource

This section describes known or expected native and naturalized plants and animals and their habitats found in the Action Area. For the purposes of analysis, the Action Area encompasses the project areas and a 100-ft (30-m) wide buffer around all project areas, including proposed staging areas. The 100-ft (30-m) wide buffer would enclose potential incidental effects and would accommodate any potential future design modifications. While the actual limits of construction and disturbance may be smaller due to topography, geology, hydrologic conditions, or vegetation surrounding the project sites, the 100-ft (30-m) wide buffer is appropriate for planning and environmental impact analysis purposes.

This biological resources discussion is divided into three sections: (1) plant communities and aquatic habitat, including CWA Section 404 jurisdictional waters of the U.S. and vernal pools; (2) wildlife, including all animals and habitat features that are of special importance to wildlife; and (3) special-status species, defined as plant and animal species listed as threatened, endangered, or proposed as such by the USFWS. This EA also considers species of local or regional concern.

3.3.2 Existing Conditions

In support of this EA, biologists conducted biological resource-specific field surveys for CAGN, SKR, PPM, rare plants, Plant Communities, and jurisdictional waters of the U.S. This baseline section incorporates the survey findings to aid in characterizing existing conditions; for the full reports, please see Appendices C through H. In addition, this section also incorporates information provided by MCB Camp Pendleton (USMC 2011, 2009).

3.3.2.1 Plant Communities and Aquatic Habitats

Plant Communities

Cardno scientists surveyed, delineated, and classified plant communities in the Action Area using the Sawyer Keeler-Wolf system (1997), modified for consistency with local circumstances, and digitally mapped the findings onto aerial photographs (Appendix D). The survey identified and recorded the dominant plant species at each survey location and then compared survey findings with previous plant community mapping on the installation (USMC 2011, 2009). The survey identified 42 plant communities in the Action Area. The following paragraphs describe 31 of the plant communities found throughout the entire Action Area (the other 11 plant communities are combinations of series):

- ***Arroyo Willow Series (AW).*** A riparian woodland in which arroyo willow (*Salix lasiolepis*) is the predominant woody riparian species, typically forming a canopy about 30 ft (9 m) high.
- ***Bare Ground (BARE).*** May include river washes, bare slopes, and other areas with little or no vegetation, but not disturbed by direct human activity.
- ***Buckwheat/Deerweed Series (B/D).*** A local variant of CSS in which the subshrubs deerweed or buckwheat are dominant or important. This series is found on disturbed sites and probably successional to CSS more typically dominated by larger shrubs.
- ***Burned Areas (BURN).*** Areas recently burned; vegetation community is unknown.
- ***Black Sage Series (BSS).*** A local variant of CSS in which black sage is conspicuously dominant; often found along roadsides.
- ***California Annual Grassland (CAG).*** Grassland vegetation strongly dominated by non-native grasses and forbs, including fennel, but may also include native grasses and forbs, especially ragweed (*Ambrosia psilostachya*) and fascicled tarweed (*Deinandra fasciculata*).
- ***California Sagebrush Series (CSS).*** Coastal sage scrub in which California sagebrush (*Artemisia californica*) is dominant, usually accounting for more than half of total shrub cover. This series usually occurs on dry, open slopes. Other shrub species are present but singly or combined typically do not account for more than half of total shrub cover.
- ***California Sycamore Series (CSY).*** A type of riparian woodland or forest in which large California sycamores (*Platanus racemosa*) dominate the canopy over a riparian

understory, which may include willows (*Salix* spp.), mulefat (*Baccharis salicifolia*), coyote brush (*Baccharis pilularis*), blue elderberry (*Sambucus nigra* ssp. *canadensis*), or herbaceous species. In some locations, sycamores are relicts of past flooding, and upland grasses dominated the understory. Coast live oaks (*Quercus agrifolia*) are often present on slopes above the flooded area.

- ***Cattail/Bulrush Series (CAT)***. A freshwater marsh community that includes Olney's bulrush (*Schoenoplectus americanus*), spike-rush (*Eleocharis* spp.), southern cattail (*Typha domingensis*), leather root (*Hoita macrostachya*), seep monkey flower (*Mimulus guttatus*), water-cress (*Rorippa nasturtium-aquaticum*), water-pimpernel (*Samolus parviflorus*), great marsh primrose (*Oenothera elata*), and horsetail (*Equisetum* sp.).
- ***Chamise Chaparral (CH).*** This category encompasses numerous series in which chamise (*Adenostoma fasciculatum*) is important or dominant.
- ***Coast Live Oak Series (CLO).*** A type of woodland vegetation in which coast live oak is an important or dominant component of the canopy. This community may occur along watercourses as a riparian community, in which case sycamore and willow are also likely to be important in the canopy. In canyons and on shaded slopes away from streams, coast live oak is more likely to be the sole canopy dominant or may be mixed with Engelmann oak (*Quercus engelmannii*). The understory is variable and may include chaparral and coastal sage scrub species, elderberry or grassland.
- ***Coyote Brush Series (CB).*** A variant of coastal sage scrub strongly dominated by coyote brush, usually occurring on old disturbed sites and mesic slopes above drainages.
- ***Disturbed/Developed Areas (D-D).*** Disturbed areas include pavement, graded land, firebreaks, roads, paths, buildings, and other human structures.
- ***Disturbed – Ruderal (D-R).*** A recently disturbed habitat with much open ground but dominated by non-native weedy species of grasses and forbs, with occasional native forbs. The composition and percent cover of vegetation are highly variable.
- ***Elderberry Series (ELD)***. An open scrub or low-woodland community in which blue elderberry accounts for a majority of the overstory cover.
- ***Engelmann Oak Series (EOS).*** Oak woodland in which Engelmann oak is a conspicuously dominant species, although coast live oak may be important. Coast live oak and mixed oak series contain a less dominant Englemann oak component. The Englemann oak series usually occurs with grassland or coastal sage scrub understory.
- ***Exotics – Acacia Series (EX-A).*** Stands of acacias (*Acacia* spp.) that dominate the vegetation.
- ***Exotics – Fennel Series (EX-F).*** A community dominated by sweet fennel (*Foeniculum vulgare*).
- ***Mixed Grassland (MG).*** Grassland where native perennial species are prevalent but not strongly dominant. Native perennials may be sub-dominant to or co-dominant with non-native species.
- ***Mixed Oak Series (MOS).*** Oak forest or woodland vegetation comprising roughly equal numbers and canopy coverage of Engelmann and coast live oaks.
- ***Mixed Sage Series (MSS).*** A diverse type of coastal sage scrub in which no single shrub species is strongly dominant. Composition varies and may include laurel sumac (*Malosma laurina*), California sagebrush, deerweed (*Lotus scoparius*), black sage

(*Salvia mellifera*), blue elderberry, white sage (*Salvia apiana*), California buckwheat (*Eriogonum fasciculatum*), lemonadeberry (*Rhus integrifolia*), toyon (*Heteromeles arbutifolia*), and coyote brush. This series usually occurs on more mesic sites than California sagebrush series.

- ***Mixed Willow Series (MW).*** A type of riparian scrub or woodland that is closely associated with streams and includes a mixture of woody riparian species, no one of which is dominant, but in which one or more species of willows are important. Other important species typically include mulefat or coyote brush. Scattered coast live oaks or sycamores may be present as an overstory. The understory includes herbaceous wetland species.
- ***Mulefat Series (MFS).*** A riparian scrub directly associated with stream channels and bordering floodplains, and is strongly dominated by mulefat. Scattered willows, elderberry, coyote brush, or isolated sycamore may also be present. Series typically occurs on coarse alluvium.
- ***Needlegrass Series (NG)***. Native perennial grassland dominated by species of *Nassella*.
- ***Pickleweed Series (PWS)***. A brackish or estuarine community dominated by pickleweed (*Salicornia virginica*) often found along the edges of coastal lagoons and rivermouths.
- ***Rush Series (RUSH).*** Herbaceous community in mesic swales and depressions where rushes (*Juncus* spp.) are dominant/important along with other low-growing herbaceous wetland species.
- ***Saltgrass Series (SALT)***. A salt marsh community dominated by saltgrass (*Distichlis spicata*).
- ***Scrub Oak Series (SOS).*** Scrub or woodland in which scrub oak species (*Quercus* spp.) dominate.
- ***Scalebroom Series (SB).*** A type of interior sage scrub vegetation that occurs on rocky alluvial soils in the floodplains of the largest streams. Scalebroom (*Lepidospartum squamatum*) is not strongly dominant, but occurs only in this community. An association of sage scrub and chaparral species and cacti are present.
- ***Sumac Series (SUM).*** On MCB Camp Pendleton, areas in which laurel sumac, lemonadeberry, and/or sugar bush (*Rhus ovata*) are dominant or important along with other shrubs.
- ***White Sage Series (WSS).*** A local variant of CSS where white sage is conspicuously dominant.

Appendix D provides a detailed description of each community and its representative species. Table 3.3-1 lists the plant communities and acreages found within the Action Area associated with each access road (refer to Figure 2-1 for road names and locations). Plant communities were mapped before the 2007 Horno Fire. For the purpose of this analysis, all burned areas are assumed to contain the pre-fire mapped plant communities. The 42 plant communities range in size from less than a tenth of an acre (e.g., Saltgrass Series) to almost 180 ac (72 ha) (e.g., California Sagebrush Series).

Table 3.3-1. Plant Community Types by Access Road Action Area

Plant Community	*Total*	*01*	*02*	*03*	*04*	*05*	*06*	*07*	*08*	*09*	*11*	*12*	*13*	*14*	*15*	*17*	*19*	*20*	*21*	*23*	*24*
Coastal Sage Scrub																					
California Sagebrush Series	172.36	0.18	3.35	48.89	0.00	2.01	27.07	42.91	1.20	4.26	0.91	11.72	0.20	22.38	1.72	0.00	1.90	0.24	0.49	0.83	2.10
California Sagebrush/Black Sage Series	4.78	0.00	0.00	0.00	0.00	0.00	4.05	0.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Coyote Brush Series	46.74	0.00	0.00	0.85	0.26	0.00	6.11	0.72	6.90	0.00	8.73	19.10	0.15	0.00	0.14	0.00	0.00	1.69	0.42	1.69	0.00
California Sagebrush/Coyote Brush Series	1.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Subtotal	224.94	**0.18**	**3.35**	**49.74**	**0.26**	**2.01**	**37.23**	**44.36**	**8.10**	**4.26**	**9.64**	**31.86**	**0.35**	**22.38**	**1.85**	**0.00**	**1.90**	**1.93**	**0.90**	**2.52**	**2.10**
Scrub Vegetation																					
Black Sage Series	0.94	0.00	0.00	0.00	0.00	0.00	0.00	0.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Buckwheat/Deerweed Series	0.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.84	0.00	0.00	0.00	0.00
Chamise Chaparral	26.44	0.00	0.00	0.00	0.00	0.00	1.17	3.69	0.00	0.00	0.00	0.00	0.00	0.00	6.15	13.20	2.23	0.00	0.00	0.00	0.00
Chamise Chaparral/Englemann Oak Series	3.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.37	0.00	0.00	0.00	0.00	0.00	0.00
Mixed Sage Series	81.7	0.00	46.30	4.82	0.00	7.80	9.77	7.83	0.00	0.00	0.00	3.99	0.00	0.00	0.61	0.00	0.00	0.00	0.00	0.00	0.58
Scalebroom Series	4.66	0.00	4.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
California Sagebrush/Chamise Chaparral	1.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.58	0.00	0.64	0.00	0.00	0.00	0.00
California Sagebrush/Sumac Series	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mulefat/California Sagebrush Series	0.14	0.00	0.00	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Scrub Oak Series	2.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.13	0.00	0.00	0.00	0.00	0.00	0.00
Sumac Series	2.89	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.70	0.00	0.79	1.30	0.00	0.00	0.00	0.00	0.00	0.10
White Sage Series	1.21	0.00	0.00	0.87	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.34
Coyote Brush/Elderberry Series	0.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mulefat/Coast Live Oak Series	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Subtotal	126.21	0.00	**50.96**	**5.83**	0.00	**7.80**	**10.94**	**12.47**	**0.08**	0.00	0.00	**5.07**	0.00	**1.00**	**14.13**	**13.20**	**3.71**	0.00	0.00	0.00	**1.02**
Riparian																					
Arroyo Willow Series	9.77	0.12	0.00	0.00	0.00	0.00	0.84	5.53	1.44	0.00	0.72	0.62	0.00	0.46	0.04	0.00	0.00	0.00	0.00	0.00	0.00
Mixed Willow Series	13.71	0.00	0.00	2.92	0.00	0.00	5.20	0.00	0.11	0.00	0.12	1.34	0.00	1.87	1.63	0.00	0.00	0.00	0.21	0.31	0.00
Mulefat Series	66.65	3.93	1.55	29.91	6.77	0.00	9.22	0.86	0.60	0.97	2.44	3.42	1.64	1.01	1.18	0.00	0.00	0.56	0.42	1.71	0.46
Arroyo Willow/Coast Live Oak Series	8.33	0.00	0.00	0.00	0.00	0.00	0.00	8.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Coyote Brush Series/Mulefat Series	5.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.95	0.00	0.00	0.00	0.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Subtotal	103.72	**4.05**	**1.55**	**32.83**	**6.77**	0.00	**15.26**	**14.72**	**7.10**	**0.97**	**3.27**	**5.38**	**1.95**	**3.34**	**2.86**	0.00	0.00	**0.56**	**0.64**	**2.01**	**0.46**
Other Aquatic																					
Cattail/Bulrush Series	1.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rush Series	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pickleweed Series	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Saltgrass Series	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Subtotal	1.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**1.22**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Plant Community	Total	01	02	03	04	05	06	07	08	09	11	12	13	14	15	17	19	20	21	23	24
Woodlands																					
California Sycamore Series	16.25	1.79	1.69	1.86	7.45	0.00	0.00	0.00	0.00	0.00	0.00	1.52	0.18	0.00	0.00	0.00	0.00	1.76	0.00	0.00	0.00
Coast Live Oak Series	46.57	0.00	0.31	17.66	7.32	1.25	0.77	4.89	0.00	0.00	0.00	0.00	0.00	9.36	2.77	0.00	2.08	0.00	0.00	0.07	0.09
Engelmann Oak Series	3.24	0.00	0.00	0.00	0.00	0.01	0.00	1.50	0.00	0.06	0.00	0.00	0.00	0.00	1.59	0.00	0.00	0.00	0.00	0.00	0.08
Mixed Oak Series	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Elderberry Series	0.83	0.00	0.00	0.00	0.00	0.00	0.08	0.64	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Subtotal	66.89	**1.79**	**2.00**	**19.52**	**14.76**	**1.26**	**0.85**	**7.03**	0.00	**0.06**	0.00	**1.63**	**0.18**	**9.36**	**4.37**	0.00	**2.08**	**1.76**	0.00	**0.07**	**0.17**
Miscellaneous																					
Bare ground	3.63	0.00	0.67	0.00	0.00	0.00	1.27	0.42	0.76	0.00	0.00	0.00	0.00	0.00	0.51	0.00	0.00	0.00	0.00	0.00	0.00
Burned Areas	4.52	0.00	0.00	1.36	0.00	0.00	0.00	0.00	0.00	0.42	0.00	2.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.35	0.00
California Annual Grassland	56.28	0.00	0.00	1.97	0.70	0.48	14.10	5.42	0.00	1.84	0.19	9.73	0.00	0.48	12.65	0.00	0.72	0.37	0.55	2.29	4.79
Disturbed-Developed	86.92	2.36	4.47	8.64	1.99	3.74	7.83	9.99	4.40	4.35	5.70	15.40	0.30	2.80	6.30	1.34	2.04	0.65	0.57	1.18	2.87
Disturbed-Ruderal	37.01	7.95	0.44	1.81	0.00	1.34	1.88	2.69	0.00	0.00	0.83	6.65	0.00	1.17	8.51	1.38	0.00	0.00	0.00	2.36	0.00
Exotics-Acacia Series	0.14	0.00	0.00	0.00	0.00	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Exotics-Fennel Series	24.24	0.20	0.00	0.07	0.00	0.00	0.29	2.92	0.00	0.38	0.57	17.81	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00
Mixed Grassland	84.59	0.00	7.89	4.40	0.03	0.00	0.00	2.13	0.00	5.15	0.00	27.27	0.99	0.00	22.88	0.00	0.00	0.49	1.92	2.82	8.62
Needlegrass Series	55.69	0.00	0.00	13.20	0.28	0.00	0.00	3.81	0.00	0.83	9.09	16.93	0.26	0.00	4.37	0.00	0.61	0.84	2.49	0.00	2.98
Needlegrass/Buckwheat/Deerweed Series	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27
Subtotal	353.3	**10.51**	**13.47**	**31.45**	**2.99**	**5.71**	**25.37**	**27.37**	**5.16**	**12.97**	**16.38**	**96.18**	**1.55**	**4.45**	**57.22**	**2.72**	**3.38**	**2.35**	**5.52**	**9.01**	**19.54**
TOTAL	876.26	**16.53**	**71.33**	**139.37**	**24.78**	**16.78**	**89.65**	**105.95**	**21.66**	**18.26**	**29.29**	**140.12**	**4.03**	**40.53**	**80.43**	**15.92**	**11.07**	**6.6**	**7.06**	**13.61**	**23.29**

Rare Plants

Botanists performed rare plant surveys for plant species of regional concern, as well as federally listed threatened or endangered species, in the Action Area during 2007 and 2008 (Appendix E). As shown in Table 3.3-2, the survey did not find any federally or state listed species.

Table 3.3-2. Rare Plants Found Within the Action Area

Road	Common Name	Scientific Name	Status* Fed/CA/CNPS	Year	Estimated Number
2	many-stemmed dudleya	*Dudleya multicaulis*	-/-/1B.2	2008	228
17	Rainbow manzanita	*Arctostaphylos rainbowensis*	-/-/1B.1	2007	50
19	Engelmann oak	*Quercus engelmannii*	-/-/4.2	2007	10
24	many-stemmed dudleya	*Dudleya multicaulis*	-/-/1B.2	2008	491

Notes: Refer to Figure 2-1 for road names and locations.
In instances where estimated impact calculations in this EA differ from the BO, the BO supersedes the EA (see Appendix B).

Many-Stemmed Dudleya

Many-stemmed Dudleya is not a federally or state listed species, but is considered by the California Native Plant Society (CNPS) to be endangered, and is classified as a CNPS list 1B species (CNPS 2015). This grassland species is only found in Los Angeles, Orange, Riverside, San Bernardino, and San Diego counties. It is most prevalent in the western portions of the counties, especially Orange County and the northern most portion of San Diego County, including Camp Pendleton. This species is found in heavy, often clayey soils at elevations less than 1,900 ft (600 m) in the coastal plain, especially in chaparral, coastal sage scrub, and valley and foothill grassland habitats (CNPS 2015; Hickman 1993). Surveys found numerous individuals located in the Action Areas associated with Access Roads 2 and 24 (refer to Appendix E).

Rainbow Manzanita

Rainbow manzanita, a CNPS list 1B species, was found in chamise chaparral vegetation along Access Road 17 (CNPS 2015). This species is found in chaparral vegetation and is restricted to southwestern Riverside County, south of Pauma Valley, and northeastern San Diego County, north of the San Luis Rey River, between 984 ft (300 m) and 1,968 ft (600 m) (Keeley and Massihi 1994).

Engelmann Oak

Ten Engelmann oaks, a CNPS list 4 species, were found along Access Road 19 (CNPS 2015). Engelmann oak is a species restricted to southern California and adjacent Baja California. It is considered rare and though is not in any immediate threat of extinction, its preservation is of special concern to land managers. MCB Camp Pendleton contains one of the largest and healthiest populations in the region, with over 3,000 ac (1,214 ha) of Engelmann oak woodland (USMC 2011). Engelmann oak has a growth form and life history that are broadly similar to coast live oak. Leaves are grayish-green rather than dark green, allowing the species to be identified from a distance. Engelmann oaks are more abundant in the drier more open areas than coast live oaks. Coast live oaks are more closely associated with a stream or watercourse (USMC 2011). In addition to rare plant occurrences, several other noteworthy discoveries were

made during the surveys. *Ericameria palmeri* var. *pachylepis*, a species never before documented on MCB Camp Pendleton, was found on the east edge of Access Road 9. A population of an unusual *Senecio* shrub was found in riparian habitat along Access Road 7 at the intersection of Horno Canyon Road and Basilone Road, and along Access Road 20. A portion of the shrub was collected and sent to the San Diego Natural History Museum for identification (it remains unidentified as of December 2009).

Aquatic Habitat

Cardno staff performed a jurisdictional waters of the U.S. survey of the project area (Appendix C). The largest jurisdictional stream crossings in the project area are found at Access Road 1 (crossing San Onofre Creek), Access Road 4 (crossing Talega Creek), and Access Road 14 (crossing Pilgrim Creek). The survey identified and delineated small areas of wetlands at Access Roads 8, 9, 14, and 21. These wetlands are within or adjacent to jurisdictional water bodies and are, therefore, also considered jurisdictional.

Table 3.3-3 presents jurisdictional waters of the U.S. and wetlands within the Action Area, by road. Appendix C provides a detailed description of each roadway and any associated jurisdictional waters as well as figures depicting communities by road and roadway segment. A total of 22.58 ac (9.13 ha) of jurisdictional waters are in the Action Area including 14.91 ac (6.03 ha) waters of the U.S. and 5.16 ac (2.08 ha) of wetlands. The survey found a small number of seasonally ponded depressions in road ruts and other manmade excavations along some of the roads. These areas did not support hydrophytic vegetation, were isolated from the other drainages, and did not flow into other waterways; therefore, they are non-jurisdictional areas.

3.3.2.2 Wildlife

A diverse assemblage of mammals, birds, reptiles, amphibians, fish, and invertebrates occur within MCB Camp Pendleton. In addition to hundreds of invertebrates, MCB Camp Pendleton has documented the presence of more than 50 mammalian, 30 reptilian, 10 amphibian, 300 avian, and 60 fish species. Of these species, a relatively large number and high percentage are native to coastal southern California (USMC 2011). All of MCB Camp Pendleton's reptiles and amphibians, most of the mammals, and a small percentage of the birds are year-round residents. The other species are seasonal residents, wide-ranging migrants, or transient visitors, such as migratory birds. A majority (91 percent) of avian species on MCB Camp Pendleton are included on the list of migratory birds (50 CFR 10.13) protected by the MBTA and EO 13186. The Memorandum of Understanding between the U.S. Department of Defense and the USFWS to Promote the Conservation of Migratory Birds is included in Appendix F. Some species, especially among the special-status species (Section 3.3.2.3), are limited in distribution to a single habitat, e.g., riparian habitat, coastal sage scrub, or vernal pools. Most, species, however, are generalists and will utilize multiple habitats for shelter and foraging.

Table 3.3-3. Jurisdictional Waters of the U.S. and Wetland Habitat by Access Road

Road	Waters of the U.S.		Wetlands		Drains to:
	Acres	Linear Feet	Acres	Linear Feet	
1	0.57	483	--	--	San Onofre Creek (main stem)
2	0.79	1712	--	--	San Mateo Creek
3	2.55	10,534	--	--	San Onofre Creek tributaries
4	6.10	4,242	--	--	Talega Creek
5	0.21	1,088	--	--	Santa Margarita River tributary
6	1.13	5,480	--	--	Piedra de Lumbre Creek (Las Pulgas Creek tributary)
7	0.68	6,981	--	--	Horno Canyon; Las Pulgas lake tributary
8	0.20	937	4.72	2,154	Las Flores Creek
9	0.07	247	0.18	286	Aliso Creek tributaries
11	0.06	449	--	--	Las Flores Creek
12	1.17	2,668	--	--	Aliso Creek
13	0.09	360	--	--	San Onofre Creek south fork tributary
14	0.33	2,643	0.08	315	Pilgrim Creek
15	0.15	489	--	--	Las Pulgas lake tributary
17	--	--	--	--	N/A
19	0.12	1,036	--	--	San Onofre Creek south fork tributary
20	0.24	850	--	--	San Onofre Creek south fork tributary
21	0.18	410	0.18	537	San Onofre Creek south fork tributary
23	0.21	704	--	--	Las Flores Creek tributaries
24	0.06	599	--	--	Las Flores Creek tributaries
Total	**14.91**	**41,912**	**5.16**	**3,292**	

Wildlife observations occurred during vegetation mapping, rare plant surveys, wetlands delineations, CAGN surveys (Appendix G) and SKR/PPM surveys (Appendix H). Over 50 avian species were observed within and adjacent to the Action Area during surveys, including mourning dove (*Zenaida macroura*), black phoebe (*Sayornis nigricans*), cliff swallow (*Petrochelidon pyrrhonota*), turkey vulture (*Cathartes aura*), American crow (*Corvus brachyrhynchos*), Anna's hummingbird (*Calypte anna*), Nuttall's woodpecker (*Picoides nuttallii*), common raven (*Corvus corax*), wrentit (*Chamaea fasciata*), bushtit (*Psaltriparus minimus*), northern mockingbird (*Mimus polyglottos*), song sparrow (*Melospiza melodia*), and lesser goldfinch (*Spinus psaltria*).

Reptiles observed include western fence lizard (*Sceloporus occidentalis),* common side-blotched lizard (*Uta stansburiana*), San Diego gopher snake (*Pituophis catenifer annectens*), whiptail lizard spp. (genus *Aspidoscelis,* but not the orange-throated species), and southern Pacific rattlesnake (*Crotalus oreganus helleri).* Some mammals observed include desert

cottontail (*Sylvilagus audubonii),* striped skunk (*Mephitis mephitis),* coyote (*Canis latrans),* raccoon (*Procyon lotor),* California mountain lion *(Felis concolor),* bobcat (*Lynx rufus*), American badger (*Taxidea taxus),* bison (*Bison bison),* and mule deer (*Odocoileus hemionus*).

Mammals in the Order Rodentia were observed during SKR and PPM surveys in the Action Areas (Appendix H). Species observed included federally endangered SKR (*Dipodomys stephensi*; Access Roads 5, 9, and 12), Dulzura kangaroo rat (*Dipodomys simulans*; Access Roads 3, 5, 8, 9, and 14), California pocket mouse (*Chaetodipus californicus*; Access Roads 3, 5, 9, 12, and 14), deer mouse (*Peromyscus maniculatus*; Access Roads 3, 5, 8, 9, 12, and 14), desert woodrat (*Neotoma lepida*; Access Road 5), and western harvest mouse (*Reithrodontomys megalotis*; Access Road 8). Rodents observed in the Action Area during other surveys include valley pocket gopher (*Thomomys bottae)*, desert woodrat (*Neotoma lepida),* dusky-footed woodrat (*Neotoma fuscipes*), big-eared woodrat (*Neotoma macrotis)*, and ground squirrel (*Spermophilus beecheyi*).

According to MCB Camp Pendleton Geographic Information Systems (GIS), non-listed Lindahl's fairy shrimp (*Branchinecta lindahli*) occur in 11 pools within the Access Road 8 Action Area (USMC 2009).

3.3.2.3 Special-Status Species

Federally Listed Species

As part of this project, a Biological Assessment (BA) was prepared, and information from the BA has been incorporated into relevant sections of this EA. The BA provides the information necessary to initiate and support formal consultation between USMC and USFWS as required by 50 CFR 402.14(c) and Section 7 of the ESA. Under the ESA, species are listed as endangered or threatened according to the following definitions:

- Endangered: A species that is in danger of extinction throughout all or a significant portion of its range.
- Threatened: A species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

The ESA specifies that it is illegal to "take" (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt the foregoing to) a listed species. However, certain take authorization can be granted if the USFWS finds that the take would not jeopardize the continued existence of the species. When the project proponent is a federal agency, incidental take authorizations by the USFWS may be issued in association with a BO after Section 7 consultation under the ESA. On 5 October 2015, the USFWS issued BO FWS-MCBCP-09B0334-09F0946 for the Repairs to 24 Access Roads project (Appendix B).

Through the Section 7 consultation, the status of each listed species and its environmental baseline in the project action area were updated. As of this writing, the BO (Appendix B) contains and/or references the best available scientific information on the status and biology of each listed species as of October 2015. Accordingly, the BO (Appendix B) is incorporated herein by reference and should be referred to supplement and update the information that follows for each listed species in the remainder of this section.

Eighteen federally threatened, endangered, or candidate fish and wildlife species are found on, transit through, or have the potential to occur on MCB Camp Pendleton (USMC 2011). Table 3.3-4 summarizes the potential for each species to occur in the Action Area, based on field surveys and/or previous surveys and data. Figures 3-2 thru 3-11 present all known federally listed species locations with respect to the Action Area.

Coastal California Gnatcatcher

The CAGN is a small gray songbird that is an obligate, permanent resident of CSS vegetation, but they will make limited use of adjacent habitats outside of the breeding season. The CAGN range from Ventura County south to San Diego County and east to San Bernardino County. The breeding season extends from 15 February through 31 August, with peak nesting activities occurring from mid-March through May, as identified by the USFWS Carlsbad, CA office.

CAGN usually begin to molt into breeding plumage in early February. Males primarily select the site for nesting, and nest building begins two to four weeks after the molt. Eggs are incubated for 12 days, and nestlings fledge at 13 days. Young remain with their parents for three to five weeks after fledging. If there is persistent predation of eggs and young, up to 10 nests can be constructed during the breeding season (Grishaver et al. 1998).

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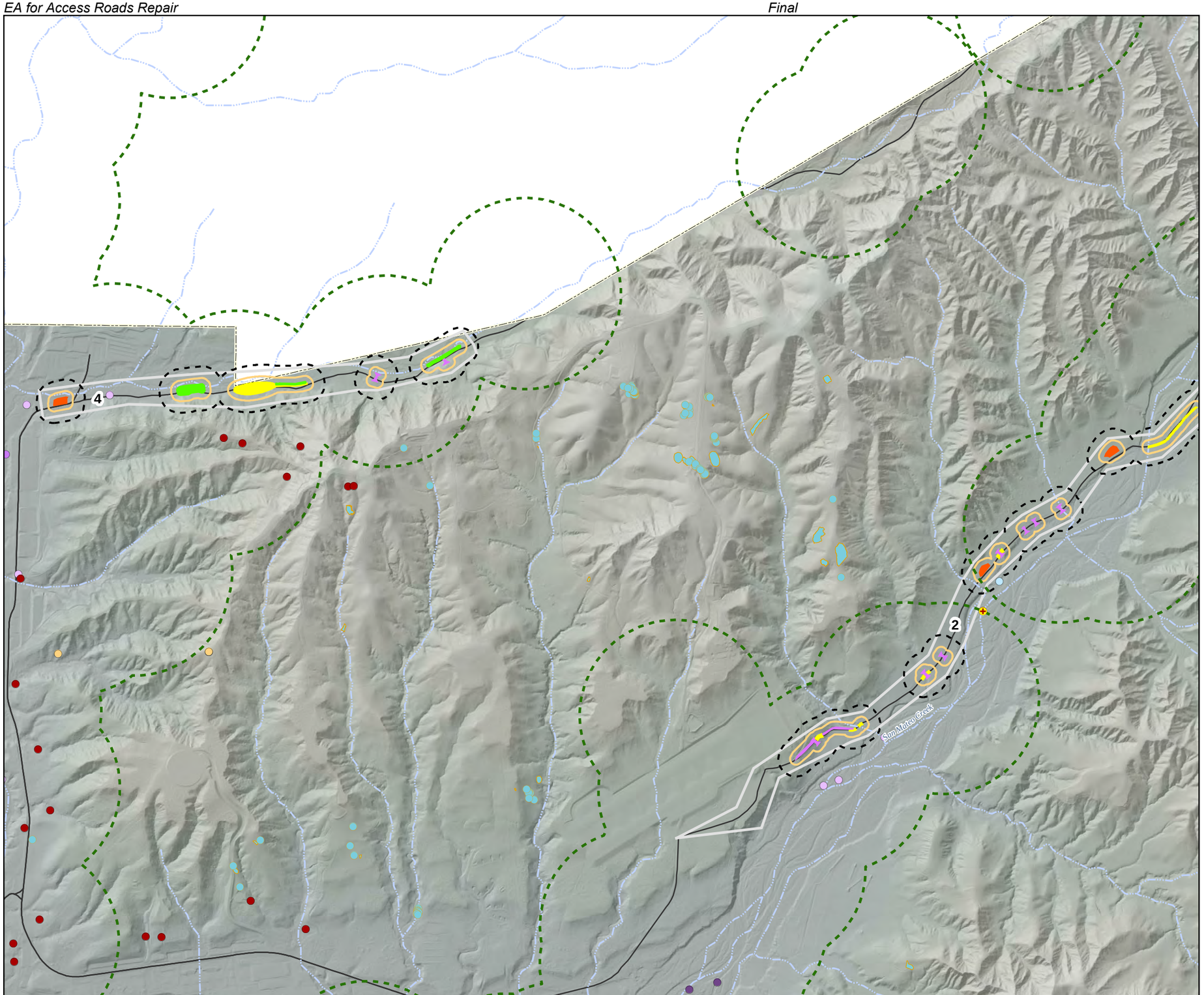


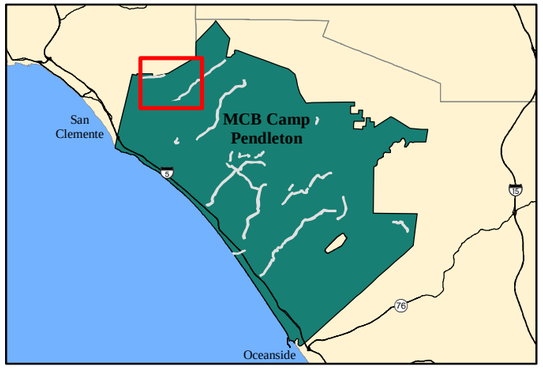
Figure 3-2
Threatened and Endangered Species in the Vicinity of Access Roads 2 and 4

LEGEND

Species Data
- California Gnatcatcher 2006
- California Gnatcatcher 2009 & 2010
- California Gnatcatcher 2009 & 2010 Territories within the Action Area
- California Gnatcatcher 2009 & 2010 Territories within 300 ft from the Action Area
- Least Bell's Vireo 2009
- Least Bell's Vireo 2010
- Least Bell's Vireo 2011
- Southwestern Willow Flycatcher 2009
- Southwestern Willow Flycatcher 2010
- Southwestern Willow Flycatcher 2011
- Least Bell's Vireo Nests 2008 - 2010
- Southwestern Willow Flycatcher Nests 2009 - 2011
- SKR 2008 Capture
- Potentially Occupiable by SKR
- SKR Occupied
- Thread-leaved Brodiaea Filifolia Areas
- 300 ft Buffer for CAGN, LBVI, and SWFL
- Arroyo Toad Habitat Buffer

Project Features
- Road Segments
- Action Area
- Proposed Road Improvement
- Proposed Delineation
- Proposed Drainage Improvement
- Proposed Stabilization
- Proposed Staging Area

Base Data
- Camp Pendleton Boundary
- Streams



0 600 1,200 Feet
0 400 800 Meters

Source: MCB Camp Pendleton 2012

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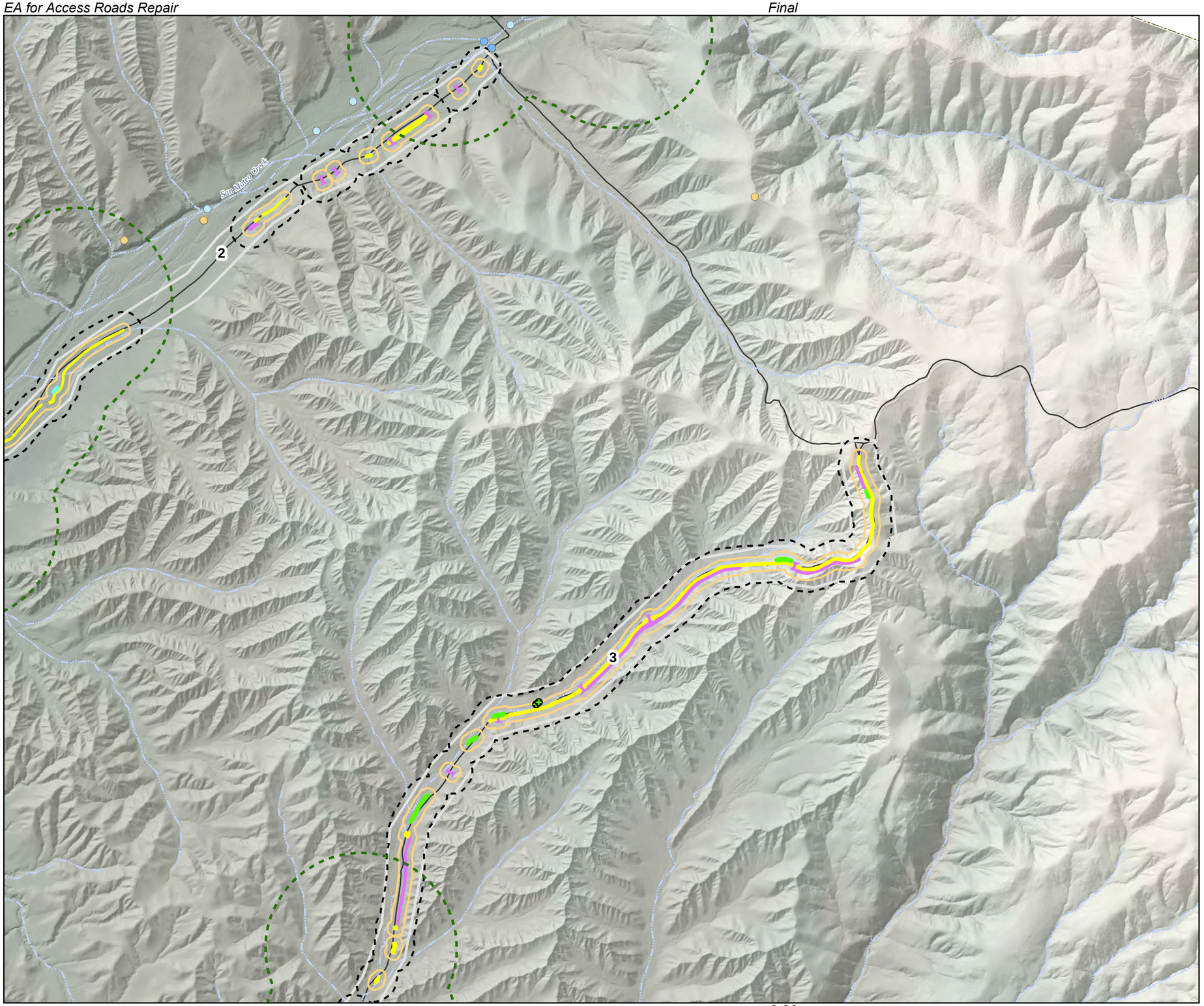

Figure 3-3
Threatened and Endangered Species in the Vicinity of Access Roads 2 and 3

LEGEND

Species Data
- California Gnatcatcher 2006
- California Gnatcatcher 2009 & 2010
- California Gnatcatcher 2009 & 2010 Territories within the Action Area
- California Gnatcatcher 2009 & 2010 Territories within 300 ft from the Action Area
- Least Bell's Vireo 2009
- Least Bell's Vireo 2010
- Least Bell's Vireo 2011
- Southwestern Willow Flycatcher 2009
- Southwestern Willow Flycatcher 2010
- Southwestern Willow Flycatcher 2011
- Least Bell's Vireo Nests 2008 - 2010
- Southwestern Willow Flycatcher Nests 2009 - 2011
- SKR 2008 Capture
- Potentially Occupiable by SKR
- SKR Occupied
- Thread-leaved Brodiaea Filifolia Areas
- 300 ft Buffer for CAGN, LBVI, and SWFL
- Arroyo Toad Habitat Buffer

Project Features
- Road Segments
- Action Area
- Proposed Road Improvement
- Proposed Delineation
- Proposed Drainage Improvement
- Proposed Stabilization
- Proposed Staging Area

Base Data
- Camp Pendleton Boundary
- Streams

0 600 1,200 Feet
0 400 800 Meters

Source: MCB Camp Pendleton 2012

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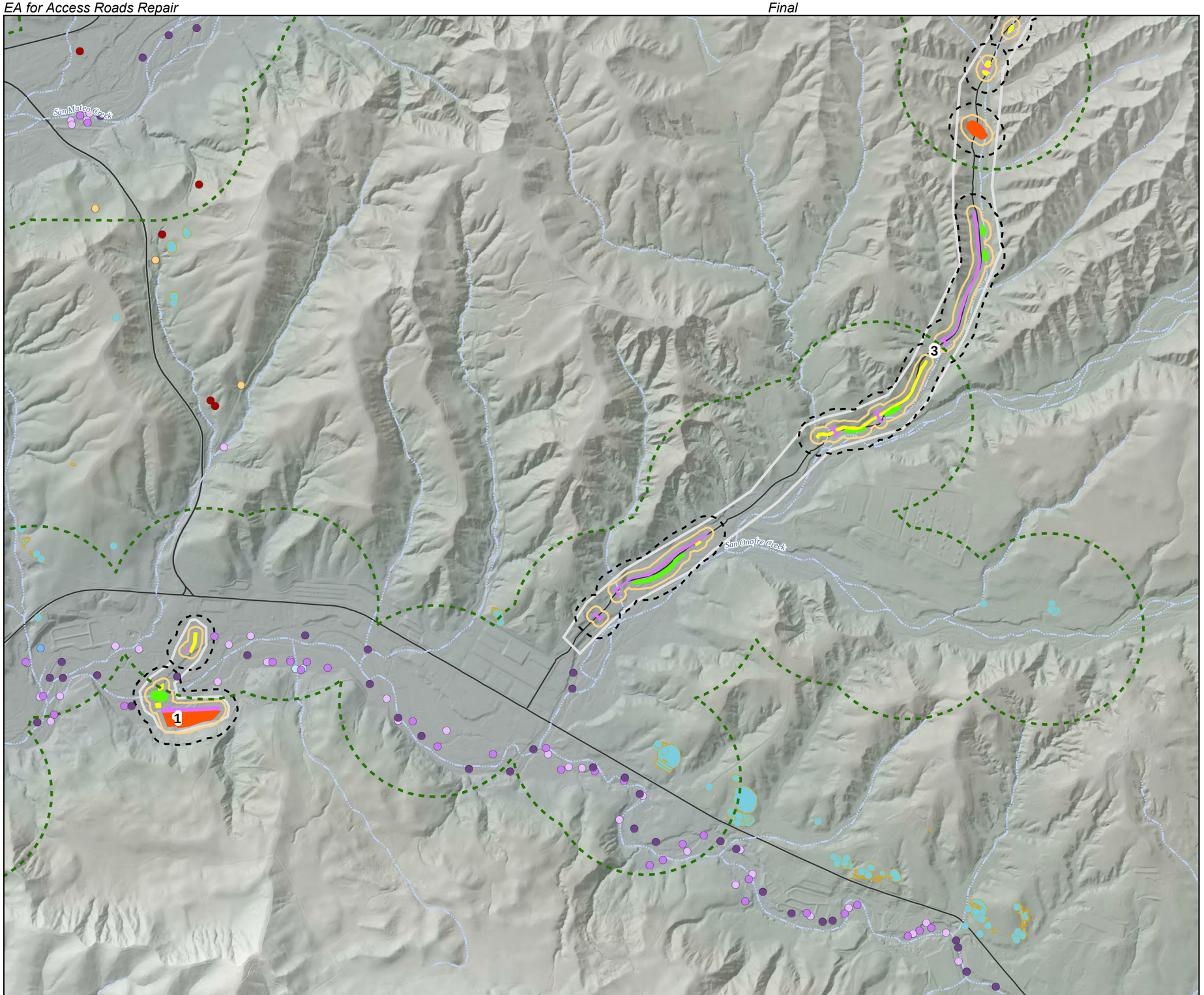

Figure 3-4
Threatened and Endangered Species in the Vicinity of Access Roads 1 and 3

LEGEND

Species Data
- California Gnatcatcher 2006
- California Gnatcatcher 2009 & 2010
- California Gnatcatcher 2009 & 2010 Territories within the Action Area
- California Gnatcatcher 2009 & 2010 Territories within 300 ft from the Action Area
- Least Bell's Vireo 2009
- Least Bell's Vireo 2010
- Least Bell's Vireo 2011
- Southwestern Willow Flycatcher 2009
- Southwestern Willow Flycatcher 2010
- Southwestern Willow Flycatcher 2011
- Least Bell's Vireo Nests 2008 - 2010
- Southwestern Willow Flycatcher Nests 2009 - 2011
- SKR 2008 Capture
- Potentially Occupiable by SKR
- SKR Occupied
- Thread-leaved Brodiaea Filifolia Areas
- 300 ft Buffer for CAGN, LBVI, and SWFL
- Arroyo Toad Habitat Buffer

Project Features
- Road Segments
- Action Area
- Proposed Road Improvement
- Proposed Delineation
- Proposed Drainage Improvement
- Proposed Stabilization
- Proposed Staging Area

Base Data
- Camp Pendleton Boundary
- Streams

0 600 1,200 Feet
0 400 800 Meters

Source: MCB Camp Pendleton 2012

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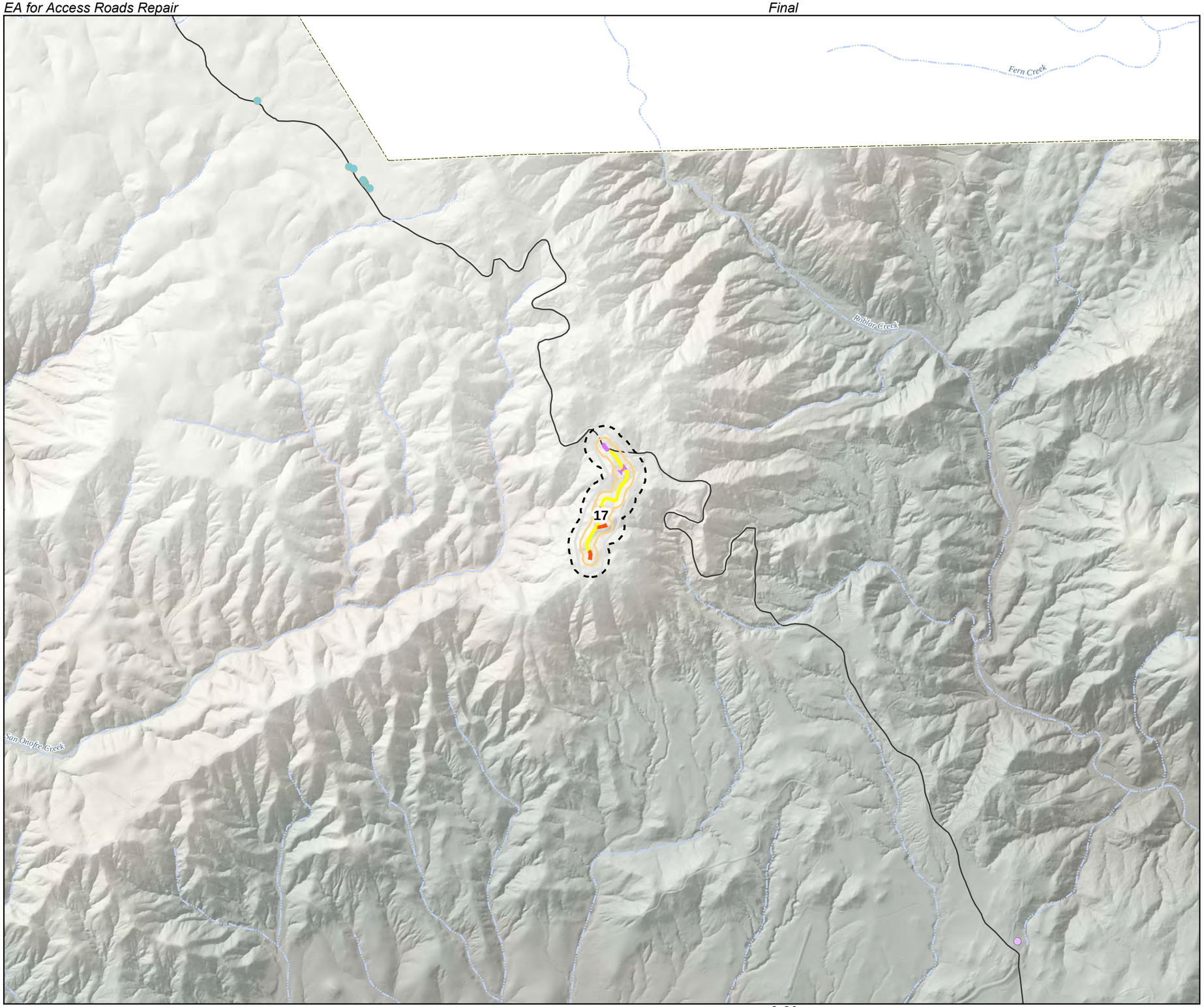

Figure 3-5
Threatened and Endangered Species in the Vicinity of Access Road 17

LEGEND

Species Data
- California Gnatcatcher 2006
- California Gnatcatcher 2009 & 2010
- California Gnatcatcher 2009 & 2010 Territories within the Action Area
- California Gnatcatcher 2009 & 2010 Territories within 300 ft from the Action Area
- Least Bell's Vireo 2009
- Least Bell's Vireo 2010
- Least Bell's Vireo 2011
- Southwestern Willow Flycatcher 2009
- Southwestern Willow Flycatcher 2010
- Southwestern Willow Flycatcher 2011
- Least Bell's Vireo Nests 2008 - 2010
- Southwestern Willow Flycatcher Nests 2009 - 2011
- SKR 2008 Capture
- Potentially Occupiable by SKR
- SKR Occupied
- Thread-leaved Brodiaea Filifolia Areas
- 300 ft Buffer for CAGN, LBVI, and SWFL
- Arroyo Toad Habitat Buffer

Project Features
- Road Segments
- Action Area
- Proposed Road Improvement
- Proposed Delineation
- Proposed Drainage Improvement
- Proposed Stabilization
- Proposed Staging Area

Base Data
- Camp Pendleton Boundary
- Streams

0 600 1,200 Feet
0 400 800 Meters

Source: MCB Camp Pendleton 2012

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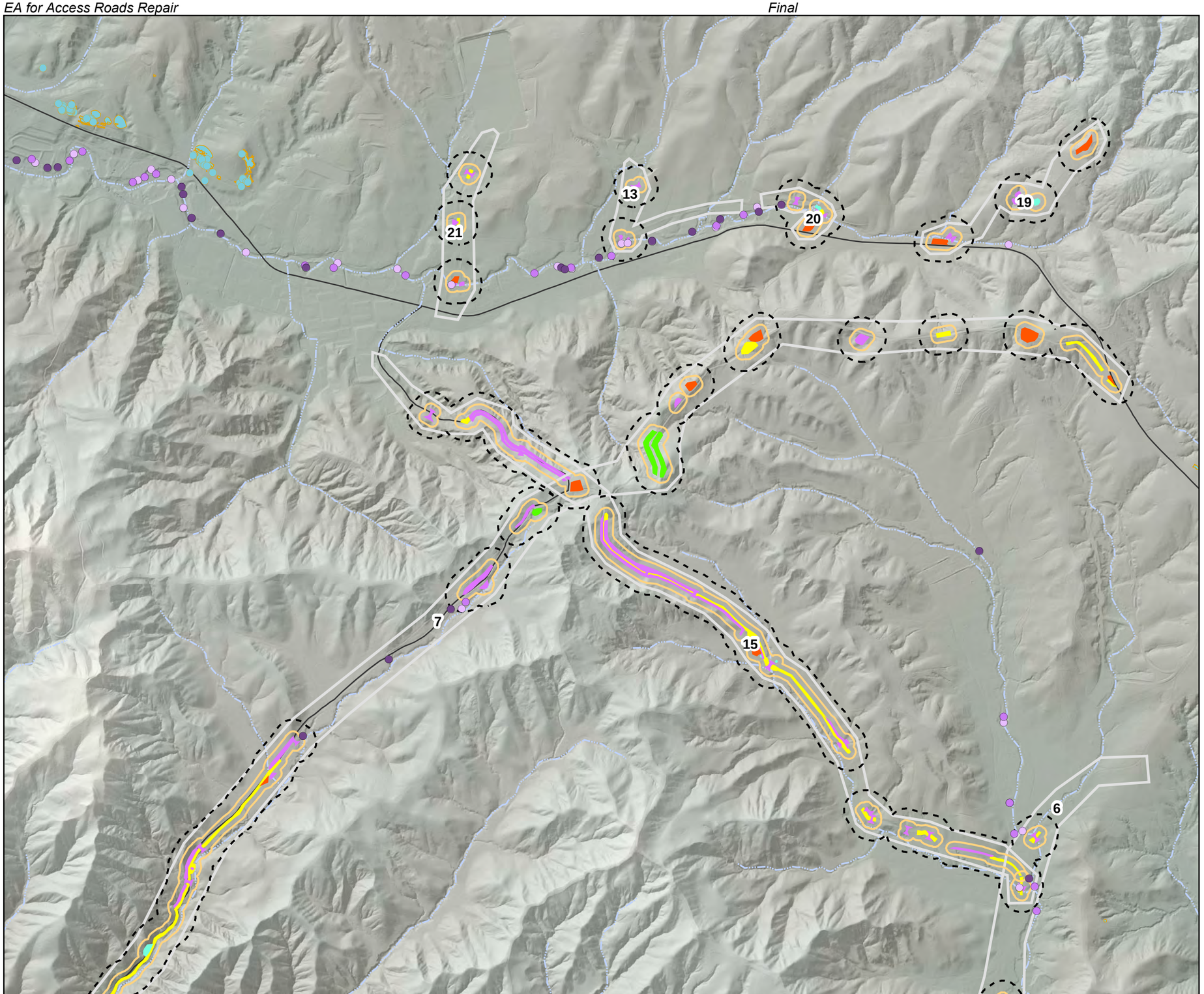


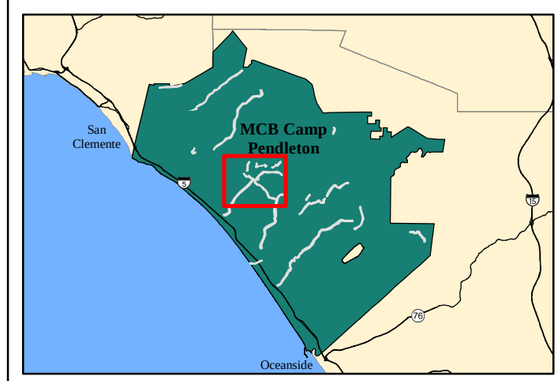
Figure 3-6
Threatened and Endangered Species in the Vicinity of Access Roads 6, 7, 13, 15, 19, 20, and 21

LEGEND

Species Data
- California Gnatcatcher 2006
- California Gnatcatcher 2009 & 2010
- California Gnatcatcher 2009 & 2010 Territories within the Action Area
- California Gnatcatcher 2009 & 2010 Territories within 300 ft from the Action Area
- Least Bell's Vireo 2009
- Least Bell's Vireo 2010
- Least Bell's Vireo 2011
- Southwestern Willow Flycatcher 2009
- Southwestern Willow Flycatcher 2010
- Southwestern Willow Flycatcher 2011
- Least Bell's Vireo Nests 2008 - 2010
- Southwestern Willow Flycatcher Nests 2009 - 2011
- SKR 2008 Capture
- Potentially Occupiable by SKR
- SKR Occupied
- Thread-leaved Brodiaea Filifolia Areas
- 300 ft Buffer for CAGN, LBVI, and SWFL
- Arroyo Toad Habitat Buffer

Project Features
- Road Segments
- Action Area
- Proposed Road Improvement
- Proposed Delineation
- Proposed Drainage Improvement
- Proposed Stabilization
- Proposed Staging Area

Base Data
- Camp Pendleton Boundary
- Streams



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Source: MCB Camp Pendleton 2012

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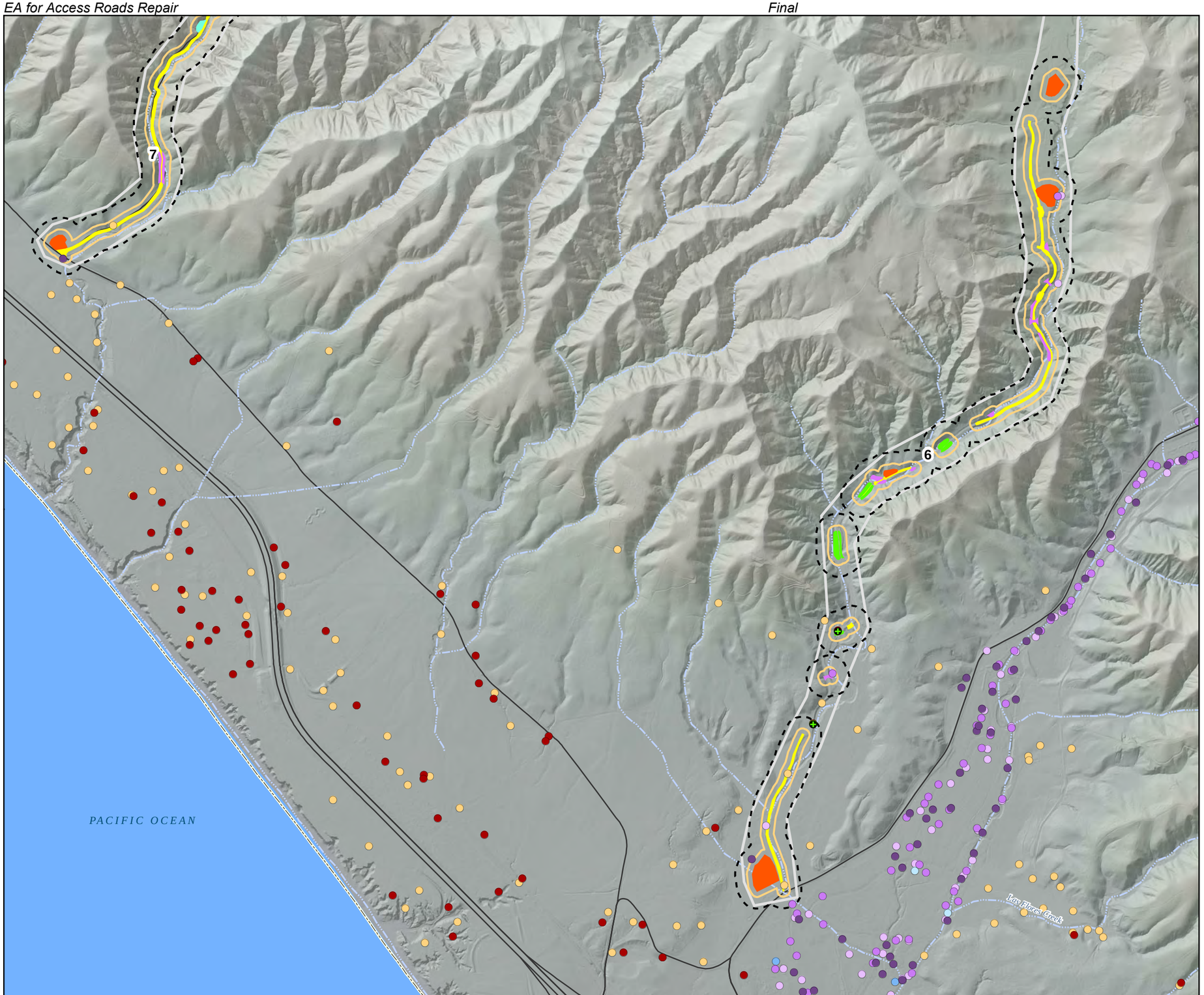


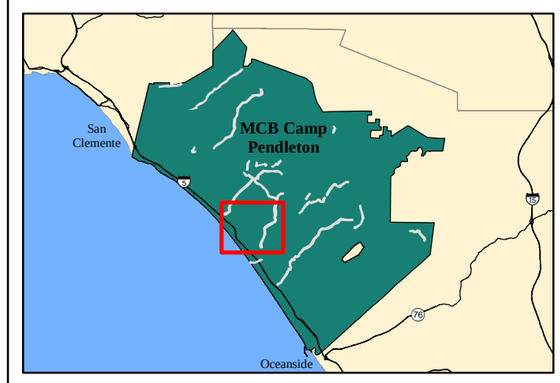
Figure 3-7
Threatened and Endangered Species in the Vicinity of Access Roads 6 and 7

LEGEND

Species Data
- California Gnatcatcher 2006
- California Gnatcatcher 2009 & 2010
- California Gnatcatcher 2009 & 2010 Territories within the Action Area
- California Gnatcatcher 2009 & 2010 Territories within 300 ft from the Action Area
- Least Bell's Vireo 2009
- Least Bell's Vireo 2010
- Least Bell's Vireo 2011
- Southwestern Willow Flycatcher 2009
- Southwestern Willow Flycatcher 2010
- Southwestern Willow Flycatcher 2011
- Least Bell's Vireo Nests 2008 - 2010
- Southwestern Willow Flycatcher Nests 2009 - 2011
- SKR 2008 Capture
- Potentially Occupiable by SKR
- SKR Occupied
- Thread-leaved Brodiaea Filifolia Areas
- 300 ft Buffer for CAGN, LBVI, and SWFL
- Arroyo Toad Habitat Buffer

Project Features
- Road Segments
- Action Area
- Proposed Road Improvement
- Proposed Delineation
- Proposed Drainage Improvement
- Proposed Stabilization
- Proposed Staging Area

Base Data
- Camp Pendleton Boundary
- Streams



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Source: MCB Camp Pendleton 2012

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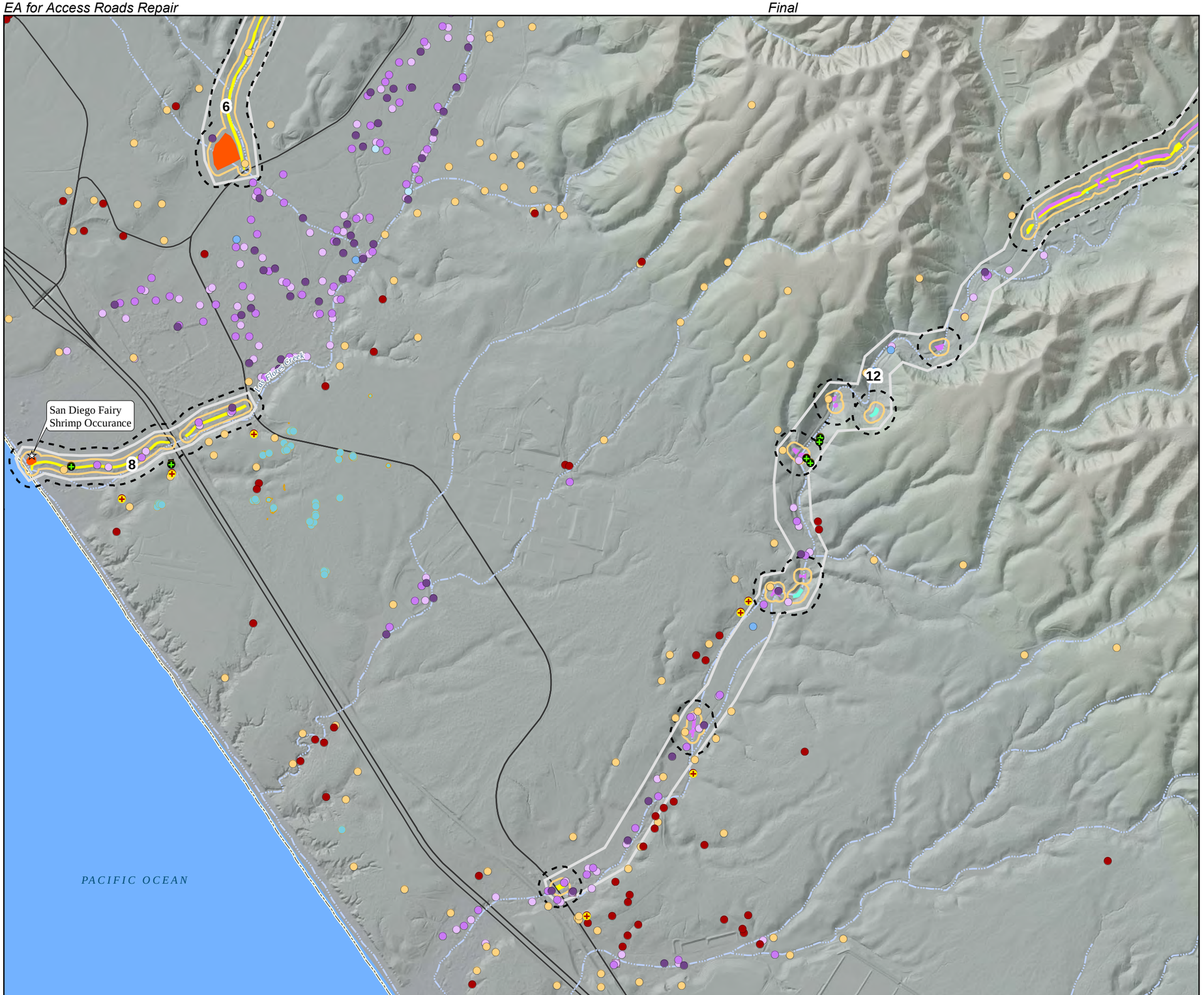

Figure 3-8
Threatened and Endangered Species in the Vicinity of Access Roads 6, 8, and 12

LEGEND

Species Data
- California Gnatcatcher 2006
- California Gnatcatcher 2009 & 2010
- California Gnatcatcher 2009 & 2010 Territories within the Action Area
- California Gnatcatcher 2009 & 2010 Territories within 300 ft from the Action Area
- Least Bell's Vireo 2009
- Least Bell's Vireo 2010
- Least Bell's Vireo 2011
- Southwestern Willow Flycatcher 2009
- Southwestern Willow Flycatcher 2010
- Southwestern Willow Flycatcher 2011
- Least Bell's Vireo Nests 2008 - 2010
- Southwestern Willow Flycatcher Nests 2009 - 2011
- SKR 2008 Capture
- Potentially Occupiable by SKR
- SKR Occupied
- Thread-leaved Brodiaea Filifolia Areas
- 300 ft Buffer for CAGN, LBVI, and SWFL
- Arroyo Toad Habitat Buffer

Project Features
- Road Segments
- Action Area
- Proposed Road Improvement
- Proposed Delineation
- Proposed Drainage Improvement
- Proposed Stabilization
- Proposed Staging Area

Base Data
- Camp Pendleton Boundary
- Streams

0 600 1,200 Feet
0 400 800 Meters

Source: MCB Camp Pendleton 2012

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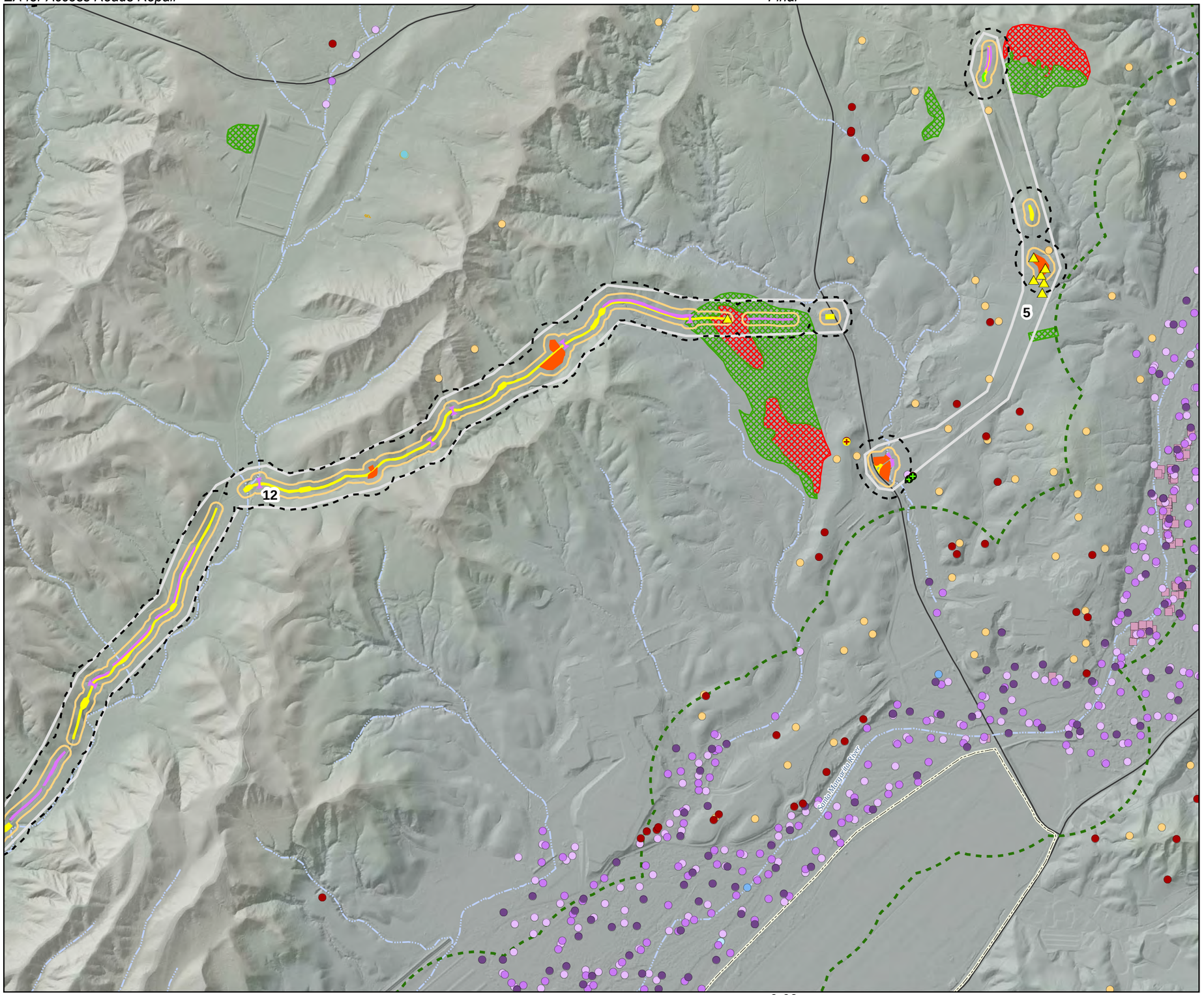


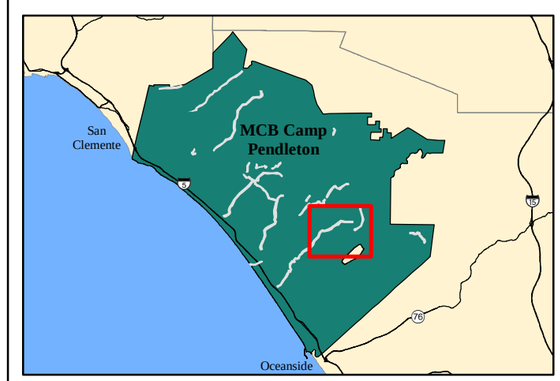
Figure 3-9
Threatened and Endangered Species in the Vicinity of Access Roads 5 and 12

LEGEND

Species Data
- California Gnatcatcher 2006
- California Gnatcatcher 2009 & 2010
- California Gnatcatcher 2009 & 2010 Territories within the Action Area
- California Gnatcatcher 2009 & 2010 Territories within 300 ft from the Action Area
- Least Bell's Vireo 2009
- Least Bell's Vireo 2010
- Least Bell's Vireo 2011
- Southwestern Willow Flycatcher 2009
- Southwestern Willow Flycatcher 2010
- Southwestern Willow Flycatcher 2011
- Least Bell's Vireo Nests 2008 - 2010
- Southwestern Willow Flycatcher Nests 2009 - 2011
- SKR 2008 Capture
- Potentially Occupiable by SKR
- SKR Occupied
- Thread-leaved Brodiaea Filifolia Areas
- 300 ft Buffer for CAGN, LBVI, and SWFL
- Arroyo Toad Habitat Buffer

Project Features
- Road Segments
- Action Area
- Proposed Road Improvement
- Proposed Delineation
- Proposed Drainage Improvement
- Proposed Stabilization
- Proposed Staging Area

Base Data
- Camp Pendleton Boundary
- Streams



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0 400 800 Meters

Source: MCB Camp Pendleton 2012

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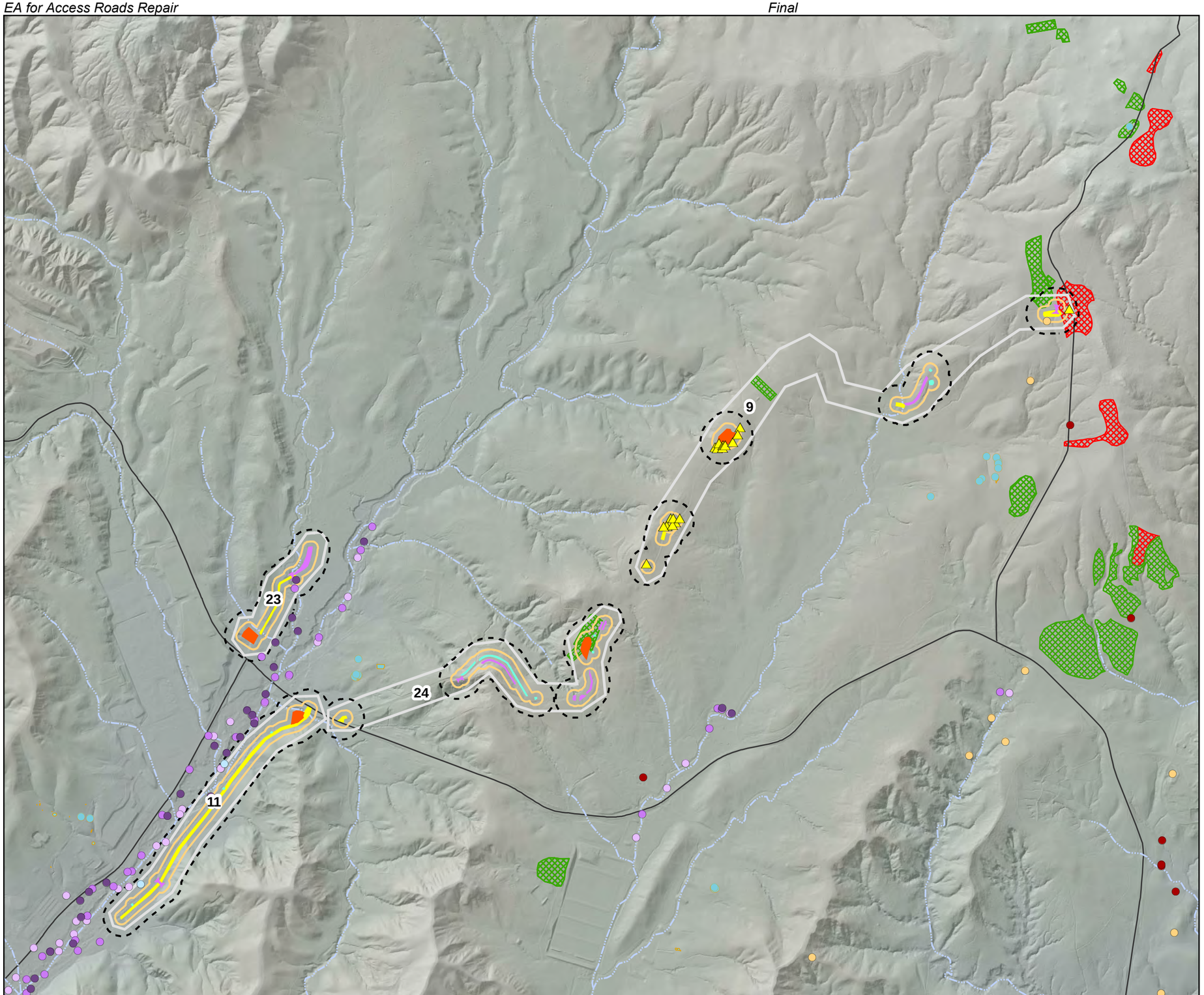

Figure 3-10
Threatened and Endangered Species in the Vicinity of Access Roads 9, 11, 23, and 24

LEGEND

Species Data
- California Gnatcatcher 2006
- California Gnatcatcher 2009 & 2010
- California Gnatcatcher 2009 & 2010 Territories within the Action Area
- California Gnatcatcher 2009 & 2010 Territories within 300 ft from the Action Area
- Least Bell's Vireo 2009
- Least Bell's Vireo 2010
- Least Bell's Vireo 2011
- Southwestern Willow Flycatcher 2009
- Southwestern Willow Flycatcher 2010
- Southwestern Willow Flycatcher 2011
- Least Bell's Vireo Nests 2008 - 2010
- Southwestern Willow Flycatcher Nests 2009 - 2011
- SKR 2008 Capture
- Potentially Occupiable by SKR
- SKR Occupied
- Thread-leaved Brodiaea Filifolia Areas
- 300 ft Buffer for CAGN, LBVI, and SWFL
- Arroyo Toad Habitat Buffer

Project Features
- Road Segments
- Action Area
- Proposed Road Improvement
- Proposed Delineation
- Proposed Drainage Improvement
- Proposed Stabilization
- Proposed Staging Area

Base Data
- Camp Pendleton Boundary
- Streams

0 600 1,200 Feet
0 400 800 Meters

Source: MCB Camp Pendleton 2012

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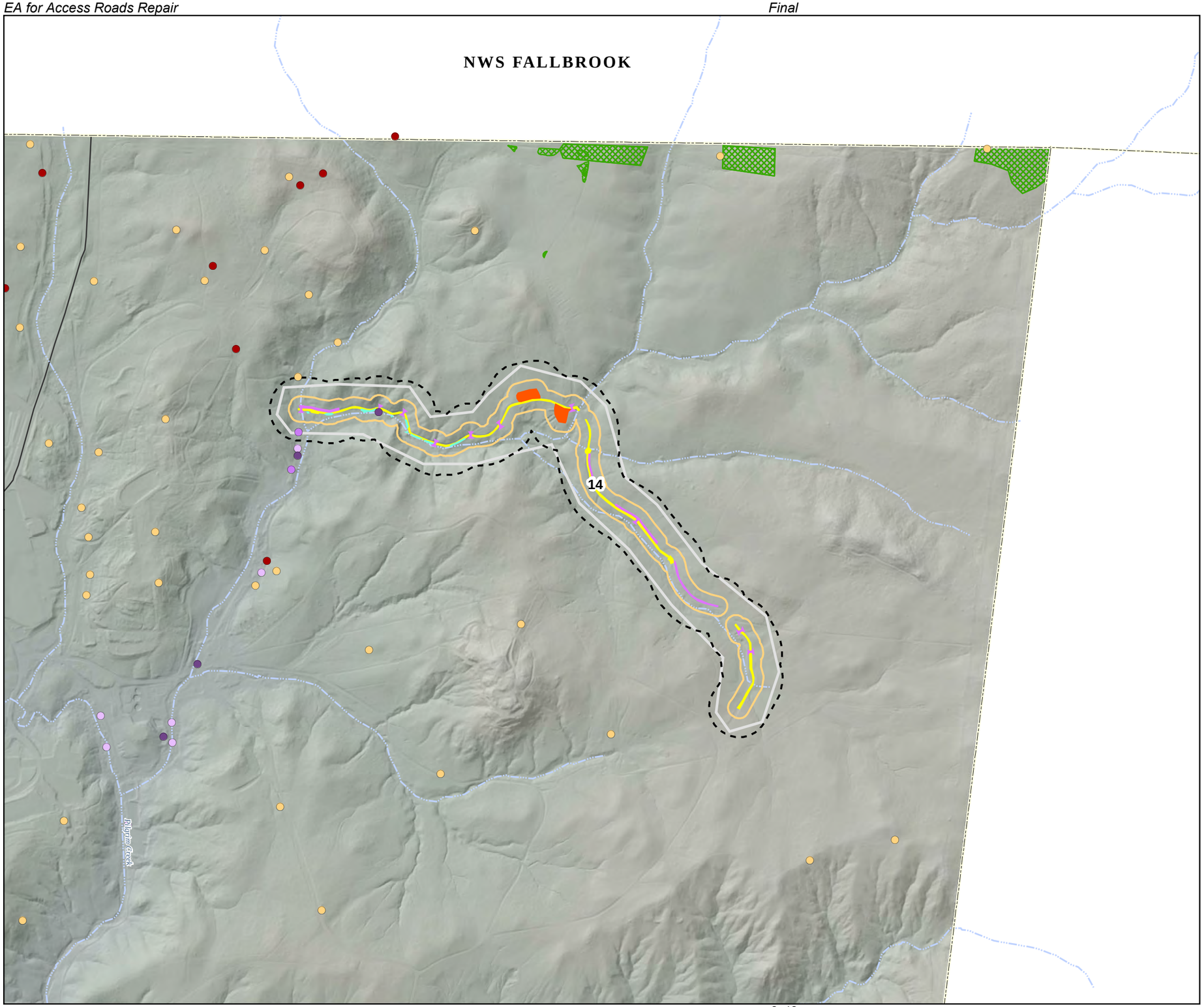


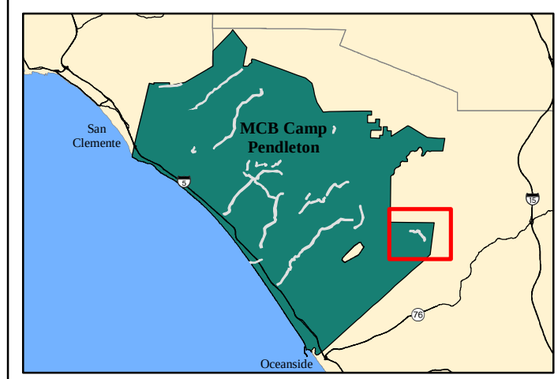
Figure 3-11
Threatened and Endangered Species in the Vicinity of Access Road 14

LEGEND

Species Data
- California Gnatcatcher 2006
- California Gnatcatcher 2009 & 2010
- California Gnatcatcher 2009 & 2010 Territories within the Action Area
- California Gnatcatcher 2009 & 2010 Territories within 300 ft from the Action Area
- Least Bell's Vireo 2009
- Least Bell's Vireo 2010
- Least Bell's Vireo 2011
- Southwestern Willow Flycatcher 2009
- Southwestern Willow Flycatcher 2010
- Southwestern Willow Flycatcher 2011
- Least Bell's Vireo Nests 2008 - 2010
- Southwestern Willow Flycatcher Nests 2009 - 2011
- SKR 2008 Capture
- Potentially Occupiable by SKR
- SKR Occupied
- Thread-leaved Brodiaea Filifolia Areas
- 300 ft Buffer for CAGN, LBVI, and SWFL
- Arroyo Toad Habitat Buffer

Project Features
- Road Segments
- Action Area
- Proposed Road Improvement
- Proposed Delineation
- Proposed Drainage Improvement
- Proposed Stabilization
- Proposed Staging Area

Base Data
- Camp Pendleton Boundary
- Streams



0 600 1,200 Feet
0 400 800 Meters

Source: MCB Camp Pendleton 2012

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The USFWS designated CAGN as threatened on 30 March 1993 (USFWS 1993a). On 24 April 2003, the USFWS proposed areas of critical habitat, to include portions of MCB Camp Pendleton. On 19 December 2007, the USFWS designated revised final critical habitat for the CAGN. All lands on MCB Camp Pendleton are exempt from final critical habitat (USFWS 2007a). MCB Camp Pendleton is currently working cooperatively with USFWS to provide conservation and protection for uplands habitat throughout the Base.

Table 3.3-4. Potential Occurrence of Federally Listed Threatened and Endangered Species in Action Area

Common Name	***Scientific Name***	***Federal Status***	***Habitat***	***Known or Potential Occurrence on Project Sites***
Birds				
California least tern	*Sterna antillarum browni*	Endangered	Sandy beaches and coastal dunes	On the beach south of Access Road 8.
coastal California gnatcatcher	*Polioptila californica californica*	Threatened	Coastal sage scrub	Recent survey of Access Road 3 found no individuals; prior survey data indicate presence near Access Roads 2, 3, 5, 6, 7, 8, 9, 12, & 14.
least Bell's vireo	*Vireo bellii pusillus*	Endangered	Willow-dominated riparian	Prior survey data indicate presence near Access Roads 1, 6, 7, 8, 11, 12, 13, 14, 15, 20, 21, & 23.
light-footed clapper rail	*Rallus longirostris levipes*	Endangered	Coastal fresh and salt water marshes	Not known or likely due to lack of habitat.
southwestern willow flycatcher	*Empidonax traillii extimus*	Endangered	Willow-dominated riparian	Prior survey data indicate presence near Access Roads 2, 6, 7, 8, 12, 14, 15.
western snowy plover	*Charadrius alexandrinus nivosus*	Threatened	Sandy beaches	On the beach south of Access Road 8.
western distinct population segment of yellow-billed cuckoo	*Coccyzus americanus*	Threatened	Riparian	Not known or likely to occur.
Mammals				
Pacific pocket mouse	*Perognathus longimembris pacificus*	*Endangered*	*Coastal mesas, in grassland w/ sandy clay loam soil.*	*None encountered during 2008 survey; potential habitat along Access Road 8.*
Stephens' kangaroo rat	*Dipodomys stephensi*	*Endangered*	*Sparse coastal sage scrub and grassland*	*Recent survey found SKR near Access Roads 5, 9, & 12; prior survey data indicate presence near Access Roads 9, 12, & 24.*

Common Name	Scientific Name	Federal Status	Habitat	Known or Potential Occurrence on Project Sites
Fish				
southern California steelhead	*Oncorhynchus mykiss*	Endangered	Rivers and major streams	Not known or likely due to lack of habitat.
tidewater goby	*Eucyclogobius newberryi*	Endangered	Estuaries/coastal brackish water	Las Flores Lagoon near the south end of Access Road 8.
Amphibians				
arroyo toad	*Anaxyrus californicus*	Endangered	Rivers, streams, surrounding uplands	Prior survey data indicate presence near Access Roads 1, 2, 3, and 4.
Crustaceans				
Riverside fairy shrimp	*Streptocephalus woottoni*	Endangered	Vernal pools	Not known or likely due to lack of habitat.
San Diego fairy shrimp	*Branchinecta sandiegonensis*	Threatened	Vernal pools	Access Road 8.
Plants				
San Diego button-celery	*Eryngium aristulatum var. parishii*	Endangered	Vernal pools	Not known or likely due to lack of habitat.
spreading navarretia	*Navarretia fossalis*	Threatened	Vernal pools	Not known or likely due to lack of habitat.
thread-leaved brodiaea	*Brodiaea filifolia*	Threatened	Grasslands	Recent survey found no individuals; prior survey data indicate potential habitat around Access Roads 6, 11, 15 & 24.
Brand's phacelia	*Phacelia stellaris*	Candidate	Sandy washes and coastal dunes	Not known or likely due to lack of habitat.

Sources: USMC 2011, 2009, and Appendices E-H.
Notes: **Bold** Indicates Known or Potential Occurrence.

The population of CAGN on MCB Camp Pendleton has expanded greatly with protective management of the species and its habitat under the INRMP (USMC 2011). Surveys in 2006 detected approximately 640 nesting pairs of the species on MCB Camp Pendleton, a substantial increase from 2003 but similar to 1998 population. Per the MCB Camp Pendleton INRMP and Range and Training Regulations, personnel cannot remove or damage CSS. In addition, all training activities near occupied habitat are required to remain on existing roads during the breeding season.

CSS (potential CAGN habitat) for this EA is defined as California sagebrush series, California sagebrush series/black sage series, coyote brush series, and California sagebrush series/coyote brush series. In 2006, there were 12 CAGN territories in the Action Area and an additional 21 CAGN territories were within 300 ft (91 m) of the Action Area (Table 3.3-5) (USMC 2012).

Table 3.3-5. 2006 Coastal California Gnatcatcher Territories within 300 ft (91 m) of the Action Area

Access Road	*CAGN Territories in the Action Area*	*CAGN Territories within 300 ft (91 m) of the Action Area*	*Figure(s)*
2: San Mateo Canyon Road	0	1	3-2 and 3-3
5: Combat Town Access Road	1	4	3-9
6: Piedra de Lumbre Canyon Road	3	2	3-7 and 3-8
7: Horno Canyon Road	1	0	3-6 and 3-7
8: Red Beach Access Road	2	3	3-8
9: Range 407 Access Road	1	0	3-10
12: Aliso Canyon Road	4	10	3-8 and 3-9
14: Juliett Road	0	1	3-11
Total	**12**	**21**	

Note: In instances where estimated impact calculations in this EA differ from the BO, the BO supersedes the EA (see Appendix B).

From 1989-2006, MCB Camp Pendleton CAGN surveys documented individuals in and within 300 ft (91 m) of the Action Area associated with Access Roads 2, 5-9, 12 and 14 (refer to Table 3.3-5) (USMC 2009). 2006 CAGN territories were analyzed for this EA as the most recent and best indicator of the occurrence of individuals that may be subject to “take” within the Action Area. Data from earlier years are factored into the consideration of effects on CAGN habitat.

The Action Area contains 224.94 ac (91.03 ha) of CSS, consisting of 172.36 ac (69.75 ha) of California sagebrush series, 4.78 ac (1.93 ha) of California sagebrush/black sage series, 46.76 ac (18.9 ha) of coyote brush series, and 1.04 ac (0.42 ha) of California sagebrush/coyote brush series which provides potential breeding habitat for CAGN (refer to Table 3.3-1). However, only Access Roads 5-9 and 12 contain CSS that is occupied by CAGN. CAGN have been documented within 300 ft (91 m) of Access Roads 2 and 14 but not within the project footprint (USMC 2012). All CSS within these Access Roads (5-9 and 12) was calculated as potential CAGN habitat since CAGN can disperse from currently occupied habitat to the adjacent CSS.

There is 48.90 ac (19.79 ha) of unoccupied CSS within the Access Road 3 Action Area (refer to Table 3.3-1). As prior CAGN surveys did not include the Road 3 Action Area, MCB Camp Pendleton instructed Cardno to perform a focused CAGN survey in the area (Appendix G). The survey started in July 2007 and ran through November 2007, consisting of nine survey passes of all suitable habitat in the area. The survey team did not observe or otherwise detect any CAGN during the survey (Davenport Biological Services 2007).

Least Bell’s Vireo

The BEVI is a small migratory songbird. The BEVI arrives at MCB Camp Pendleton as early as mid-March and leaves for its wintering grounds in Baja California in August. The breeding season is from 15 March through 31 August. BEVI primarily inhabits dense willow-dominated riparian habitats with lush understory vegetation. BEVI forage and nest primarily in willows (*Salix* spp.).

The USFWS listed the BEVI as an endangered species on 2 May 1986 (USFWS 1986). The INRMP addresses management for BEVI (USMC 2011). A draft recovery plan is available for this species (USFWS 1998a). Critical habitat for the BEVI was designated in six southern California counties on 2 February 1994 (USFWS 1994a). MCB Camp Pendleton was excluded from this designation due to a Memorandum of Understanding with the USFWS in response to the ongoing management of BEVI and riparian habitat on MCB Camp Pendleton (USMC 2011).

Prior BEVI surveys indicate that BEVI generally increased in abundance across MCB Camp Pendleton. The most significant increase occurred from 1980 to 1999, after which the population counts have declined moderately. In 1999, 1,010 territorial males were documented on MCB Camp Pendleton. The decline in abundance may be due to weather and climate, human disturbance, and/or the carrying capacity of available habitat at MCB Camp Pendleton. In 2004, 822 territorial males were documented on MCB Camp Pendleton and 2,500 territorial males were documented in all of California (USMC 2011).

Potential BEVI/WIFL riparian vegetation for this EA is defined as arroyo willow series, arroyo willow/ coast live oak series, mulefat series, and mulefat/coyote brush series. The Action Area contains 103.72 ac (41.97 ha) of riparian habitat including 9.77 ac (3.95 ha) of arroyo willow series, 13.71 ac (5.55 ha) of mixed willow series, 66.65 ac (26.97 ha) of mulefat series, 8.33 ac (3.37 ha) of arroyo willow/coast live oak series, and 5.26 ac (2.13 ha) coyote brush/mulefat series, which provides potential breeding habitat for BEVI (refer to Table 3.3-1). The majority of riparian habitat is along access roads that are not occupied by BEVI. BEVI numbers fluctuated from 2004-2006 and are included in Table 3.3-6 and 3.3-7.

Table 3.3-6. Least Bell's Vireo in the Action Area, 2004-2006

Access Road	*2004*	*2005*	*2006*	*Figure*
1: Area 52 Combat Town Access Road	0	1	2	3-4
5: 25 Area Combat Town	1	0	0	3-9
6: Piedra de Lumbre Canyon Road	2	2	1	3-7
7: Horno Canyon Road	1	1	2	3-7
8: Red Beach Access Road	7	3	4	3-8
11: Range 111 Access Road	7	2	4	3-8
12: Aliso Canyon Road	4	5	4	3-5
13: Range 216 Access Road	0	2	1	3-6
14: Juliett Road	1	1	0	3-11
15: Papa III Road	0	2	1	3-6
20: Range 218 Access Road	0	0	1	3-6
23: Artillery Firing/Storage Area 17 Road	0	2	2	3-10
Total	**14**	**18**	**11**	

Source: USMC 2009.
Note: In instances where estimated impact calculations in this EA differ from the BO, the BO supersedes the EA (see Appendix B).

Table 3.3-7. Least Bell's Vireo within 300 ft (91 m) of the Action Area, 2004-2006

Access Road	*2004*	*2005*	*2006*	*Figure*
1: Area 52 Combat Town Access Road	6	4	1	3-4
6: Piedra de Lumbre Canyon Road	0	2	1	3-6
8: Red Beach Access Road	4	2	1	3-8
11: Range 111 Access Road	6	2	9	3-10
12: Aliso Canyon Road	10	9	5	3-8
13: Range 216 Access Road	2	0	0	3-6
20: Range 218 Access Road	0	0	0	3-6
23: Artillery Firing/Storage Area 17 Road	0	0	2	3-10
Total	**28**	**19**	**19**	

Source: USMC 2009.
Note: In instances where estimated impact calculations in this EA differ from the BO, the BO supersedes the EA (see Appendix B).

This EA uses 2006 locations because it is the most current data available. In 2006, 11 BEVI were observed in the Action Area and an additional 19 BEVI were observed within 300 ft (91 m) of the Action Area. MCB Camp Pendleton survey data for BEVI from 2004 to 2006 show BEVI individual locations in and within 300 ft (91 m) of the Action Areas associated with Access Roads 1, 6, 8, 11-13, 20, and 23 (USMC 2011). MCB Camp Pendleton did not conduct project specific surveys for BEVI as part of this EA.

Southwestern Willow Flycatcher

The WIFL is a neo-tropical migrant. It arrives at MCB Camp Pendleton in breeding habitat as early as mid-May and may be present until mid-August. However, for consistency and protection of riparian habitat on MCB Camp Pendleton, the WIFL breeding season is considered 15 March through 31 August (the same as the BEVI). Its breeding range extends from southern California, east to western Texas, north to extreme southern Utah and Nevada, and south to extreme northern Baja California, Mexico. The WIFL inhabits riparian areas along rivers, streams, and other wetlands. In San Diego County, the WIFL typically nests in even-aged, structurally homogeneous, dense stands of willow and mulefat with a high percentage of canopy cover and dense foliage up to 13 ft (4 m) above the ground and invariably nest near surface water or saturated soil. The USFWS listed the WIFL as endangered in February 1995 and approved a final recovery plan in August 2002 (USFWS 1995b, 2002).

The Action Area contains 103.72 ac (41.97 ha) of riparian habitat including 9.77 ac (3.95 ha) of arroyo willow series, 13.71 ac (5.55 ha) of mixed willow series, 66.65 ac (26.97 ha) of mulefat series, 8.33 ac (3.37 ha) of arroyo willow/coast live oak series, and 5.26 ac (2.13 ha) coyote brush/mulefat series, which provides potential breeding habitat for WIFL (refer to Table 3.3-1). From 2004-2006, transient WIFL were observed within or in the vicinity of Access Roads 2, 6, 7, 8, and 14 (refer to Figures 3-2, 3-6, 3-7, 3-8, and 3-11). In 2007, WIFL were only observed in the vicinity (within 300 ft [91 m]) of Access Road 6 (refer to Figure 3-7). No resident or breeding WIFL were documented near the Action Area. Resident WIFL are found along the Santa Margarita River and Lake O'Neil on Fallbrook Creek. MCB Camp Pendleton did not conduct project specific surveys for WIFL as part of this EA.

Western Snowy Plover

The SNPL is a small shorebird (length of 6 inches [15 cm]), pale in color, with a thin dark bill, dark or grayish legs, partial breast band, and a dark ear patch. Females and juveniles may be confused with piping plover (*Charadrius melodus*), but have a much thinner bill and darker legs. They typically forage above the water line of coastal beaches and lagoons, feeding on invertebrates (flies, beach hoppers, etc.) from the sand surface, stranded vegetation, marine-mammal carcasses, or low foredune vegetation (USFWS 2005a). SNPLs regularly run back and forth short distances between resting sites in the foredunes, where they are well camouflaged, and foraging areas along the high-tide line or at the water's edge.

The SNPL breeding season occurs from 1 March through 15 September. Many of the SNPL on MCB Camp Pendleton are year round residents. Wintering and migratory SNPLs also occur on MCB Camp Pendleton beaches in the winter and before the start of breeding. Primary factors contributing to the decline and listing of the SNPL are predation, loss of habitat, and anthropogenic disturbances (USMC 2011).

The SNPL was listed by the USFWS as threatened on 5 March 1993 (USFWS 1993b). A small area of critical habitat was designated on California State Parks leased land on the northwest corner of MCB Camp Pendleton (USFWS 2005b). None of the access roads Action Areas are within SNPL critical habitat. The recovery plan for the SNPL was finalized in 2007 (USFWS 2007c). Protection and management of the SNPL and its habitat is provided for through the INRMP, incorporating the Estuarine and Beach Conservation Plan and Riparian/Estuarine BO (USMC 2011). Programmatic instructions for avoidance and minimization of impacts to the species and its habitat, especially during breeding season, are provided in the Estuarine and Beach Conservation Plan (Riparian/Estuarine BO USFWS 1995a) and Base Order P3500.1M (*Range and Training Regulations*). SNPL nesting on MCB Camp Pendleton beaches is monitored every year. Detected nest locations are marked for avoidance with orange carsonite "off limits" markers. Undetected/unmarked nests are still protected and must be avoided under the ESA. Additional information such as management and survey details for the SNPL is contained in the MCB Camp Pendleton INRMP (USMC 2011).

Two main breeding sites exist for the SNPL in San Diego County: MCB Camp Pendleton and the Silver Strand. Other breeding sites include: Batiquitos Lagoon, San Elijo Lagoon, Mariner's Point (Mission Bay), Sweetwater River Estuary, Chula Vista Wildlife Reserve, and the Tijuana Rivermouth. Within San Diego County, 72 to 87 percent of SNPL nests were located on federal properties from 1994 to 1997; the majority was located on military bases (USMC 2011).

MCB Camp Pendleton is one of the most important SNPL breeding sites in southern California. Since 1994, MCB Camp Pendleton has been performing yearly surveys on the base for the SNPL. The nesting population has risen dramatically during the past decade, with 212 nests during 2004 (Foster 2006; USMC 2011). Nesting locations occur from the Santa Margarita River salt flats and foredune habitat and are widely dispersed north beyond Red Beach (Las Flores Creek) (USMC 2011). Nesting success has been low on MCB Camp Pendleton, averaging 0.4 fledglings per nest during 1994-1998 (Collier and Powell 2000), and declining more recently (personal communication, Sullivan 2007).

MCB Camp Pendleton beaches provide important habitat for wintering and migratory SNPLs. As described by MCB Camp Pendleton biologists (Sullivan 2007), during the winter, SNPLs aggregate in large groups at the north end of Del Mar beach, at the mouth of the Santa

Margarita River, at Cockleburr pond, and small groups have been seen at Red Beach. They also use areas between the crest of the beach and the foredunes for foraging at low tide. SNPLs start marking out territories and making nest scrapes in January, and some individuals have laid eggs as early as 22 February. If their scrapes are bladed over or they are otherwise disturbed they will move to another location and try again (MCB Camp Pendleton 2007). The sandy southwestern end of Access Road 8 at Red Beach is an area of potential SNPL breeding and foraging habitat. The proposed staging area is at the end of the compacted dirt road and the potential SNPL habitat is within the 100-ft (30-m) wide buffer surrounding the staging area (refer to Figure 3-8).

California Least Tern

The LETE is a small bird about 9 inches (23 cm) long with a 20 inch (51 cm) wingspan. It is mostly white and pale gray in body color, with black wingtips. The head of the adult has a black cap and white forehead, and the yellow beak is black tipped. This small migratory tern nests colonially on undisturbed, sparsely vegetated, flat areas with loose, sandy, or saltpan substrate and lives and breeds in large beach colonies along the coastline. LETE are opportunistic feeders known to capture more than 50 species of fish in relatively shallow, near shore waters and coastal freshwater ponds, channels, and lakes. The breeding season extends from 1 March through 15 September (USMC 2011).

In southern California, LETE nest in scattered aggregations on sandy beaches and salt flats along the coast. Active breeding areas in the San Diego County area include: Camp Pendleton, Batiquitos Lagoon, San Elijo Lagoon, Mission Bay, Coronado Island, Tijuana River, Chula Vista Wildlife Refuge, and San Diego Bay (USMC 2011). On MCB Camp Pendleton, LETE nesting sites are located on the beaches at the mouths of the Santa Margarita River (Blue Beach), French and Aliso Creeks (White Beach), and at the mouth of Las Flores Creek (Red Beach), as well as on the salt flats of the Santa Margarita Estuary (USMC 2011). The Red Beach nesting location is new (since 2003) and subject to change; it is not yet included in the MCB Camp Pendleton GIS database.

The USFWS designated LETE as endangered in June 1970 under the predecessor of the ESA (USFWS 1970). No critical habitat has been designated for the species. Protection and management of the LETE and its habitat is provided for through the INRMP, incorporating the Estuarine and Beach Conservation Plan and Riparian/Estuarine BO (USFWS 1995a; USMC 2011). Programmatic instructions for the avoidance and minimization of impacts to the species and its habitat, especially during breeding season, are provided in the Estuarine and Beach Conservation Plan and Base Order P3500.1M (*Range and Training Regulations*). Information such as management and survey details for the LETE is located in the MCB Camp Pendleton INRMP (USMC 2011).

During the last decade, the LETE nesting population on MCB Camp Pendleton has grown substantially and currently represents a significant proportion (about 20 percent) of the total California breeding population (USMC 2011). The minimum threshold set by the Riparian/Estuarine BO for the LETE population on MCB Camp Pendleton is 340 pairs (USFWS 1995a) with a minimum of two colonies. Since 1996, the number of pairs has consistently exceeded the threshold and as of 2004, the total had increased to 1,355 pairs (USMC 2011). Nesting success (number of young successfully fledged), however, has been highly variable and in 2004 declined to less than 5 percent of the number of pairs. All known nest sites are

protected by fencing or have carsonite markers advising pedestrian and vehicular traffic of off-limits areas. Nest sites are also protected by the Range and Training Regulations and the Riparian/Estuarine BO terms and conditions, and are incorporated into the INRMP (USMC 2011) and Environmental Operations Map (USMC 2008). Undetected/unmarked LETE nests are still protected under the ESA.

On White Beach, LETE nesting grounds are enclosed by permanent and temporary fencing to provide protection from human encroachment. Depending on site conditions, the birds may nest outside of the existing fencing. These nests are delineated with orange carsonite markers. Should this occur, temporary fencing is erected as necessary to protect any nests. This nesting habitat is a narrow strip of sand 66 to 131 ft (20 to 40 m) wide and consists of 9.9 ac (4 ha) of sand substrate with salt marsh vegetation encroaching. A monitoring grid system is in place with squares in sizes of 82 to 98 square ft (25 to 30 square m) (USMC 2011).

At the Santa Margarita Estuary nesting grounds, periodic floods create a somewhat unstable habitat. About 30 ac (12 ha) are available for nesting on the north side of the beach at the mouth of the estuary. At this nest site, about 185 ac (75 ha) of salt flats are present, but only about 8.2 ac (3.3 ha) are suitable for nesting. There is no fencing, but passage of training vehicles and human foot traffic is tightly regulated in accordance with the Riparian/Estuarine BO (USFWS 1995a). Monitoring grids are also present, and efforts to control ice plant are continuing (USMC 2011).

There is potential habitat at the southwestern end of Access Road 8 Action Area at Red Beach for LETE nesting. A small number of LETE began using red beach for nesting in 2003 (USMC 2011). In 2007, 12 pairs of LETE laid 14 nests on Red Beach (Marschalek 2008). The proposed staging area is at the end of the compacted dirt road and the potential LETE nesting habitat is within the 100-ft (30-m) wide buffer surrounding the staging area. Las Flores Lagoon (Access Road 8) provides foraging habitat for the LETE.

Stephens' Kangaroo Rat

The SKR is a member of a family of burrowing rodents characterized by cheek pouches, long tails, and comparatively long rear legs. SKR occurs in three distinct geographic regions: western Riverside County, western San Diego County, and central San Diego County (USFWS 1997a). The western San Diego County distribution extends into lands of MCB Camp Pendleton. SKR inhabits grassland, coastal sage scrub, and chaparral habitats where vegetative cover is less than 30 percent and bare ground is abundant (Thomas 1975; O'Farrell and Uptain 1987, 1989; O'Farrell 1997; USFWS 1993c). The species prefers open habitats with patches of bare ground, habitats that are not typically inhabited by other kangaroo rat species. Dense grasses, herbaceous cover, and some non-native species (*Bromus diandrus*) can exclude SKR. SKR has been documented across a variety of soil types, but it is generally less common in clay or rocky soils due to difficulty burrowing through those substrates (USFWS 1997a). The USFWS listed the SKR as endangered in 1988 (USFWS 1988). Critical habitat has not been designated.

The largest groups of SKR at MCB Camp Pendleton occur within the vicinity of the 25 Area Combat Town (Road 5), along Access Road 9 to Range 407 (adjacent to the Zulu Impact Area), and within the 409 Impact Area. Habitat conditions within portions of these areas appear to be maintained through frequent training exercises that keep the habitat open and prevent the establishment of large stands of exotic grasses (*Bromus* sp., *Avena* sp.), and exotic perennials such as sweet fennel (*Foeniculum vulgare*).

Prior SKR surveys documented the presence of SKR in the Action Areas associated with Access Roads 9, 12, and 24 (refer to Figures 3-8 through 3-10) (USMC 2009). A total of 13.78 ac (5.58 ha) of previously mapped occupied (3.18 ac [1.29 ha]) and potentially occupied (10.60 ac [4.29 ha]) habitat is within Access Roads 9, 12, and 24. Based on input from MCB Camp Pendleton and NAVFAC SW biologists, portions of nine Access Roads were surveyed for SKR as part of this project (Appendix H). These areas included Access Roads 3, 5, 9, 12, 13, and 14. Permitted scientists conducted surveys from 19 May to 20 October 2008. Field methods followed the survey protocol provided by USFWS under a federal recovery permit.

The survey confirmed SKR individuals within or in close proximity to the Action Areas along Access Roads 5, 9, and 12 (Table 3.3-8) in habitat patches where aerial vegetative cover was low to non-existent and bare ground was abundant. SKR were trapped along the middle segment of Access Road 5; this area had not been previously documented as SKR habitat (refer to Figure 3-9). SKR were trapped within 4 of the 5 segments of Access Road 9. Only the northeastern segment of Access Road 9 had been previously documented as SKR habitat (refer to Figure 3-10). The SKR trapped along Access Road 12 was within previously mapped SKR habitat (refer to Figures 3-8 and 3-9).

Table 3.3-8. Stephens' Kangaroo Rat 2008 Surveys

Access Road	*SKR*	*Figure*
3: Jardine Canyon Road	0	3-3, 3-4
5: 25 Area Combat Town	6	3-9
9: Range 407	25	3-10
12: Aliso Canyon Road	1	3-8, 3-9
13: Range 216	0	3-6
14: Juliett Road	0	3-10
Total	**32**	

Source: Davenport Biological Services 2008.

Note: In instances where estimated impact calculations in this EA differ from the BO, the BO supersedes the EA (see Appendix B).

Based on MCB Camp Pendleton previously mapped SKR habitat, 2008 SKR locations (Appendix H), and the 2006 USFWS Designation of Core Areas and Potential Restoration Sites for the CAGN, PPM, and SKR on MCB Camp Pendleton, California, SKR habitat within the Action Area was determined (USMC 2009, USFWS 2006a). MCB Camp Pendleton mapped SKR habitat was used for Access Roads 12 and 24 (USMC 2009). All grassland vegetation within Access Road 9 was assumed to be SKR habitat. The entire middle segment of Access Road 5 was calculated as SKR habitat based on the 2008 documentation of SKR in the area (Appendix H). A total of 24.79 ac (10.03 ha) of SKR habitat is within the Action Area.

Pacific Pocket Mouse

The PPM is a small rodent, ranging in size from 4.3 to 6 inches (11 to 15 cm) from nose to tip of the tail. Their coat is spineless and bristle-free, and the coat color is a light pinkish brown with a lighter underside. The ears have a patch of light hairs on the tips, the tail is bi-colored, and the soles of the hind feet are hairy, all of which are distinguishing marks of the PPM. The PPM was listed as an endangered species in 1994 (USFWS 1994b). Critical habitat has not been

proposed or designated for this species. A recovery plan has been completed for this species (USFWS 1998b).

The PPM is one of 19 subspecies of *Perognathus longimembris* (Hall 1981), and one of two *P. longimembris* that occur on the coastal plain of southern California (i.e., south of the Transverse Range and west of the Peninsular Ranges). The largest known remaining population of PPM occurs on MCB Camp Pendleton. This population is located within the Oscar 1 and Edson Range Impact Area (Ogden Envrionmental and Energy Services Company, Inc. 1997). Two other populations of PPM also occur on MCB Camp Pendleton near San Mateo Creek (Davenport Biological Services 2008).

The PPM is associated with various coastal plant communities. This subspecies has been observed/collected in coastal dune, coastal bluff scrub, as well as coastal sage scrub plant communities. Common attributes of the collection sites have included the presence of sandy soils and an open vegetative community. The structure of its habitat is similar to sites where a closely related subspecies, the Los Angeles pocket mouse (*Perognathus longimembris brevinasus*), has been documented. Like other little pocket mice, PPM is thought to predominantly collect and consume seeds (e.g., grass and forbs), but will eat green vegetation as well as insects.

The PPM is known to be active during the spring, summer, and fall. Of 30 specimens held at the Museum of Vertebrate Zoology, Berkeley, California, one specimen was collected in April, seven in July, nine in August, four in September, and three in October (Appendix H).

Existing data indicated that the PPM were not within the Action Area (USMC 2009). However, as suitable habitat was present, particularly near Red Beach (at the end of Access Road 8), SKR/PPM surveys were conducted from May-October 2008. The survey did not detect any PPM (Appendix H).

Arroyo Toad

The ARTO is a small toad, colored light-olive green or grey to tan on the back, with dark-spotted, warty skin. The underside is white or buff and without dark blotches or spots. A light colored, V-shaped stripe crosses the head and eyelids, and the anterior portion of the oval parotid glands (just behind the eyes) are pale (USMC 2011). The ARTO requires shallow, slow moving streams and riparian habitat for breeding and is dependent on upland terraces and the marginal zones between stream channels and upland terraces during the non-breeding season, generally late fall and winter (Sweet 1992). The USFWS listed the ARTO as an endangered species in December 1994 (USFWS 1994c). In both the 2005 final critical habitat and the revised 2009 proposed critical habitat all lands owned or controlled by MCB Camp Pendleton were excluded from critical habitat designation under Section 4(b)(2) of the ESA for economic reasons and Section 4(a)(3) of the ESA due to the effectiveness of the INRMP in providing for the conservation of this species (USFWS 2005c, 2009; USMC 2009).

Historically, ARTO inhabited the length of drainages from central California into northwestern Baja California, Mexico. On MCB Camp Pendleton, the ARTO occurs in three drainages: Santa Margarita, San Onofre, and San Mateo. MCB Camp Pendleton ARTO populations may represent some of the largest remaining populations and the only one occurring on an undammed major river system within southern California (USMC 2011).

Prior ARTO surveys documented the presence of ARTO and ARTO habitat in the Action Area associated with San Onofre and San Mateo Creeks and their tributaries along Access Roads 1, 3, and 4 (USMC 2009). MCB Camp Pendleton did not conduct ARTO surveys for this EA. Table 3.3-9 includes the acreages and figures numbers of potential ARTO riparian habitat (Mulefat Series, Arroyo Willow Series, and Mixed Willow Series for each Access Road Action Area; a total of 45.20 ac [18.29 ha] is in the Action Area). The ARTO buffer is shown on the figures; however, all riparian habitat within the Access Roads 1, 2, 3, and 4 Action Area was considered potential ARTO habitat due to its proximity to San Onofre Creek, San Mateo Creek, or their tributaries.

Table 3.3-9. Potential Arroyo Toad Riparian Habitat

Access Road	*Creek*	*ARTO Riparian Habitat (ac)*	*Figure*
1: Area 52 Combat Town	San Onofre	4.05	3-4
2: San Mateo Canyon Road	San Mateo	1.55	3-2, 3-3
3: Jardine Canyon Road	Tributary to San Onofre	32.83	3-3, 3-4
4: Talega Canyon Road	Talega	6.77	3-2
	Total	**45.20**	

Source: USMC 2009.

Note: In instances where estimated impact calculations in this EA differ from the BO, the BO supersedes the EA (see Appendix B).

ARTO habitat occurs within the Access Road 1 Action Area in the main channel of San Onofre Creek (refer to Figure 3-4). The Action Area for Access Road 3 is within ARTO habitat along tributaries to San Onofre Creek. The majority of the ARTO habitat within the Action Area is along Access Road 3. ARTO habitat occurs within the Access Road 2 Action Area in the main channel of San Mateo Creek. ARTO habitat occurs within the Access Road 4 Action Area along Talega Creek a tributary to Christianitos Creek, which is ultimately a tributary to San Mateo Creek.

There is potential ARTO upland habitat within Access Roads 1, 2, 3, and 4; however, no acreages were calculated because it is difficult to determine the use of upland habitat by ARTO. The USFWS defines essential upland habitat as 82 ft (25 m) elevation or 1,640 ft (500 m) from the stream where an ARTO occurs (USFWS 2005c). MCB Camp Pendleton did not initiate project specific ARTO surveys for this BA.

San Diego Fairy Shrimp

The SDFS is a small freshwater crustacean that occurs in vernal pools in coastal southern California and northwestern Baja California. Vernal pools are seasonal shallow pools that are filled by winter and spring rains that usually begin in November and continue into April or May (USMC 2009). SDFS is found in both natural and manmade ephemeral pools that range in depth from approximately 2 to 12 inches (5 to 30 cm). Hatching from cysts occurs following prolonged inundation during the winter rainy season, and individuals mature in 7 to 14 days (USFWS 2003). Adults are usually seen between January and March, but the hatching period is highly variable depending on rainfall. Some cysts appear to remain dormant despite inundation, and repeat cycles of hatching and reproduction occur within a season in response to episodic rainfall (USFWS 2003).

The SDFS was listed as federally endangered in February 1997 (USFWS 1997b). Critical habitat proposed in 2003 for SDFS included some non-training areas of MCB Camp Pendleton, subunits 2A-2F. MCB Camp Pendleton including subunits 2A-2F was exempt from 2007 final critical habitat designation due to the effectiveness of the INRMP in providing for the conservation of the species (USFWS 2007b).

On MCB Camp Pendleton, the SDFS shares the same coastal distribution as the RFS. On MCB Camp Pendleton, SDFS appears to be locally abundant in natural vernal pools and in manmade pools that have not been disturbed in several seasons (Mouer 1998). Vernal pools of high natural quality would generally be occupied by SDFS while more degraded pools have a greater likelihood of containing non-listed Lindahl's fairy shrimp; however, SDFS also occur in unvegetated road ruts in some training areas on MCB Camp Pendleton. SDFS occur on relatively flat coastal mesas on the western and southwestern portions of MCB Camp Pendleton primarily in Victor, Oscar One, and Oscar Two training areas and the Wire Mountain housing area (refer to Figure 3-12) (USMC 2009). Almost all of the access roads Action Areas are outside of known areas of occurrence for SDFS.

Wet depressions previously mapped but not sampled for fairy shrimp were identified within or near the Action Areas for Access Roads 5 and 8 were inspected during early 2007 by biologists from NAVFAC SW (J. Rice) and MCB Camp Pendleton (T. Sabol). The depressions were found to be road ruts and were considered too small and/or dry to have the potential to support fairy shrimp. In surveys being conducted for MCB Camp Pendleton's Grow the Force program, three additional wet depressions have been mapped within Access Roads 7 (USMC 2009).

One pool on the northwest edge of Access Road 8 Action Area contains SDFS (refer to Figure 3-8) (USMC 2009). The pool is located in CSS vegetation near the edge of Access Road 8. There are 22 other mapped pools within Access Road 8 Action Area: 11 support Lindahl's fairy shrimp, 8 pools were surveyed and did not support any fairy shrimp, and 3 pools were not surveyed. The unsurveyed pools are unlikely to support SDFS but have the potential to support SDFS (refer to Figure 3-8). There are 12 unsurveyed pools along Access Roads 5 and 7 that are unlikely to support SDFS as there are not any known occurrences of SDFS in the general vicinity (Figure 3-12).

Riverside Fairy Shrimp

The RFS is a small freshwater crustacean that occurs in vernal pools in coastal southern California counties and northern Baja California, typically within 15 miles (24 km) of the coastline (Mouer 1998; USFWS 2005d). RFS takes 2 months to mature and reproduce, resulting in a specific set of habitat requirements. The species is found in cool, deep (10 inches [25 cm] to 10 ft [3 m]) pools with low dissolved solids and standing water that remains into the warmer spring months (USFWS 2005d). Cysts can survive for multiple years without hatching, thus adequate hydrologic conditions each year are not required for species occurrence.

Figure 3-12
Access Roads
Fairy Shrimp Overview

Source: MCB Camp Pendleton 2012b

The RFS was listed as endangered in 1993 (USFWS 1993d). Final critical habitat was designated in 2005 and all lands owned or controlled by MCB Camp Pendleton were excluded from listing in accordance with Section (4)(a)(3) of the ESA due to the effectiveness of the INRMP in providing for the conservation of this species (USFWS 2005d; USMC 2009).

MCB Camp Pendleton contains isolated populations and a core population of RFS in the southern coastal portion of the base (refer to Figure 3-12) (USFWS 2004b). A core population contains multiple pools or pool complexes that are inhabited by the species and are also within 5 miles (8 km) of other occupied pools (USFWS 2004b).

Existing data was analyzed for RFS; no RFS are known to occur within the project Action Area (refer to Figure 3-12) (MCB Camp Pendleton 2008). The unsurveyed pools along Access Roads 5, 7, and 8 are unlikely to support RFS, as there are not any documented RFS in the area (refer to Figure 3-12).

Tidewater Goby

The TWG is a small fish, rarely exceeding 2 inches (5 cm) in length, which is restricted to California coastal brackish water habitats. TWGs typically inhabit lagoons and estuaries at stream and river mouths that are seasonally opened to the ocean by flooding, but are subject to closure by natural berming. These habitats are typically brackish, but salinities vary greatly, and often there is restricted, if any, tidal circulation or connection to the ocean during dry periods. TWGs are benthic, living on the substrate and in shallow burrows, and primarily feed on small benthic invertebrates and crustaceans including aquatic insects, larvae, snails, and shrimp. TWGs live approximately 1 year, with the spawning season typically occurring from 1 April to 30 June, but spawning activity can be variable, such that spawning can occur year-round (USMC 2011; USFWS 2005b).

The TWG was federally listed as endangered on 4 February 1994 (USFWS 1994d). Critical habitat for TWG was initially designated on 20 November 2000, and included the lagoons of the Santa Margarita River and Cockleburr, French, Aliso, Hidden, and Las Flores Creeks, from the ocean to the upper limits of brackish/tidal influence (USFWS 2000). On 28 November 2006, the USFWS proposed to exclude critical habitat designation for the TWG on MCB Camp Pendleton, citing adequate protection for the species under the INRMP and related programmatic conservation measures (USFWS 2006b). In the revised final designation of critical habitat, all streams supporting the TWG on MCB Camp Pendleton, including Las Flores Creek, are recognized as essential but have been exempted from critical habitat designation due to the protection to the species which is provided through the INRMP and the Estuarine Conservation Plan and Riparian/Estuarine BO (USFWS 2008; USMC 2009; USFWS 1995a). A final recovery plan for the TWG has been published (USFWS 2005b). Principal threats to the TWG include loss and modification of habitat, water diversions, predatory and competitive introduced fish species, habitat channelization, and degraded water quality (USFWS 2005b).

The TWG appears to spend all life stages in lagoons, estuaries, and river mouths. TWGs may enter marine environments only when flushed out of lagoons, estuaries, and river mouths by normal breaching of the sandbars following storm events. This is an important mechanism for dispersal to and recolonization of coastal streams. Variable brackish conditions and restricted tidal exposure limit the dispersal and survival of predatory species in these habitats, providing a refuge for the TWG (USFWS 2005b). In recent years, TWGs have been found in Cockleburr,

French, Aliso, Hidden, and Las Flores Creeks, but have not been found in the Santa Margarita River since 2001 (USMC 2011).

TWG is known to occur at the mouth of Las Flores Creek, which is located near Red Beach at the southern end of Access Road 8 (USMC 2011). MCB Camp Pendleton programmatic instructions applied to coastal lagoons to protect the TWG include minimizing vehicle and foot traffic, rehabilitating beach and estuarine habitats disturbed by non-routine activities, exotic vegetation and invasive aquatic predatory species control, water quality and stream hydrology monitoring, and annual surveys (USMC 2011).

Thread-leaved Brodiaea

The BRFI is a perennial herb with several long, narrow leaves growing from underground corms. Flowers typically bloom from May to June, depending on precipitation and regional soil conditions. This species grows from a corm in clay or clay loam soils, usually in grasslands on level to gradually (<10 percent) sloping sites. BRFI has a short flowering season, typically late spring. The USFWS listed BRFI as federally threatened in October 1998 (USFWS 1998c). No lands on MCB Camp Pendleton are designated critical habitat for BRFI (USFWS 2005c; USMC 2011).

The historical range of BRFI is from the foothills of the San Gabriel Mountains in Los Angeles County, east to Arrowhead Hot Springs in the western foothills of the San Bernardino Mountains (San Bernardino County), and south through eastern Orange and western Riverside Counties to Carlsbad in San Diego County. The size and extent of BRFI populations vary in response to temperature and the timing and amount of rainfall. BRFI occurs at 22 general localities on MCB Camp Pendleton (USMC 2011).

As the Action Area contains the potential for BRFI (based on soil composition, elevation, and plant communities), qualified botanists surveyed the Action Area for BRFI and other rare plants in 2007 and 2008 (Appendix E). This survey did not find any BRFI; however, 2007 and 2008 had unusually low rainfall, resulting in dry habitat conditions. These conditions can decrease the diversity of species, and therefore could have decreased the probability of finding rare plants such as BRFI during the recent surveys. Thus, MCB Camp Pendleton recently awarded a contract to perform BRFI surveys in spring of 2009 along Access Roads 6, 11, 15, 24, and adjacent areas which could support BRFI populations. MCB Camp Pendleton will share the results from the spring 2009 BRFI survey with the project team and biological monitors when the data is available.

Other Special-Status Species

Eight California Department of Fish and Wildlife (CDFW) avian species of special concern observed in the Action Area include loggerhead shrike (*Lanius ludovicianus*; Access Roads 1 and 6), northern harrier (*Circus cyaneus*; Access Road 4), sharp-shinned hawk (*Accipiter striatus*; Access Road 1), American white pelican (*Pelecanus erythrorhynchos*; Access Road 12), yellow-breasted chat (*Icteria virens*), and yellow warbler (*Dendroica petechia brewsteri*; Access Road 3). The white-tailed kite (*Elanus leucurus*) was observed in the Access Road 2 Action Area and is classified by the CDFW as fully protected. The cactus wren (*Campylorhynchus brunneicapillus*), a CDFW species of concern (previously documented near of Access Road 2) was not observed in the Action Area during surveys for this project (USMC 2009).

CDFW species of special concern with the potential to occur within the Action Area include Blainville's horned lizard (*Phrynosoma blainvillii*), orange-throated whiptail (*Aspidoscelis hyperythra*), two-striped garter snake (*Thamnophis hammondii*), red diamond rattlesnake (*Crotalus ruber ruber*), western spadefoot (*Spea hammondii*), yellow warbler, southern California rufous-crowned sparrow (*Aimophila ruficeps canescens*), burrowing owl (*Athene cunicularia*) and California horned lark (*Eremophila alpestris actia*) (USMC 2011). Coastal rosy boa (*Lichanura trivirgata roseofusca),* a USFWS sensitive species also has the potential to occur in the Action Area. None of these species were observed in the Action Area, but their occurrence is possible, as they could have been absent or undetected.

The following section describes the potential direct and indirect impacts on biological resources that would result from implementation of the Proposed Action. Factors especially relevant to determining whether impacts would be significant include the severity of any effects on individuals or habitats of threatened and endangered species.

Direct impacts are associated with ground-disturbing activities resulting from access road repair activities (e.g., direct mortality of species or removal of vegetation and habitat by grading). Direct impacts may be either temporary (reversible) or permanent (irreversible). Most direct impacts are confined to the repair footprint, but some may extend beyond project boundary.

Indirect impacts result from project-related activities, but occur later in time and are reasonably certain to occur. Indirect impacts are diffuse, resource-specific, and less amenable to quantification or mapping than direct impacts. Indirect impacts such as noise during construction can extend beyond the immediate construction footprint(s).

Project effects are evaluated based upon an understanding of proposed repair activities and construction methods and equipment that would be used. The areas surveyed for biological resources at each project site encompass foreseeable direct or indirect effects, allowing for flexibility in the final design and configuration of facilities. All project effects are described as they would occur after the SCMs described in Section 2.6 are implemented. Following repair and stabilization activities, revegetation of temporarily disturbed areas would occur in accordance with SCMs. The areas of potential construction do not present difficult conditions such as steep slopes or large areas of sensitive habitat or difficult to restore habitat, such as riparian, CSS, or oak woodland. As a result, confinement of construction activities to specified areas and the implementation of requirements for erosion control and revegetation would minimize corresponding indirect effects.

3.3.3 Environmental Consequences

3.3.4 Proposed Action/Alternative 1

<u>Plant Communities</u>

Potential permanent and temporary impacts to plant communities from the implementation of the Proposed Action/Alternative 1 are summarized in tables at the end of this section (Tables 3.3-15 and 3.3-16, respectively). Permanent impacts to plant communities would occur during road improvements, including general road improvements, delineations, drainage improvements, stabilization, and staging areas. All segments proposed for road improvements were considered permanent impacts (refer to Figures 2-1 through 2-9). Temporary impacts were calculated using the 100-ft (30-m) wide buffer area around the road improvements footprint (refer to Figures 2-1 through 2-9). Temporary impact acreages are maximum impact acreages;

however, actual temporary impacts are anticipated to be much less. As described in Section 2.6, SCMs, MCB Camp Pendleton would ensure that contractors re-seed disturbed non-road areas with approved native vegetation, complimentary with the surrounding plant communities.

As much as 195.71 ac (79.20 ha) of CAGN-occupied CSS habitat would be temporarily impacted by the Proposed Action/Alternative 1. As much as 89.85 ac (36.36 ha) of BEVI/WIFL riparian habitat would be temporarily impacted by the Proposed Action/Alternative 1.

As described in Section 2.6, temporarily disturbed CSS and riparian habitat would be stabilized and re-planted with native species that are consistent with pre-existing vegetation (species and quantities to be approved by MCB Camp Pendleton ES). CSS vegetation would be cleared outside of the CAGN breeding season (15 February to 31 August) and riparian vegetation would be cleared outside the BEVI/WIFL breeding season (15 March to 31 August).

By minimizing the removal of CSS vegetation, riparian vegetation, SKR habitat, ARTO habitat, and other native vegetation, and the implementation of SCMs (Section 2.6), implementation of the Proposed Action/Alternative 1 would result in less than significant impacts to plant communities.

Aquatic Habitat

As described in Section 3.3, the repair/stabilization and associated buffer areas cross and overlap a substantial number of water features, which is not surprising given that the access roads follow valley bottoms and canyon lands. Because the project is specifically designed to repair problematic (i.e., susceptible to erosion or failure) drainage crossings, it is not feasible to avoid all of the aquatic features in the project area. However, implementation of the Proposed Action/Alternative 1 would not disturb or impact the entire area of wetlands and waters presented in Table 3.3-3, as these calculations include the 100-ft (30-m) wide buffer area.

Based on conceptual site plans, the Proposed Action/Alternative 1 would directly affect approximately 0.1 ac (0.04 ha) of wetlands and 3.0 ac (1.21 ha) of non-wetland jurisdictional waters of the U.S. MCB Camp Pendleton would obtain a Section 401 Water Quality Certification from the RWQCB in support of USACE permits for the fill of wetlands and jurisdictional waters of the U.S. As part of the Proposed Action/Alternative 1, repair and stabilization activities would incorporate all provisions of the USACE Permits and Water Quality Certification.

To minimize sedimentation and erosion, as noted in Section 2.6, the contractor would develop and implement a SWPPP with site-specific BMPs. Measures to avoid and minimize impacts to wetlands and jurisdictional waters of the U.S. may include silt fencing, straw bales, water diversion and retention areas, and velocity control devices. Culverts would maintain the flow of stormwater through these drainages following the repair of the access roads.

The majority of wetlands and jurisdictional waters of the U.S. are located away from the roads, but within the 100-ft (30-m) wide buffer, would not receive direct impacts from repair activities, but indirect impacts may occur due to construction activity and runoff. By minimizing construction activities in jurisdictional waters of the U.S. and wetlands and other aquatic areas, and implementing SCMs, implementation of the Proposed Action/Alternative 1 would result in less than significant impacts to aquatic habitat.

Wildlife

Proposed access road repair activities would disturb or displace wildlife from the areas of construction and immediate surrounding areas. These activities could destroy individuals of the smaller, less mobile and burrowing species, whereas mobile species would disperse to surrounding areas. Large areas of native habitat including CSS and riparian habitat surrounding the proposed project area would remain unaffected. In areas temporarily impacted, wildlife species would likely re-colonize the area after construction. No long-term permanent impacts to wildlife are likely. Therefore, implementation of the Proposed Action/Alternative 1 would result in less than significant impacts to wildlife, including migratory birds.

Special Status Species

Federally Listed Species

The listed species that occur, or are likely to occur within or adjacent to the Action Area associated with the Proposed Action/Alternative 1 are the CAGN, BEVI, WIFL, SNPL, LETE, SKR, PPM, ARTO, SDFS, RFS, TWG, and BRFI (refer to Table 3.3-4).

The following analyses were updated during the Section 7 consultation as reflected in the BO (Appendix B). The BO analysis of effects and its conclusions supersedes the following and is incorporated herein by reference.

Coastal California Gnatcatcher

The principal permanent direct effect of the Proposed Action/Alternative 1 would be the loss of CAGN habitat. While impacts to occupied and unoccupied CSS habitat would be minimized to the greatest extent possible, construction would permanently affect a limited area (up to 14.62 ac [5.92 ha]) within Access Roads 5-9 and 12 which were occupied by CAGN and contain CSS that may be used by CAGN (Table 3.3-10). As much as 0.20 ac (0.08 ha) of CSS along Access Road 5 (not currently occupied by CAGN) could be permanently impacted and is included in this total.

Table 3.3-10. Permanent Impacts to Coastal California Gnatcatcher Occupied Coastal Sage Scrub

Access Road	*Permanent impacts to CAGN CSS (ac)*	*Figure*
5: Combat Town Access Road	0.20	3-9
6: Piedra de Lumbre Canyon Road	4.48	3-7
7: Horno Canyon Road	6.60	3-6, 3-7
8: Red Beach	0.21	3-8
9: Range 407	0.43	3-10
12: Aliso Canyon Road	2.70	3-8, 3-9
Total	**14.62**	

Note: In instances where estimated impact calculations in this EA differ from the BO, the BO supersedes the EA (see Appendix B).

The one known CAGN within the Access Road 5 Action Area is along the eastern side, and only the outer portion of the territory would be affected. The three known CAGN within the Access Road 6 Action Area are along the southern segments of the road; therefore, CSS along the northern section of Access Road 6 is less likely to support CAGN (refer to Figures 3-6 and 3-7).

As much as 4.48 ac (1.81 ha) of CSS along Access Road 6 could be permanently impacted. The one known CAGN within the Access Road 7 Action Area was documented along the southern segment of the road; therefore, CSS along most of Access Road 7 is not likely to support CAGN. As much as 6.60 ac (2.67 ha) of CSS along Access Road 7 could be permanently impacted. As much as 0.21 ac (0.08 ha) of CSS along Access Road 8 could be permanently impacted. As much as 0.43 ac (0.17 ha) of CSS along Access Road 9 could be permanently impacted. As much as 2.70 ac (1.09 ha) of CSS along Access Road 12 could be permanently impacted. The seven known CAGN within the Access Road 12 Action Area are along the southern section of the road; therefore, CSS along the northern section of Access Road 12 is less likely to support CAGN. Permanent impacts to CAGN-occupied CSS would be compensated at a 2:1 ratio.

Temporary removal of CAGN-occupied CSS could impact as much as 195.71 ac (79.20 ha) of CSS (Table 3.3-11). Temporary disturbance to CSS habitat would be stabilized and re-planted with native species that are consistent with pre-existing vegetation (species and quantities to be approved by MCB Camp Pendleton ES). Temporary impacts are anticipated to be much less, because the surveyed area is a buffer area around the road improvement footprints.

As much as 1.81 ac (0.55 ha) of CSS along Access Road 5 could be temporarily impacted. As much as 32.75 ac (9.98 ha) of CSS along Access Road 6 could be temporarily impacted. As much as 37.76 ac (11.51 ha) of CSS along Access Road 7 could be temporarily impacted. As much as 7.88 ac (2.40 ha) of CSS along Access Road 8 could be temporarily impacted. As much as 3.83 ac (1.17 ha) of CSS along Access Road 9 could be temporarily impacted. As much as 29.16 ac (8.89 ha) ac of CSS along Access Road 12 could be temporarily impacted.

Table 3.3-11. Temporary Impacts to Coastal California Gnatcatcher Occupied Coastal Sage Scrub

Access Road	*Temporary Impacts to CAGN CSS (ac)*	*Figure*
5: Combat Town Access Road	1.81	3-9
6: Piedra de Lumbre Canyon Road	32.75	3-6, 3-7
7: Horno Canyon Road	37.76	3-6, 3-7
8: Red Beach	7.88	3-8
9: Range 407	3.83	3-10
12: Aliso Canyon Road	29.16	3-9
Total	**113.19**	

Note: In instances where estimated impact calculations in this EA differ from the BO, the BO supersedes the EA (see Appendix B).

Although vegetation clearing would be initiated outside of the breeding season (15 February to 31 August) avoiding direct effects to nestlings, the amount of suitable habitat would be temporarily reduced at the project location. Individual birds would be displaced to adjacent habitat and may experience increased stress, competition, or risk of predation from the temporary loss of foraging, dispersal, and nesting habitat. This effect would be short-term and localized and would not be expected to negatively affect CAGN on a regional scale.

Effects to CAGN-occupied CSS would be minimized. Where occupied CAGN habitat is present within 300 ft (91 m) of proposed construction areas, a biological monitor would be present during construction and subsequent construction would take place outside the breeding season to the maximum extent practicable. If seasonal avoidance is not feasible then additional SCMs would be implemented as described in Section 2.6; therefore, temporary direct effects due to noise or activity would not immediately affect nesting pairs or reproduction.

The long-term indirect effect of the road improvements is not likely to negatively affect the CAGN. The road improvements may benefit CAGN by less vehicles driving off roads into native vegetation. Minor increases in dispersal distances for CAGN across the occupied Access Roads 5-9 and 12 due to permanent impacts to CSS may occur. Additional noise and lights from vehicles after the road are improved is not anticipated since the roads are currently used.

The Proposed Action/Alternative 1 may impact a relatively small number of individual CAGN within the construction area. The affected area is a relatively small fraction of CAGN habitat on MCB Camp Pendleton and the impacts of construction would diminish over time as the vegetation recovers. Thus, no long-term effect on the CAGN population on MCB Camp Pendleton would result. Therefore, by minimizing the removal of CSS vegetation, implementing the SCMs and any additional measures identified through consultation with the USFWS, implementation of the Proposed Action/Alternative 1 would result in less than significant impacts to CAGN.

Least Bell's Vireo

Implementation of the Proposed Action/Alternative 1 would result in the loss of potential BEVI habitat. While impacts to BEVI riparian habitat would be minimized to the greatest extent possible, implementation of the Proposed Action/Alternative 1 could permanently affect approximately 4.07 ac (1.64 ha) of BEVI riparian habitat (Table 3.3-12). Direct effects would include temporary and permanent removal of riparian vegetation during the non-breeding season (1 September to 14 March) and potential disturbance of BEVI during construction due to noise, traffic, and human occupancy in the project vicinity.

Table 3.3-12. Permanent Impacts to Least Bell's Vireo Riparian Habitat

Access Road	*Permanent impacts to BEVI Riparian Habitat (ac)*	*Figure*
1: Area 52 Combat Town	1.12	3-4
6: Piedra de Lumbre Canyon Road	1.74	3-6
8: Red Beach	0.06	3-8
11: Range 111 Access Road	0.51	3-10
12: Aliso Canyon Road	0.63	3-8, 3-9
20: Range 218	0.01	3-5
Total	**4.07**	

Note: In instances where estimated impact calculations in this EA differ from the BO, the BO supersedes the EA (see Appendix B).

Under the Proposed Action/Alternative 1, as much as 1.74 ac (0.70 ha) of riparian vegetation along Access Road 6 could be permanently impacted. The majority of the BEVI occupied riparian habitat along Access Road 8 is mulefat/coyote brush. As much as 0.06 ac (0.02 ha) of riparian vegetation along Access Road 8 could be permanently impacted (refer to Figure 3-8). One BEVI was documented along Access Road 11 in 2005 and nine BEVI were documented along Las Pulgas Creek east of and within 300 ft (91 m) of Access Road 11 in 2006 (refer to Figure 3-10). Therefore, as much 0.51 ac (0.21 ha) of potential BEVI riparian vegetation along Access Road 11 could be permanently impacted. The majority of the riparian habitat is along the southwestern segments of Access Road 12 and is occupied by BEVI (refer to Figures 3-8 and 3-9). As much as 0.63 ac (0.25 ha) of riparian vegetation along Access Road 12 could be permanently impacted. As much as 0.01 ac (<0.01 ha) of BEVI occupied riparian vegetation along Access Road 20 could be permanently impacted (refer to Figure 3-6).

Permanent impacts to riparian vegetation would be compensated according to the Riparian/Estuarine BO. Riparian habitat would be compensated through enhancement at a ratio determined according to guidance established in the Riparian/Estuarine BO. The restoration site would be determined by MCB Camp Pendleton and reviewed by USFWS. The compensation strategy may include exotic plant control and off-site habitat restoration, or may draw from the positive balance of MCB Camp Pendleton's established mitigation bank (USFWS 1995a).

Temporary removal of riparian vegetation could impact as much as 93.82 ac (37.96 ha) (refer to Table 3.3-16). Temporary disturbance to riparian vegetation would be stabilized and re-planted with native species that are consistent with pre-existing vegetation (species and quantities to be approved by MCB Camp Pendleton ES).

If occupied BEVI habitat is present within 300 ft (91 m) of proposed construction areas, a biological monitor would be present during construction and construction would take place outside the breeding season to the maximum extent practicable. The BEVI breeding season is 15 March to 31 August. If seasonal avoidance is not feasible then SCMs would be implemented.

The long-term indirect effect of proposed access road improvements is not likely to negatively affect BEVI. The access road improvements may benefit BEVI by less vehicles driving off access roads into riparian vegetation. Additional culverts and creek crossings would be installed or repaired during the access road improvements project; therefore, less runoff and impacts to the creeks is expected after the project is complete. Minor increases in dispersal distances for BEVI across BEVI occupied Access Roads 1, 6, 8, 11, 12, and 20 due to permanent impacts to riparian vegetation may occur. Additional noise and lights from vehicles after the access roads are improved is not anticipated since the roads are currently used.

Based on the nature of proposed construction activities and the listed species present in the Action Area, the Proposed Action/Alternative 1 is considered Class II under the four-class system described in the Riparian/Estuarine BO (USFWS 1995a). The riparian acreage affected by the Proposed Action/Alternative 1 is greater than 10 ac (4.0 ha) and activities entail less than 12 months of disturbance. The Proposed Action/Alternative 1 may affect a relatively small number of individual BEVI within the construction area. The affected area is a relatively small fraction of BEVI habitat on MCB Camp Pendleton and the adverse effects of construction would diminish over time as the vegetation recovers. Therefore, no long-term effect on the BEVI population on MCB Camp Pendleton would result. By minimizing the removal of BEVI/WIFL riparian vegetation, implementation of SCMs and any additional measures identified through

consultation with the USFWS, implementation of the Proposed Action/Alternative 1 would result in less than significant impacts to BEVI.

Southwestern Willow Flycatcher

There are 14 known transient WIFL individuals in the Action Area and an additional 4 transient WIFL individuals within 300 ft (91 m) of the Action Area (refer to Figures 3-2 through 3-4). Because there are not any known resident WIFL within 300 ft (91 m) of the Action Area, there would not be a direct or indirect effect to WIFL from implementation of the Proposed Action/Alternative 1. If occupied WIFL habitat is present within 300 ft (91 m) of proposed construction areas, a biological monitor would be present during construction and construction would take place outside the breeding season to the maximum extent practicable. The WIFL breeding season is 15 March to 31 August. If seasonal avoidance is not feasible then SCMs would be implemented.

Any disturbances to WIFL from the Proposed Action/Alternative 1 would be to transient birds and would be short term, minimal, and would not differ greatly from the current level of disturbance created by training activities and human presence in the project area. The majority of WIFL habitat on MCB Camp Pendleton is along the Santa Margarita River, which would not be affected by the Proposed Action/Alternative 1. Therefore, implementation of the Proposed Action/Alternative 1 would result in less than significant impacts to WIFL.

Western Snowy Plover

No SNPL were found within the Action Area and any potential disturbances to SNPL near Access Road 8 (Red Beach) would be short term, minimal, and would not differ greatly from the current level of disturbance created by training activities and human presence along Access Road 8. As there would be no direct or long-term effects to SNPL, and all project activities would follow guidelines in the Estuarine and Beach Conservation Plan in the Riparian/Estuarine BO (USFWS 1995a), implementation of the Proposed Action/Alternative 1 would have no effect on SNPL.

California Least Tern

No LETE were found within the Action Area and any potential disturbances to nesting or foraging LETE near Access Road 8 (Red Beach) would be short term, minimal, and would not differ greatly from the current level of disturbance created by training activities and human presence along Access Road 8. As there would be no direct or long-term effects to LETE, and all project activities would follow guidelines in the Estuarine and Beach Conservation Plan in the Riparian/Estuarine BO (USFWS 1995a), implementation of the Proposed Action/Alternative 1 would have no effect on LETE.

Stephens' Kangaroo Rat

The proposed project would directly affect SKR and its habitat along Access Roads 5, 9, 12, and 24. A total of 32 individual SKRs were sighted in surveys along Access Roads 5, 9, and 12 in 2008 (Appendix H). A total of 24.79 ac (10.03 ha) of SKR habitat is within Access Roads 5, 9, 12, and 24 (Table 3.3-13) (refer to Figures 3-8 through 3-10) (Appendix H).

Table 3.3-13. Permanent Impacts to Stephens' Kangaroo Rat Occupied and Potentially Occupied Habitat

Access Road	*Permanent impacts to SKR habitat (ac)*	*Temporary impacts to SKR habitat (ac)*	*Total SKR Habitat (ac)*	*Figure*
5: 25 Area Combat Town	1.24	3.00	4.24	3-9
9: Range 407 Access Road	1.09	6.73	7.82	3-10
12: Aliso Canyon Road	0.66	8.50	9.16	3-8, 3-9
24: Range 407/Artillery Firing Area	0.64	2.93	3.57	3-10
Total	**3.63**	**21.16**	**24.79**	

The principal permanent direct effect of the Proposed Action/Alternative 1 would be the loss of occupied and potentially occupied SKR habitat. As much as 3.63 ac (1.46 ha) of occupied SKR habitat along Access Roads 5, 9, 12, and 24 could be permanently impacted with the implementation of the Proposed Action/Alternative 1.

Direct effects to SKR would include grading roads and adjacent berms in SKR habitat that may displace, injure, or kill SKR. Vehicles, foot traffic, and ground vibrations may induce burrows to collapse, directly injuring SKRs, or damaging their habitat.

As much as 21.16 ac (8.56 ha) of occupied SKR habitat along Access Roads 5, 9, 12, and 24 could be temporarily disturbed with the implementation of the Proposed Action/Alternative 1 (refer to Table 3.3-13). Temporary impacts would be for the duration of the project, and displaced SKRs would likely re-inhabit the area upon completion of the road improvements.

A positive indirect effect that may be a result of access road and berm grading and clearing is the potential to create additional SKR habitat. SKR only inhabit areas with low vegetative cover, so when seasonal rains increase rates of vegetative growth, areas with high growth become unsuitable habitat. When the project is complete, SKR may colonize new areas along the edge of the road.

The Proposed Action/Alternative 1 may impact a small (unquantifiable) number of SKR due to construction-related risks of injury or mortality that cannot be completely eliminated. Through the implementation of the SCMs, these impacts would be minimized. No effect on the overall distribution and abundance of the species is anticipated. Although a limited number of takes is possible, project impacts would not jeopardize the continued existence of SKR populations. MCB Camp Pendleton ES would formally consult with the USFWS regarding this potential take of SKR and the need for any additional measures. Therefore, implementation of the Proposed Action/Alternative 1 would result in less than significant impacts to SKR.

Pacific Pocket Mouse

No PPM were found within the Action Area. Therefore, implementation of the Proposed Action/Alternative 1 would result in no impacts to PPM.

Arroyo Toad

Implementation of the Proposed Action/Alternative 1 would result in the loss of potential ARTO habitat. As much as 7.8 ac (3.15 ha) of ARTO riparian habitat could be permanently impacted and 37.44 ac (15.15 ha) of ARTO riparian habitat could be temporarily impacted by the implementation of the Proposed Action/Alternative 1 (Table 3.3-14). Small, unquantifiable impacts to upland ARTO habitat could occur.

Table 3.3-14. Permanent and Temporary Impacts to Arroyo Toad Habitat

Access Road	*Creek*	*Permanent Impacts to ARTO habitat (ac)*	*Temporary Impacts to ARTO habitat (ac)*	*ARTO Riparian Habitat (ac)*	*Figure*
1: Area 52 Combat Town	San Onofre	1.12	2.93	4.05	3-4
2: San Mateo Canyon Road	San Mateo	0.09	1.46	1.55	3-2, 3-3
3: Jardine Canyon Road	San Onofre Trib	5.05	27.79	32.83	3-3, 3-4
4: Talega Canyon Road	Talega	1.51	5.26	6.77	3-2
	Total	**7.8**	**37.44**	**45.20**	

Note: In instances where estimated impact calculations in this EA differ from the BO, the BO supersedes the EA (see Appendix B).

To minimize impacts to ARTO potentially occurring within the Action Area, SCMs would be implemented. Before construction begins an ARTO plan would be submitted to USFWS. If an ARTO is observed within the Action Area, all construction would stop until a qualified biologist could identify and relocate the ARTO. Nevertheless, a few individuals may unavoidably be injured or killed during construction activities; therefore, MCB Camp Pendleton would formally consult with the USFWS regarding this potential take of individuals and the need for any additional measures. Based on the limited areas of effect and implementation of the SCMs, implementation of the Proposed Action/Alternative 1 would result in less than significant impacts to ARTO.

San Diego Fairy Shrimp and Riverside Fairy Shrimp

The Access Road 8 vernal pools known to contain SDFS would be avoided (see Figure 3-8). SCMs would be followed to minimize impacts to vernal pools and RFS are not known to occur in the Action Area. Therefore, implementation of the Proposed Action/Alternative 1 would result in less than significant impacts to SDFS and RFS.

Tidewater Goby

No project activities would occur within Las Flores Creek, and no direct impacts to TWG habitat would occur. During road construction on the west side of the I-5 Bridge near Las Flores Creek and near the mouth of Las Flores lagoon within the Access Road 8 Action Area, BMPs would be implemented to ensure that re-grading does not encroach into the streambed or lagoon or adversely affect runoff into it.

No indirect impacts to TWG would occur, as precautions would be used to avoid TWG habitat. BMPs would be utilized to prevent contamination of runoff into the creek bed or lagoon. With the implementation of the SCMs, no direct or indirect impacts are expected. Therefore, implementation of the Proposed Action/Alternative 1 would result in less than significant impacts to TWG.

Thread-Leaved Brodiaea

Through avoidance and with the implementation of the SCM for BRFI, implementation of the Proposed Action/Alternative 1 would result in less than significant impacts to BRFI.

Other Special Concern Species

As described in Section 3.3, Other Special-Status Species, eight CDFW avian species of special concern and four CNPS rare plants (refer to Table 3.3-2) occur in the proposed project areas. Because the majority of the construction disturbance would be temporary and only small areas of native habitat would be permanently altered, implementation of the Proposed Action/Alternative 1 would result in less than significant impacts to other special concern species.

3.3.4.1 Mitigation Measures

Implementation of the Proposed Action/Alternative 1 and associated SCMs, including new measures developed and mitigation agreed to as part of the BO (Appendix B, incorporated herein by reference) would result in no significant impacts to biological resources.

3.3.5 Alternative 2

Impacts under Alternative 2 would be similar to Alternative 1. The same SCMs described in Section 2.6 would apply including new measures developed and mitigation agreed to as part of the BO. Therefore, implementation of Alternative 2 would have no significant impact to biological resources.

3.3.6 No Action Alternative

Under the No Action Alternative, MCB Camp Pendleton would not implement proposed access road repairs. Existing conditions (as described in Section 3.3) would remain unchanged. However, under the No Action Alternative, the training area roads would continue to degrade and negative impacts to the surrounding terrestrial and aquatic habitats (e.g., erosion and sedimentation) would continue to occur. Therefore, implementation of the No Action Alternative would result in no significant impacts to biological resources.

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Table 3.3-15. Permanent Impacts to Plant Community Types by Access Road

Plant Community	*Total*	*01*	*02*	*03*	*04*	*05*	*06*	*07*	*08*	*09*	*11*	*12*	*13*	*14*	*15*	*17*	*19*	*20*	*21*	*23*	*24*
Coastal Sage Scrub																					
California Sagebrush Series	**22.34**	0.01	0.28	9.25	0.00	0.20	2.88	6.35	0.00	0.43	0.00	0.97	0.00	1.51	0.19	0.00	0.21	0.00	0.00	0.01	0.05
California Sagebrush/Black Sage Series	**0.53**	0.00	0.00	0.00	0.00	0.00	0.47	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Coyote Brush Series	**5.41**	0.00	0.00	0.01	0.01	0.00	1.12	0.19	0.21	0.00	1.26	1.68	0.00	0.00	0.00	0.00	0.00	0.43	0.03	0.47	0.00
California Sagebrush/Coyote Brush Series	**0.06**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Subtotal	**28.34**	0.01	0.28	9.26	0.01	0.20	4.48	6.60	0.21	0.43	1.26	2.70	0.00	1.51	0.19	0.00	0.21	0.43	0.03	0.48	0.05
Scrub Vegetation																					
Black Sage Series	**0.13**	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Buckwheat/Deerweed Series	**0.04**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00
Chamise Chaparral	**2.74**	0.00	0.00	0.00	0.00	0.00	0.10	0.37	0.00	0.00	0.00	0.00	0.00	0.00	0.86	1.14	0.27	0.00	0.00	0.00	0.00
Chamise Chaparral/Englemann Oak Series	**0.56**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.56	0.00	0.00	0.00	0.00	0.00	0.00
Mixed Sage Series	**12.13**	0.00	4.13	0.56	0.00	1.93	3.45	1.64	0.00	0.00	0.00	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06
Scalebroom Series	**0.27**	0.00	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
California Sagebrush/Chamise Chaparral	**0.20**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.00	0.09	0.00	0.00	0.00	0.00
California Sagebrush/Sumac Series	**0**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mulefat/California Sagebrush Series	**0**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Scrub Oak Series	**2.76**	0.00	0.48	0.00	0.00	0.00	1.00	0.11	0.72	0.00	0.00	0.00	0.00	0.00	0.45	0.00	0.00	0.00	0.00	0.00	0.00
Sumac Series	**0.19**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.18	0.00	0.00	0.00	0.00	0.00	0.00
White Sage Series	**0.44**	0.00	0.00	0.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Coyote Brush/Elderberry Series	**0.11**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mulefat/Coast Live Oak Series	**0**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Subtotal	**19.57**	0.00	4.88	1.00	0.00	1.93	4.54	2.25	0.72	0.00	0.00	0.47	0.00	0.02	2.17	1.14	0.39	0.00	0.00	0.00	0.06
Riparian																					
Arroyo Willow Series	**0.956**	0.02	0.00	0.00	0.00	0.00	0.05	0.78	0.006	0.00	0.02	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mixed Willow Series	**0.93**	0.00	0.00	0.11	0.00	0.00	0.37	0.00	0.00	0.00	0.00	0.09	0.00	0.08	0.21	0.00	0.00	0.00	0.07	0.00	0.00
Mulefat Series	**10.82**	1.11	0.09	4.93	1.51	0.00	1.32	0.03	0.00	0.10	0.49	0.46	0.13	0.06	0.21	0.00	0.00	0.01	0.08	0.26	0.03
Arroyo Willow/Coast Live Oak Series	**1.12**	0.00	0.00	0.00	0.00	0.00	0.00	1.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Coyote Brush Series/Mulefat Series	**0.07**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Subtotal	**13.9**	1.12	0.09	5.05	1.51	0.00	1.74	1.93	0.06	0.10	0.51	0.63	0.15	0.14	0.42	0.00	0.00	0.01	0.15	0.26	0.03
Other Aquatic																					
Cattail/Bulrush Series	**0.00**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rush Series	**0.00**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pickleweed Series	**0.00**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Saltgrass Series	**0.00**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Subtotal	**0.00**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Plant Community	Total	01	02	03	04	05	06	07	08	09	11	12	13	14	15	17	19	20	21	23	24
Woodlands																					
California Sycamore Series	**3.21**	0.56	0.02	0.12	2.09	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.30	0.00	0.00	0.00
Coast Live Oak Series	**6.44**	0.00	0.02	2.54	1.25	0.35	0.10	1.25	0.00	0.00	0.00	0.00	0.00	0.24	0.18	0.00	0.51	0.00	0.00	0.00	0.00
Engelmann Oak Series	**0.55**	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.38	0.00	0.00	0.00	0.00	0.00	0.00
Mixed Oak Series	**0**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Elderberry Series	**0.04**	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Subtotal	**10.2**	0.56	0.03	2.66	3.33	0.35	0.10	1.45	0.00	0.00	0.00	0.12	0.00	0.24	0.55	0.00	0.51	0.30	0.00	0.00	0.00
Miscellaneous																					
Bare ground	**0.87**	0.00	0.19	0.00	0.00	0.00	0.27	0.31	0.04	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00
Burned Areas	**0.07**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
California Annual Grassland	**8.58**	0.00	0.00	0.18	0.13	0.21	2.87	0.60	0.00	0.08	0.03	0.84	0.00	0.03	2.01	0.00	0.00	0.00	0.07	0.56	0.97
Disturbed-Developed	**36.33**	0.32	1.98	5.22	1.02	0.94	4.26	4.70	2.09	1.66	2.09	6.03	0.01	1.49	2.64	0.74	0.42	0.04	0.14	0.43	0.11
Disturbed-Ruderal	**9.62**	4.04	0.23	0.45	0.00	0.13	1.29	0.81	0.00	0.00	0.12	0.96	0.00	0.07	0.90	0.61	0.00	0.00	0.00	0.01	0.00
Exotics-Acacia Series	**0.1**	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Exotics-Fennel Series	**3.37**	0.00	0.00	0.07	0.00	0.00	0.00	1.11	0.00	0.00	0.34	1.60	0.00	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.00
Mixed Grassland	**9.86**	0.00	0.52	0.42	0.00	0.00	0.00	0.14	0.00	0.99	0.00	2.54	0.06	0.00	4.16	0.00	0.00	0.05	0.11	0.37	0.50
Needlegrass Series	**9.6**	0.00	0.00	2.38	0.00	0.00	0.00	0.78	0.00	0.02	0.52	3.69	0.00	0.00	1.69	0.00	0.02	0.04	0.27	0.00	0.19
Needlegrass/Buckwheat/Deerweed Series	**0**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Subtotal	**78.46**	**4.37**	**2.92**	**8.73**	**1.15**	**1.39**	**8.69**	**8.44**	**2.14**	**2.79**	**3.12**	**15.69**	**0.07**	**1.59**	**11.70**	**1.34**	**0.44**	**0.13**	**0.59**	**1.39**	**1.78**
TOTAL	**150.47**	**6.06**	**8.20**	**26.70**	**6.00**	**3.87**	**19.55**	**20.67**	**3.13**	**3.32**	**4.89**	**19.61**	**0.22**	**3.5**	**15.03**	**2.48**	**1.55**	**0.87**	**0.77**	**2.13**	**1.92**

Table 3.3-16. Temporary Impacts to Plant Community Types by Access Road

Plant Community	*Total*	*01*	*02*	*03*	*04*	*05*	*06*	*07*	*08*	*09*	*11*	*12*	*13*	*14*	*15*	*17*	*19*	*20*	*21*	*23*	*24*
Coastal Sage Scrub																					
California Sagebrush Series	**149.98**	0.17	3.06	39.64	0.00	1.81	24.18	36.56	1.20	3.83	0.90	10.75	0.20	20.87	1.52	0.00	1.69	0.24	0.49	0.82	2.05
California Sagebrush/Black Sage Series	**4.25**	0.00	0.00	0.00	0.00	0.00	3.58	0.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Coyote Brush Series	**40.5**	0.00	0.00	0.00	0.24	0.00	4.99	0.53	6.68	0.00	7.48	17.42	0.15	0.00	0.14	0.00	0.00	1.26	0.39	1.22	0.00
California Sagebrush/Coyote Brush Series	**0.98**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Subtotal	**195.71**	0.17	3.06	39.64	0.24	1.81	32.75	37.76	7.88	3.83	8.38	29.16	0.35	20.87	1.66	0.00	1.69	1.50	0.87	2.04	2.05
Scrub Vegetation																					
Black Sage Series	**0.82**	0.00	0.00	0.00	0.00	0.00	0.00	0.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Buckwheat/Deerweed Series	**0.8**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.80	0.00	0.00	0.00	0.00
Chamise Chaparral	**23.69**	0.00	0.00	0.00	0.00	0.00	1.07	3.32	0.00	0.00	0.00	0.00	0.00	0.00	5.29	12.05	1.96	0.00	0.00	0.00	0.00
Chamise Chaparral/Englemann Oak Series	**2.81**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.81	0.00	0.00	0.00	0.00	0.00	0.00
Mixed Sage Series	**69.57**	0.00	42.17	4.26	0.00	5.87	6.32	6.19	0.00	0.00	0.00	3.63	0.00	0.00	0.61	0.00	0.00	0.00	0.00	0.00	0.52
Scalebroom Series	**4.39**	0.00	4.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
California Sagebrush/Chamise Chaparral	**1.02**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.47	0.00	0.55	0.00	0.00	0.00	0.00
California Sagebrush/Sumac Series	**0**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mulefat/California Sagebrush Series	**0.14**	0.00	0.00	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Scrub Oak Series	**1.67**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.67	0.00	0.00	0.00	0.00	0.00	0.00
Sumac Series	**2.69**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.70	0.00	0.77	1.12	0.00	0.00	0.00	0.00	0.00	0.10
White Sage Series	**0.77**	0.00	0.00	0.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.34
Coyote Brush/Elderberry Series	**0.36**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mulefat/Coast Live Oak Series	**0.21**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Subtotal	**108.95**	0.00	46.56	4.83	0.00	5.87	7.40	10.33	0.08	0.00	0.00	4.61	0.00	0.98	11.96	12.05	3.31	0.00	0.00	0.00	0.97
Riparian																					
Arroyo Willow Series	**8.81**	0.10	0.00	0.00	0.00	0.00	0.80	4.75	1.43	0.00	0.70	0.54	0.00	0.45	0.04	0.00	0.00	0.00	0.00	0.00	0.00
Mixed Willow Series	**12.78**	0.00	0.00	2.81	0.00	0.00	4.83	0.00	0.11	0.00	0.12	1.25	0.00	1.79	1.42	0.00	0.00	0.00	0.14	0.31	0.00
Mulefat Series	**55.85**	2.83	1.46	24.98	5.26	0.00	7.90	0.83	0.60	0.87	1.95	2.96	1.52	0.96	0.97	0.00	0.00	0.56	0.34	1.44	0.42
Arroyo Willow/Coast Live Oak Series	**7.22**	0.00	0.00	0.00	0.00	0.00	0.00	7.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Coyote Brush Series/Mulefat Series	**5.19**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.90	0.00	0.00	0.00	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Subtotal	**89.85**	2.93	1.46	27.79	5.26	0.00	13.52	12.80	7.04	0.87	2.76	4.76	1.80	3.21	2.44	0.00	0.00	0.56	0.48	1.75	0.42
Other Aquatic																					
Cattail/Bulrush Series	**1.02**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rush Series	**0.04**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pickleweed Series	**0.15**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Saltgrass Series	**0.01**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Subtotal	**1.22**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Plant Community	Total	01	02	03	04	05	06	07	08	09	11	12	13	14	15	17	19	20	21	23	24
Woodlands																					
California Sycamore Series	**13.05**	1.23	1.67	1.74	5.36	0.00	0.00	0.00	0.00	0.00	0.00	1.41	0.18	0.00	0.00	0.00	0.00	1.46	0.00	0.00	0.00
Coast Live Oak Series	**40.14**	0.00	0.30	15.11	6.07	0.90	0.67	3.64	0.00	0.00	0.00	0.00	0.00	9.12	2.60	0.00	1.57	0.00	0.00	0.07	0.09
Engelmann Oak Series	**2.7**	0.00	0.00	0.00	0.00	0.01	0.00	1.33	0.00	0.06	0.00	0.00	0.00	0.00	1.22	0.00	0.00	0.00	0.00	0.00	0.08
Mixed Oak Series	**0**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Elderberry Series	**0.78**	0.00	0.00	0.00	0.00	0.00	0.08	0.60	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Subtotal	**56.68**	1.23	1.97	16.86	11.43	0.91	0.75	5.58	0.00	0.06	0.00	1.51	0.18	9.12	3.81	0.00	1.57	1.46	0.00	0.07	0.17
Miscellaneous																					
Bare ground	**2.76**	0.00	0.48	0.00	0.00	0.00	1.00	0.11	0.72	0.00	0.00	0.00	0.00	0.00	0.45	0.00	0.00	0.00	0.00	0.00	0.00
Burned Areas	**4.45**	0.00	0.00	1.36	0.00	0.00	0.00	0.00	0.00	0.38	0.00	2.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.34	0.00
California Annual Grassland	**47.7**	0.00	0.00	1.79	0.57	0.27	11.23	4.82	0.00	1.75	0.16	8.89	0.00	0.45	10.65	0.00	0.72	0.37	0.48	1.73	3.82
Disturbed-Developed	**50.56**	2.03	2.49	3.43	0.96	2.80	3.57	5.28	2.31	2.69	3.61	9.37	0.29	1.31	3.65	0.61	1.62	0.60	0.43	0.75	2.76
Disturbed-Ruderal	**27.38**	3.91	0.21	1.35	0.00	1.21	0.59	1.89	0.00	0.00	0.70	5.69	0.00	1.10	7.61	0.77	0.00	0.00	0.00	2.35	0.00
Exotics-Acacia Series	**0.04**	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Exotics-Fennel Series	**20.85**	0.20	0.00	0.00	0.00	0.00	0.29	1.81	0.00	0.37	0.22	16.21	0.00	0.00	1.75	0.00	0.00	0.00	0.00	0.00	0.00
Mixed Grassland	**74.72**	0.00	7.37	3.97	0.03	0.00	0.00	1.99	0.00	4.16	0.00	24.73	0.93	0.00	18.72	0.00	0.00	0.44	1.81	2.45	8.12
Needlegrass Series	**46.1**	0.00	0.00	10.82	0.28	0.00	0.00	3.03	0.00	0.82	8.57	13.24	0.26	0.00	2.68	0.00	0.59	0.80	2.22	0.00	2.79
Needlegrass/Buckwheat/Deerweed Series	**0.27**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27
Subtotal	**274.84**	6.15	10.55	22.72	1.84	4.32	16.69	18.93	3.02	10.18	13.26	80.49	1.48	2.86	45.51	1.38	2.93	2.22	4.93	7.62	17.76
TOTAL	**727.25**	**10.48**	**63.60**	**111.84**	**18.77**	**12.91**	**71.11**	**85.4**	**19.24**	**14.94**	**24.40**	**120.53**	**3.81**	**37.04**	**65.38**	**13.43**	**9.50**	**5.74**	**6.28**	**11.48**	**21.37**

3.4 Cultural Resources

3.4.1 Definition of Resource

The NHPA establishes guidelines for the protection, enhancement, and preservation of any property that possesses significant archaeological, architectural, historical, or cultural characteristics. Section 106 of the NHPA mandates that federal agencies take into account the effect of their undertakings on properties included in or eligible for inclusion in the National Register of Historic Places (NRHP). Section 110 mandates that each Federal agency shall establish a preservation program for the identification, evaluation, and nomination to the NRHP, and the protection of historic properties on its land.

3.4.2 Existing Conditions

3.4.2.1 Existing Cultural Resource Data

As part of this EA, ASM Affiliates conducted a cultural resource investigation of portions of the project area (ASM Affiliates 2007) as directed by MCB Camp Pendleton ES staff, based on information contained in the MCB Camp Pendleton Archaeological Geographic Information System. This EA has combined the survey data with existing data to complete the baseline analysis for cultural resources.

In 2008, MCB Camp Pendleton consulted with the SHPO for the undertaking, which included 29 sites in the APE under Section 106. MCB Camp Pendleton did not receive concurrence. The Proposed Action was never implemented.

While previous investigations have evaluated nearly the entire APE, since 2008, new archaeological sites and sites not previously noted within or near the APE have been identified. As a result, in 2016, SHPO consultation was reinitiated for this project. Although the 2016 consultation addresses 40 sites, 15 of the 40 are described as being “avoided and monitored, removed from project, and will be addressed in a separate undertaking” (Table 3.4-1) (Appendix I). These 15 sites have been eliminated from Alternative 1, but are included in Alternative 2.

Table 3.4-1. Known Archaeological Sites within or near the APE

Site (SDI-)	Road	Type	In APE/ADI?	Eligibility Status	Alt. 1	Alt. 2
19383	2	Bedrock Milling	Yes (within 8 m)	Unevaluated / Assume Eligible	x	x
13658	2	Artifact Scatter	Yes	Unevaluated / Assume Eligible		x
13659	2	Sparse Lithic Scatter	Yes	Ineligible	x	x
13661	2	Artifact Scatter	Yes	Unevaluated / Assume Eligible		x
14345	2	Sparse Lithic Scatter	Yes	Ineligible	x	x
19384	2	Lithic Scatter	Yes (within 5 m)	Unevaluated / Assume Eligible	x	x
14417	*3*	*Shell Midden*	*Yes*	*Unevaluated / Assume Eligible*		*x*
20015	3	Artifact Scatter	Yes	Ineligible	x	x
20815	3	Artifact Scatter	Yes (within 57 m)	Unevaluated / Assume Eligible	x	x
9565	*4*	*Sparse Lithic Scatter*	*No*	*Ineligible*	*x*	*x*
9568	*4*	*Artifact Scatter*	*Yes*	*Ineligible*	*x*	*x*
21318H	4	Historic Outdoor Theater	Yes (within 60 m)	Unevaluated / Assume Eligible	x	x
812/H	6	Village	Yes (within 10 m)	Eligible / Listed	x	x
14573	6	Shell Scatter	Yes (within 5 m)	Unevaluated / Assume Eligible	x	x
4538	7	Shell Midden	Yes	Eligible		x
10006	7	Artifact Scatter	Yes	Eligible		x
14006H	7	Historic Route 2, El Camino Real	Yes	Segment C Eligible (*)		x
14577	7	Artifact Scatter	Yes (adjacent)	Eligible	x	x
14578	7	Sparse Lithic Scatter	Yes (within 82 m)	Unevaluated / Assume Eligible	x	x
14580	7	Sparse Lithic Scatter	Yes (within 114 m)	Unevaluated / Assume Eligible	x	x
811	8	Shell Midden	Yes	Eligible		x
10731	8	Shell Midden	Yes	Eligible		x
14657	9	Sparse Lithic Scatter	Yes	Unevaluated / Assume Eligible		x
14687	9	Artifact Scatter	Yes (within 400 m)	Unevaluated / Assume Eligible	x	x
14688	9	Artifact Scatter	Yes	Unevaluated / Assume Eligible		x
14689	9	Artifact Scatter	Yes (within 330 m)	Unevaluated / Assume Eligible	x	x
15107	9	Sparse Lithic Scatter	Yes (within 270 m)	Unevaluated / Assume Eligible	x	x
14496	12	Artifact Scatter	Yes	Ineligible	x	x
14497	12	Artifact Scatter	Yes (within 67 m)	Eligible	x	x

Site (SDI-)	Road	Type	In APE/ADI?	Eligibility Status	Alt. 1	Alt. 2
14500	12	Artifact Scatter	Yes	Ineligible	x	x
14717	12	Sparse Lithic Scatter	Yes	Unevaluated / Assumed Eligible		x
14675	13	Bedrock Milling	Yes (within 56 m)	Unevaluated / Assume Eligible	x	x
6051	14	Bedrock Milling Site with Artifact Scatter	Yes	Unevaluated / Assume Eligible		x
18931/13931	15	Artifact Scatter	Yes	Unevaluated / Assume Eligible		x
14575	15	Sparse Lithic Scatter	Yes (within 25 m)	Unevaluated / Assume Eligible	x	x
15762	21	Artifact Scatter	Yes	Ineligible	x	x
18990	23	Habitation Donax	Yes (within 32 m)	Eligible	x	x
19392	23	Habitation Projectile Points	Yes	Eligible		x
14719	24	Artifact Scatter	Yes (within 100 m)	Eligible	x	x
14684/14704	24	Artifact Scatter	Yes	Eligible		x

Notes: Italicized font = site surveyed by ASM in 2007; **bold** font = in APE or ADI; (*) Moved to Alt. 2 after SHPO consultation. APE = Area of Potential Effect; ADI = Area of Direct Impact.

3.4.3 Environmental Consequences

3.4.4 Proposed Action/Alternative 1

As shown in Table 3.4-1, for the Proposed Action/Alternative 1, cultural resource sites within the APE are either not subject to direct impacts (e.g., they would not be disturbed during repair activities because they are near, but not in the APE/Area of Direct Impact [ADI]), or they are not eligible for listing in the NRHP. All of sites near the APE/ADI that are either eligible or assumed eligible for listing in the NRHP would be monitored during construction. As part of the Section 106 consultation, MCB Camp Pendleton cultural resource staff has assumed concurrence from the SHPO, as MCB Camp Pendleton had not received a response from the SHPO in response to MCB Camp Pendleton's request for concurrence letters, dated 1 May 2008 and 19 February 2016 (Appendix I).

3.4.4.1 Mitigation

Based on the results of the identification efforts and subject to the following conditions contained in the SHPO concurrence request dated 19 February 2016, MCB Camp Pendleton has found the the undertaking will have no adverse effect, with conditions or SCMs, for the Proposed Action/Alternative 1:

1. Avoidance of all eligible and assumed eligible archaeological sites in the APE;
2. Monitoring of all sites in the APE;
3. Development and implementation of a monitoring program for ensuring avoidance of direct impacts to sites from repair;
4. Development and implementation of a discovery plan;

5. Monitoring of all repair activities will be conducted by a qualified archaeologist and Native American Monitor; and
6. A monitoring report will be submitted to the SHPO upon completion.

Therefore, Proposed Action/Alternative 1 would result in no significant impact to cultural resources.

3.4.5 Alternative 2

Impacts to sites under Alternative 2 would be the same as under Alternative 1 with the addition of 15 sites. These sites would be evaluated for listing in the NRHP and would be subject to additional consultation if needed. Pending site survey, testing, and SHPO consultation on the 15 sites not included in Alternative 1, MCB Camp Pendleton has found that the undertaking will have no adverse effect, with the same conditions or SCMs that apply to the Proposed Action/Alternative 1, and any additional conditions as result of successful future SHPO consultation on the 15 sites included in Alternative 2.

Therefore, Alternative 2 would result in no significant impact to cultural resources.

3.4.6 No Action Alternative

Under the No Action Alternative, MCB Camp Pendleton would not implement proposed access road repairs. Existing conditions (as described in Section 3.4) would remain unchanged. Therefore, implementation of the No Action Alternative would result in no significant impacts to cultural resources.

3.5 AIR QUALITY

3.5.1 Definition of Resource

Air quality is defined by ambient (outdoor) air concentrations of specific pollutants determined by the USEPA to be of concern with respect to the health, safety, and welfare of the public. Ambient air quality refers to the amount of pollutants in a specified volume of air (or the atmospheric concentration of a specific compound) that occurs at a particular geographic location. Pollutant concentration is generally expressed in units of parts per million (ppm) or micrograms per cubic meter (µg/m³). Chemical reactions in the atmosphere can transform pollutant emissions into other chemical substances. Ambient air quality measured at a particular location is determined by the interaction of emissions, meteorology, and chemistry. Emissions include the types, amounts, and locations of pollutants discharged into the atmosphere. Meteorological considerations include wind and precipitation patterns affecting the distribution, dilution, and removal of pollutant emissions.

Pollutant emissions typically refer to the amount of pollutants (or pollutant precursors) introduced into the atmosphere by a pollutant source or group of sources. Pollutant emissions contribute to the ambient air concentrations of criteria pollutants, either by directly affecting the pollutant concentrations measured in the air or by interacting in the atmosphere to form criteria pollutants. Primary pollutants, such as carbon monoxide (CO), sulfur dioxide (SO_2), lead, and some particulates are emitted directly into the atmosphere from emission sources. Secondary pollutants, such as ozone (O_3), nitrogen dioxide (NO_2), and some particulates, are formed through atmospheric chemical reactions that are influenced by meteorology, ultraviolet light, and other atmospheric processes.

3.5.2 Federal Requirements

The USEPA established the National Ambient Air Quality Standards (NAAQS) and there are seven criteria pollutants of concern. The seven are CO, SO_2, NO_2, O_3, total suspended particulate matter less than or equal to 10 (PM_{10}) and 2.5 ($PM_{2.5}$) microns in diameter, and lead. The NAAQS represent maximum acceptable concentrations that generally may not be exceeded more than once per year, except the annual standards, which may never be exceeded (USEPA 2015a).

The USEPA designates an area as in attainment when it complies with the NAAQS. Areas that violate these ambient air quality standards are designated as nonattainment areas. Areas that have improved air quality from nonattainment to attainment are designated as attainment/maintenance areas. Varying levels of nonattainment are established for O_3, CO, and PM_{10} to indicate the severity of the air quality problem (i.e., the classifications run from moderate to serious PM_{10} and from marginal to extreme for O_3). The San Diego Air Basin (SDAB) is in nonattainment (marginal) of the 8-hour O_3 NAAQS (which includes its precursor pollutants of volatile organic compounds [VOCs] and nitrogen oxides [NO_x]) and is classified as a maintenance area for the CO NAAQS (USEPA 2015b). All other criteria pollutants are in attainment of the NAAQS. Although VOCs or NO_x other than NO_2 have no established ambient air quality standards, they are important as precursors to O_3 formation.

3.5.3 State and Local Requirements

Each state is required by the CAA to develop, adopt, and implement a State Implementation Plan (SIP) to achieve, maintain, and enforce the federal air quality standards across the state, for areas in nonattainment of the NAAQS. At the state level, the more stringent California Ambient Air Quality Standards (CAAQS) represent maximum acceptable pollutant concentrations that are not to be equaled or exceeded (California Air Resources Board [CARB] 2015a). Within California, the CARB is responsible for enforcing both the federal and state air pollution standards. The CARB is charged with developing the SIPs on a pollutant-by-pollutant basis for air quality standards in violation of the NAAQS and CAAQS.

With respect to the CAAQS, the SDAB is in nonattainment of the state standards for O_3, $PM_{2.5}$, and PM_{10} (CARB 2015b), and is in attainment of all other CAAQS criteria pollutants. Table 3.5-1 presents the NAAQS and CAAQS for the criteria pollutants.

MCB Camp Pendleton is located within San Diego County and is under the jurisdiction of the San Diego County Air Pollution Control District (SDCAPCD). The SDCAPCD is the agency responsible for the administration of federal and state air quality laws, regulations, and policies in the SDAB, which is contiguous with San Diego County.

In terms of the CAAQS, SDAB is in nonattainment for particulate matter (both $PM_{2.5}$ and PM_{10}) as well as O_3. The 2007 *Eight-Hour Ozone Attainment Plan for San Diego County* is a comprehensive plan to bring the SDAB into compliance with the national standard for marginal O_3 nonattainment areas (SDCAPCD 2007). A *Redesignation Request and Maintenance Plan for the 1997 National Ozone Standard* was adopted by the SDCAPCD in 2012 but has not yet been approved by the USEPA (SDCAPCD 2012). The 1996 *Carbon Monoxide Maintenance Plan* (later amended in 1998 and 2004) provides a road map for continued attainment of CO (CARB 1996, 1998, 2004).

The 2009 *Regional Air Quality Strategy Revision* is the most recent plan to bring SDAB into compliance with the CAAQS (SDCAPCD 2009). This plan includes all feasible control measures that can be implemented to reduce O_3 precursor emissions of VOCs and NO_x. To be consistent with the Regional Air Quality Strategy, a project must conform to the defined emission growth factors.

Table 3.5-1. National and California Ambient Air Quality Standards

Pollutant	Averaging Time	National[1,2]		California[5]
		Primary[3]	Secondary[4]	Concentration
O_3	1-hour	—	—	0.09 ppm (180 µg/m^3)
	8-hour (2008 standard)	0.075 ppm (147 µg/m^3)	Same as primary	0.07 ppm (137 µg/m^3)
	8-hour (2015 standard)[6]	0.070 ppm (137 µg/m^3)	Same as primary	0.07 ppm (137 µg/m^3)
CO	1-hour	35 ppm (40 mg/m^3)	—	20 ppm (23 mg/m^3)
	8-hour	9 ppm (10 mg/m^3)	—	9 ppm (10 mg/m^3)
NO_2	1-hour	0.10 ppm (188 µg/m^3)	—	0.18 ppm (339 µg/m^3)
	Annual	0.053 ppm (100 µg/m^3)	Same as primary	0.03 ppm (57 µg/m^3)
SO_2	1-hour	0.075 ppm (105 µg/m^3)	—	—
	3-hour	—	0.5 ppm (1,300 µg/m^3)	—
	24-hour	—	—	0.04 ppm (105 µg/m^3)
PM_{10}	24-hour	150 µg/m^3	Same as primary	50 µg/m^3
	Annual	—	—	20 µg/m^3
$PM_{2.5}$	24-hour	35 µg/m^3	Same as primary	—
	Annual	12 µg/m^3	15 µg/m^3	12 µg/m^3
Lead	Rolling 3-month period	0.15 µg/m^3	Same as primary	—
	30-day average	—	—	1.5 µg/m^3

Sources: USEPA 2015a; CARB 2015a.
Notes: µg/m³ = micrograms per cubic meter; mg/m³ = milligrams per cubic meter.
[1] Concentrations are expressed first in units in which they were promulgated. Equivalent units given in parenthesis.
[2] National standards (other than ozone, particulate matter, and those based on annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration measured at each site in a year, averaged over three years, is equal to or less than the standard. For PM_{10}, the 24-hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 µg/m^3 is equal to or less than one. For $PM_{2.5}$, the 24-hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard.
[3] Primary Standards: The levels of air quality necessary, with an adequate margin of safety, to protect the public health.
[4] Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.
[5] California standards for ozone, carbon monoxide (except 8-hour Lake Tahoe), sulfur dioxide (1 and 24 hour), nitrogen dioxide, and particulate matter (PM_{10}, $PM_{2.5}$, and visibility reducing particles), are values that are not to be exceeded. All others are not to be equaled or exceeded. CAAQS are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.
[6] Final Rule effective on 28 December 2015.

3.5.4 General Conformity

Under 40 CFR part 93 and the provisions of Part 51, Subchapter C, Chapter I, Title 40, Appendix W of the CFR, of the CAA as amended, federal agencies are required to demonstrate that federal actions conform with the applicable SIP. To ensure that federal activities do not hamper local efforts to control air pollution, Section 176(c) of the CAA, 42 USC 7506(c) prohibits

federal agencies from approving any action which does not conform to an approved SIP or federal implementation plan. SDCAPCD's Rule 1501 contains rules and requirements to implement the General Conformity regulations within the District.

The USEPA General Conformity Rule applies to federal actions occurring in nonattainment or maintenance areas when the total direct and indirect emissions of nonattainment pollutants (or their precursors) exceed specified thresholds. The emission thresholds that trigger requirements of the conformity rule are called *de minimis* levels. Table 3.5-2 identifies the federal nonattainment pollutants and the relevant *de minimis* emission thresholds.

Table 3.5-2. Applicable Criteria Pollutant *de minimis* Levels (tons/year)

VOCs[1]	*NO_x*[1]	*CO*	*SO_2*	*PM_{10}*[1]	*$PM_{2.5}$*
100	100	100	NA	NA	NA

Source: USEPA 2015b.
Notes: [1] The SDAB is in nonattainment (marginal) of the 2008 8-hour O_3 NAAQS (which includes its precursor pollutants of VOCs and NOx) and is in maintenance of the CO NAAQS.
NA = not applicable because the SDAB is currently in attainment of the NAAQS for these criteria pollutants.

To demonstrate conformity with the CAA, a project must clearly demonstrate that it does not cause or contribute to any new violation of any standard in any area; increase the frequency or severity of any existing violation of any standard in any area; or delay timely attainment of any standard, any required interim emission reductions, or other milestones in any area. A conformity applicability analysis is required for each of the nonattainment pollutants or its precursor emissions.

Compliance with the conformity rule can be demonstrated in several ways. Compliance is presumed if the net increase in direct and indirect emissions from a federal action would be less than the relevant *de minimis* level. If net emissions exceed the relevant *de minimis* level, a formal CAA Conformity Determination process must be followed.

3.5.5 Other Requirements

3.5.5.1 Greenhouse Gases

Greenhouse gases (GHGs) trap heat in the atmosphere. These emissions occur from natural processes as well as from human activities. The accumulation of GHGs in the atmosphere regulates, in part, the earth's temperature. Scientific evidence suggests a trend of increasing global temperature over the past century (U.S. Global Climate Change Program 2014). This warming is attributed to an increase in GHG emissions from human activities. Potential climate change associated with GHGs may produce economic and social consequences across the globe.

The most common GHGs emitted from natural processes and human activities include carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). Examples of GHGs created and emitted primarily through human activities include fluorinated gases (hydrofluorocarbons and perfluorocarbons) and sulfur hexafluoride. Each GHG is assigned a global warming potential (GWP). The GWP is the ability of a gas or aerosol to trap heat in the atmosphere. The GWP rating system is standardized to CO_2, which has a value of one. For example, CH_4 has a GWP of 21, which means that it has a global warming effect 21 times greater than CO_2 on an equal-mass basis. Total GHG emissions from a source are often reported as a CO_2 equivalent (CO_2e).

The CO_2e is calculated by multiplying the emission of each GHG by its GWP and adding the results together to produce a single, combined emission rate representing all GHGs.

Federal agencies are addressing emissions of GHGs by mandating GHG reductions in federal laws and EOs, most recently in EO 13693 (*Planning for Federal Sustainability in the Next Decade*) (EO 13693 superseded EO 13423 [*Strengthening Federal Environment, Energy, and Transportation Management*] and EO 13514 [E*nergy Efficient Standby Power Devices*]). In 2009 the USEPA signed GHG Endangerment Findings under Section 202(a) of the CAA, stating that six "key" GHGs are a threat to public health and welfare (CO_2, CH_4, N_2O, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride). Since then, the USEPA has been creating standards and regulations for controlling GHG emissions from passenger vehicles. Additionally, since 2012 the USEPA has issued proposals and updated regulations to reduce carbon emissions from new and existing power plants, landfills, and oil and natural gas facilities. Despite these efforts, there are no promulgated federal regulations to date limiting GHG emissions.

Several states have passed GHG related laws as a means to reduce statewide levels of GHG emissions. In particular, the California Global Warming Solutions Act of 2006 (Assembly Bill 32) directs the State of California to reduce statewide GHG emissions to 1990 levels by the year 2020. EO S-20-06 further directs state agencies to begin implementing Assembly Bill 32, including the recommendations made by the state's Climate Action Team. Activities taken thus far to implement Assembly Bill 32 include mandatory GHG reporting and a cap-and-trade system for major GHG-emitting sources (CARB 2015c).

In an effort to reduce energy consumption, reduce dependence on petroleum, and increase the use of renewable energy resources in accordance with goals set by EO 13693 and the Energy Policy Act of 2005, the Navy has implemented a number of renewable energy projects. The types of projects currently in operation within military installations include thermal and solar PV systems, geothermal power plants, and wind energy generators.

The potential effects of GHG emissions are by nature global and cumulative, and it is impractical to attribute climate change to individual projects (CEQ 2014). Therefore, the impact of GHG emissions associated with this project is discussed in the context of cumulative impacts in Chapter 4 of this EA.

3.5.5.2 Hazardous Air Pollutants

In addition to the ambient air quality standards for criteria pollutants, national standards exist for hazardous air pollutants (HAPs) that are regulated under Section 112(b) of the 1990 CAA and its amendments. The National Emission Standards for Hazardous Air Pollutants regulate 187 HAPs based on available control technologies (USEPA 2015d).

3.5.5.3 Toxic Air Contaminants

Toxic compounds are toxic air contaminants that have been determined to present some level of acute or chronic health risk (cancer or non-cancer) to the general public. These pollutants may be emitted in trace amounts from various types of sources, including combustion sources (CARB 2015d).

Emissions of hazardous air pollutants and toxic air contaminants fall under the Title V permitting process and not the NEPA process. Additionally, there would be no new Stationary Sources of emissions associated with the proposed project. Therefore, no further discussion of Toxic Air Contaminants is provided within this EA.

3.5.5.4 Baseline Air Quality

Representative emissions data from SDCAPCD monitoring stations for the period 2009 to 2013 (the most recent data available) are shown in Table 3.5-3. Emission sources associated with the existing use of MCB Camp Pendleton include civilian and military personal vehicles, commercial and military vehicles, aircraft engines, tactical support equipment, small stationary sources, and ongoing construction activities.

Table 3.5-3. Representative Air Quality Data for MCB Camp Pendleton (2009 – 2013)

Air Quality Indicator	*2009*	*2010*	*2011*	*2012*	*2013*
O_3 [(a)]					
Peak 8-hour value (ppm)	0.08	0.08	0.07	0.08	0.07
Days above federal standard (0.075 ppm)	1	1	0	1	0
Days above state standard (0.070 ppm)	5	1	2	1	0
NO_2 [(a)]					
Peak 1-hour value (ppm)	0.068	0.081	0.066	0.061	0.081
Days above federal standard (0.10 ppm)	0	0	0	0	0
Days above state standard (0.18 ppm)	0	0	0	0	0
CO [(b)]					
Peak 8-hour value (ppm)	3.24	2.46	2.20	3.61	NA
Days above federal and state standard (9.0 ppm)	0	0	0	0	NA
PM_{10} [(b)]					
Peak 24-hour value ($\mu g/m^3$)	74.0	43.0	40.0	33.0	82.0
Days above federal standard (150 $\mu g/m^3$)	0	0	0	0	0
Days above state standard (50 $\mu g/m^3$)	1	0	0	0	1
$PM_{2.5}$ [(a)]					
Peak 24-hour value ($\mu g/m^3$)	29.5	27.3	27.42	28.0	42.3
Days above federal standard (35 $\mu g/m^3$)	0	0	0	0	1
SO_2 [(c)]					
Peak 24-hour value (ppm)	0.006	0.002	0.003	NA	NA
Days above federal standard (0.14 ppm)	NA	NA	NA	NA	NA
Days above state standard (0.04 ppm)	NA	0	0	NA	NA

Source: CARB 2015e.

Notes: [(a)] Data from the MCB Camp Pendleton Monitoring Station.
[(b)] Data from the Escondido Monitoring Station, no data were derived from the MCB Camp Pendleton Monitoring Station.
[(c)] Data from the San Diego-1110 Beardsley Street Monitoring Station.
NA = not available.

3.5.6 Environmental Consequences

This resource section focuses the activities that have the potential to result in an impact to the ambient air quality. Types of activities that could affect air quality include operation of construction equipment, worker trips, and earth moving activities.

3.5.6.1 Approach to Analysis

The air quality analysis estimated the magnitude of emissions that would occur from proposed construction activities. Construction activities would include repairing and stabilizing existing paved and unpaved training area access roads throughout MCB Camp Pendleton's training ranges. The roads proposed for repair contain surfaces of compacted dirt, gravel, and sand in varying conditions of maintenance. The actual improvements would not take place along the entire length of the roads; only intermittent access road segments would be subject to repairs. The improvement projects would involve pockets of construction activity along the roadways.

3.5.6.2 Emissions Evaluation Methodology

Air quality impacts from construction activities would primarily occur from combustive emissions due to the use of fossil fuel-powered equipment and fugitive dust emissions (PM_{10} and $PM_{2.5}$) during construction activities, earth-moving activities, and the operation of equipment on bare soil; and VOC emissions from application of asphalt materials during paving operations. Construction emissions were estimated using the Sacramento Metropolitan Air Quality Management District's (AQMD) Road Construction Emissions Model (Version 7.1.5.1), which is a current, comprehensive tool for quantifying air quality impacts from linear road construction and modification projects in California (Sacramento Metropolitan AQMD 2015). The model includes default data (e.g., emission factors, trip lengths, construction equipment) to account for project-specific requirements and conditions. For this analysis, default data were overridden in the model by project-specific data (as provided in Chapter 2), when available. Assumptions were made regarding the total number of days each piece of equipment would be used and the types of equipment used during each project phase. Assumptions and model inputs are located within the modeling calculations in Appendix J.

3.5.7 Proposed Action/Alternative 1

<u>Road Repair Activities</u>

Table 3.5-4 presents a summary of the annual emissions associated with road repair activities at MCB Camp Pendleton. Emission calculations are provided in Appendix J, which also contains a list of estimated equipment required for access road repair activities, estimates of workforce requirements, and haul truck travel. Emission estimates assume that MCB Camp Pendleton would complete all proposed access road repairs within 3 years, and that one-third of the road repair activities would occur each year. The air emissions from the first year of project activities (to occur during 2016) were modeled, to determine the potential annual emissions. As shown in Table 3.5-4, estimated emissions from road repair activities would be below *de minimis* thresholds and would not trigger a formal Conformity Determination under the CAA General Conformity Rule.

Table 3.5-4. Annual Estimated Emissions Resulting from Implementation of the Proposed Action/Alternative 1 and Alternative 2 with Evaluation of Conformity

Emission Source	*Emissions (tons/year)*					
	CO	*VOCs*	*NO_x*	*SO_x*	*PM_{10}*	*$PM_{2.5}$*
Site Preparation Activities	0.3	0.1	0.4	NA	0.3	0.1
Drainage Improvement Activities	1.8	0.4	2.9	NA	1.1	0.4
Stabilization Activities	2.8	0.6	5.5	NA	1.4	0.5
Road Delineation/Paving Activities	0.6	0.1	0.8	NA	0.0	0.0
Annual Subtotal	**6.8**	**1.3**	**9.8**	**NA**	**2.8**	**1.0**
Conformity *de minimis* Threshold	100	100	100	NA	NA	NA
Exceeds Conformity *de minimis* Thresholds?	No	No	No	No	No	No

Note: NA = not applicable or not modeled; SO_x = sulfur oxides.

During the proposed construction activities, proper and routine maintenance of all vehicles and other construction equipment would be implemented to ensure that emissions are within the design standards of all construction equipment. Dust suppression methods (such as using water trucks to wet the construction areas) would be implemented to minimize fugitive dust emissions.

Hazardous Air Pollutants

The USEPA has listed 188 substances that are regulated under Section 112 of the CAA, and the State of California has identified additional substances that are regulated under state and local air toxics rule. Emission factors for most HAPs from combustion sources are roughly three or more orders of magnitude lower than emission factors for criteria pollutants. Trace amounts of HAPs may be emitted from sources during the road repair project; however, the amounts that would be emitted would be small in comparison with the emissions of criteria pollutants. Emissions of HAPs would also be subject to dispersion due to wind mixing and other dissipation factors.

Operation

Operational air emissions refer to air emissions that may occur after the access roads have been repaired. Operations would continue to be consistent with existing levels and would not represent a significant change in mobile sources of air pollutants or fugitive dust at MCB Camp Pendleton. No additional operational emissions from new traffic trips would be anticipated and no significant impact to air quality would occur. Operational air emissions associated with the road repairs would be negligible.

Summary

General Conformity Applicability Analysis

To address the requirements of the General Conformity Rule, the estimated emissions from proposed construction activities were compared to the *de minimis* thresholds applicable to the region (refer to Table 3.5-2). As shown in Table 3.5-4, the emissions increases for NO_x, VOCs, and CO would be well below the *de minimis* thresholds. A Record of Non-Applicability for CAA conformity has been prepared and is provide in Appendix J. A formal CAA Conformity Determination would not be required. Therefore, with implementation of the Proposed

Action/Alternative 1 there would be no significant impact to air quality.

3.5.7.1 Mitigation Measures

Implementation of the Proposed Action/Alternative 1 and associated SCMs such as vehicle maintenance and dust suppression by water trucks would not result in significant impacts to air quality; therefore, no mitigation measures would be required.

3.5.8 Alternative 2

To address the requirements of the General Conformity Rule, the estimated emissions from proposed construction activities were compared to the *de minimis* thresholds applicable to the region (refer to Table 3.5-2). Impacts under Alternative 2 would be the same as Alternative 1. As shown in Table 3.5-4, the emissions increases for NO_x, VOCs, and CO would be well below the *de minimis* thresholds. The same dust suppression BMPs would apply. A Record of Non-Applicability for CAA conformity has been prepared and is provide in Appendix J. A formal CAA Conformity Determination would not be required. Therefore, with implementation of Alternative 2 there would be no significant impact to air quality.

3.5.9 No Action Alternative

Under the No Action Alternative, MCB Camp Pendleton would not implement proposed access road repairs. Existing conditions (as described in Section 3.5) would remain unchanged. Therefore, implementation of the No Action Alternative would result no significant impact to air quality.

4 CUMULATIVE IMPACTS

4.1 CUMULATIVE IMPACTS

According to CEQ regulations, the analysis of cumulative impacts in an EA should consider the potential environmental impacts resulting from "the incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions" (40 CFR 1508.7).

4.1.1 Definition of Cumulative Impacts

Cumulative impacts may occur when there is a relationship between a proposed action and other actions expected to occur in a similar location or during a similar period. This relationship may or may not be obvious. Actions overlapping, or in close proximity to, the proposed action can have more potential for cumulative impacts on "shared resources" than actions that may be geographically separated. Similarly, actions that coincide temporally would tend to offer a higher potential for cumulative impacts.

To analyze cumulative impacts, a NEPA document must identify a cumulative impacts region for which impacts of the proposed action and other past, present, and reasonably foreseeable actions. In this EA, the USMC has identified all actions within the vicinity of the access roads and staging areas as part of the cumulative effects analysis. To the extent that details regarding such actions exist and the actions have a potential to interact with the project described in this EA, these actions are included in the cumulative analysis.

4.2 PAST, PRESENT, AND REASONABLY FORESEEABLE ACTIONS

This EA applies a phased approach to provide decision-makers with not only the cumulative impacts of the proposed action, but also the incremental contribution of past, present, and reasonably foreseeable actions. A description of past, present, and reasonably foreseeable actions relevant to this project is presented in Table 4.2-1.

Table 4.2-1. Cumulative Impact Projects

Project Title	*Project Description*	*Project Status*
MV-22 EA	Expand the amount of area available at MCB Camp Pendleton to land and operate MV-22 airframe.	FONSI signed April 2013.
Grow the Force Initiative	Construction of temporary and permanent facilities and infrastructure at MCB Camp Pendleton to support an increase in the number of personnel stationed at the installation.	FONSI signed July 2010. Construction is ongoing.
Basewide Utility Infrastructure EIS	Construction of new or upgrade of existing utility systems to provide reliable and compliant water, wastewater, natural gas, electrical, and communications systems to support military training and operations and delivery of life support and quality of life services. Includes Northern Regional Tertiary Treatment Plan (P-1043/1046); three new replacement electrical substations and a new 69-kV distribution line (P-1048); construction of a new fiber-optic cable and telephone cable system (P-1093); new 12-kV electrical distribution circuits and meter station (P-1094); and 90,000 feet (27,000 meters) of new high-pressure natural gas mains (P-1099).	A Final EIS and ROD were completed September 2010. Construction is on-going.
Various BEQs Plus-ups	Several MILCON projects are proposed to provide additional BEQ facilities in the 52, 53, and 62 areas.	Area 52: Construction is complete. Area 53: Construction is complete. Area 62: Construction is complete.
Basewide Fuel Optimization EA	Construct new fuel stations, or modernize, or replace existing fuel stations resulting in six contractor-owned and -operated fuel stations located in 12 or 14; and 21, 22, 41, 43, and 52 areas.	Construction began April 2012.
Range 108 EOD Facility	Construction and operation of a new EOD training facility that would include an ordnance library, workshop/tool room, classroom, library, office/kitchen area, two duty rooms (including a locker room and showers), restroom, lounge, permanent overhead canopy, support facilities, and site improvements.	FONSI signed March 2013.
Advanced Water Treatment Facility/Utility Corridor Project (P-113)	Construct, operate, and maintain an Advance Water Treatment facility and associated infrastructure. The project included adding treatment processes to the Haybarn Canyon Drinking Water Iron/Manganese Removal Treatment Facility and constructing a pipeline for disposal of brine that will be generated by the facility.	FONSI signed December 2010. Construction began in 2011 and is currently underway.

Table 4.2-1. Cumulative Impact Projects

Project Title	*Project Description*	*Project Status*
Operations Access Points (P-159) Red Beach	Construction of a bridge, retaining walls, and access roads that would facilitate an increase in capacity and reliability.	Final SEA was completed April 2012.
P-614 Special Operations Training Group Battle Course, 41 Area	Construct, operate, and maintain a 270-degree tactical automated reaction range/urban sniper range and related support facilities northwest of Range 130.	FONSI signed January 2011. Construction was completed June 2012.
Basewide Water Infrastructure EIS	Construction, operation, and maintenance of infrastructure upgrades, expansions, and improvements on the installation water system and replacement of a critical link in the installation roadway system. Projects include Northern Advanced Water Treatment plant and associated facilities (P-1044), connection of the installation's northern and southern water system (P-1045).	A Final EIS and ROD was completed September 2012. Construction is currently underway.
PE1015R Light-Armored Vehicle Simulator Building	This project will construct a 3,600-ft^2 facility to house four full-motion, light-armored, vehicle driver simulators.	Project is complete.
P-1008	Construction of a Single Marine Center, parking lot and BEQ.	FONSI signed September 2012.
P-1069	This project will provide a four-story open bay BEQ with a parking for 330 personally owned vehicles. The facility will have weapons rooms, laundry rooms, and company offices. This project will have 42,000 ft^2 of photovoltaic panels.	Project is complete.
P-637 (Range 314) Improvements	This project will modernize an existing live-fire range (Range 314) by constructing a live-fire infantry squad battle range, installing Remote Target Systems, constructing/modifying support facilities, and replacing the existing access road through San Mateo Creek with a road and bridge.	The EA is currently being developed.
Range and Training Areas Maintenance, Repair, and Modification Construction Actions	This EA analyzes recurring and predictable maintenance/repair, modification, and construction actions within MCB Camp Pendleton Range and Training Areas (RTAs) and impact areas that do not qualify for NEPA compliance via Categorical Exclusion because the action could potentially result in adverse impacts on resource areas.	The EA is currently being developed.

Table 4.2-1. Cumulative Impact Projects

Project Title	*Project Description*	*Project Status*
Recurring Infrastructure and Facility Actions within the Cantonment Areas	This EA analyzes recurring and predictable maintenance/repair, modification, and construction actions within the MCB Camp Pendleton Cantonment Areas that do not qualify for NEPA compliance via Categorical Exclusion because the action could potentially result in adverse impacts on resource areas.	The EA is currently being developed.
Annual programmed road maintenance	Ongoing annual road maintenance.	Qualifies for NEPA compliance via Categorical Exclusion.

BEQ = Bachelor Enlisted Quarters
CATEX = Categorical Exclusion
EA = Environmental Assessment
EIS = Environmental Impact Statement
EOD = Explosive Ordnance Disposal
FONSI = Finding of No Significant Impact
ft^2 = square feet
kV = kilovolt
MILCON = military construction
ROD = Record of Decision

4.3 POTENTIAL CUMULATIVE IMPACTS BY ENVIRONMENTAL RESOURCE AREA

This section addresses the potential cumulative impacts of the Proposed Action/Alternative 1 and Alternative 2 in conjunction with the projects identified above. These projects represent past, present, and reasonably foreseeable actions with the potential for resulting in cumulative impacts when considered in conjunction with potential impacts from implementation of access road repairs.

Topography, Geology, and Soils

With the implementation of SCMs described in Section 2.6, the Proposed Action/Alternative 1 and Alternative 2 would not result in significant impacts to geological resources. Moreover, these less than significant impacts, when added to the impacts from the other projects on MCB Camp Pendleton, would not result in a significant cumulative impact to geological resources.

Hydrology

With the implementation of SCMs described in Section 2.6, the Proposed Action/Alternative 1 and Alternative 2 would not result in significant impacts to water resources. Moreover, these less than significant impacts, when added to the impacts from the other projects on MCB Camp Pendleton, would not result in a significant cumulative impact to water resources.

Biological Resources

With the implementation of SCMs described in Section 2.6, the Proposed Action/Alternative 1 and Alternative 2 would not result in significant impacts to biological resources. Moreover, these less than significant impacts, when added to the impacts from the other listed projects on MCB Camp Pendleton, would not result in a significant cumulative impact to biological resources.

Cultural Resources

There are no cultural resources, including historic districts, buildings, or objects that would be impacted by the Proposed Action/Alternative 1. Alternative 2 would require survey, testing, and SHPO consultation prior to implementation. Therefore, there would be no significant cumulative impacts to cultural resources from either alternative.

Air Quality

In addition to the potential cumulative impacts of additional criteria pollutants, the cumulative effects analysis for air quality would determine if the Proposed Action/Alternative 1 and Alternative 2 would contribute to global climate change (in combination with the other identified past, present, and future projects). The most recent California Climate Change Scenarios Assessment predicts that temperatures in California could increase by approximately 2.7 degrees Fahrenheit (°F) by 2050, and up to 8.6°F by 2100 (California Energy Commission 2012). Predictions of long-term negative environmental impacts due to global warming include sea level rise, changing weather patterns with increases in the severity of droughts, changes to local and regional ecosystems including the potential loss of species, and a substantial reduction in winter snow pack. In California, predictions of these effects include exacerbation of air quality problems, a reduction in municipal water supply, increased impacts from coastal flooding, an increase in the number and intensity of wild fires, and damage to marine and terrestrial ecosystems (California Energy Commission 2012). Similar effects would be anticipated within San Diego County (County of San Diego 2012).

In December of 2014 the CEQ issued revised draft guidance for federal agencies, to guide them

on when and how to consider the effects of GHG emissions and climate change in their projects (CEQ 2014). In the analysis of the direct effects of a Proposed Action, the CEQ proposes that it would be appropriate to (1) quantify cumulative emissions over the life of the project; (2) discuss measures to reduce GHG emissions, including consideration of reasonable alternatives; and (3) qualitatively discuss the link between such GHG emissions and climate change. Therefore, formulating significance criteria for GHG emissions is problematic, as it is difficult to determine what level of proposed emissions would substantially contribute to global climate change. The CEQ recommends that 25,000 metric tons of CO_2e or more being produce by a Proposed Action be considered the threshold warranting a more substantial evaluation of—but not necessarily a determination of—significance of climate change impact (CEQ 2014).

The region of influence in this air quality cumulative effects analysis includes the SDAB. The minor impacts to air quality associated with the Proposed Action/Alternative 1 and Alternative 2 that could contribute to potential cumulative impacts would be from the air emissions from vehicles and construction equipment used during the road repair activities. Operational air emissions from the action alternative would be negligible compared to the existing condition, and would not result in significant long-term increases in air emissions.

The combined air emissions of the Proposed Action/Alternative 1 and Alternative 2 and potentially cumulative projects would not contribute to an exceedance of an ambient air quality standard. As a result, proposed construction and operational activities would produce less than cumulatively considerable air quality impacts. Therefore, when added to the impacts from other potentially cumulative actions, the Proposed Action/Alternative 1 and Alternative 2 would not result in significant cumulative impacts to air quality.

4.4 GREENHOUSE GASSES CUMULATIVE EFFECTS ANALYSIS

The potential effects of GHG emissions are by nature global and cumulative and it is impractical to attribute climate change to individual activities. Therefore, an appreciable impact on global climate change would only occur when GHG emissions associated with the Proposed Action/Alternative 1 and Alternative 2 are combined cumulatively with GHG emissions from other human-made activities on a global scale.

4.4.1 Proposed Action/Alternative 1 and Alternative 2

Table 4.3-1 summarizes the annual GHG emissions that would occur with implementation of the Proposed Action/Alternative 1 and Alternative 2.

Table 4.4-1. Estimated Annual GHG Emissions – Proposed Action/Alternative 1 and Alternative 2

Emission Source	**CO2 / CO_2e[1]** *(Tons per year)*
Site Preparation Activities	46.8
Drainage Improvement Activities	292.1
Stabilization Activities	513.1
Road Delineation/Paving Activities	97.2
Annual Total	**1,271.2**

Note: [1] $CO_2e = CO_2 + (21 * CH_4) + (310 * N_2O)$.

As an indication of the nominal relative magnitude of these emissions, total annual CO_2e emissions in the U.S. were approximately 5.5 billion metric tons (USEPA 2015d). Total CO_2e emissions in California in 2012 were approximately 474 million metric tons (CARB 2014). When GHG impacts from the Proposed Action are added to the GHG impacts from the cumulative projects, there would not be significant GHG cumulative impacts to global climate change from implementation of the Proposed Action/Alternative 1 and Alternative 2. There would also be no significant cumulative impact from the emission of criteria pollutants in conjunction with the other past, present, and reasonably foreseeable actions.

4.4.2 No-Action Alternative

Under the No-Action Alternative, no project activities would occur; therefore, there would be no GHG impacts to global climate change and no significant cumulative impact from the emission of criteria pollutants.

5 OTHER CONSIDERATIONS REQUIRED BY NEPA

5.1 IRREVERSIBLE OR IRRETRIEVABLE COMMITMENT OF NATURAL OR FINITE RESOURCES

Resources that are irreversibly or irretrievably committed to a project are those that are used on a long-term or permanent basis. This includes the use of non-renewable resources such as metal and fuel, and other natural or cultural resources. These resources are “irretrievable” when used for one project when another action could have used them for another purpose. Human labor is also an irretrievable resource. Another impact that falls under this category is the unavoidable destruction of natural resources that could limit the range of potential uses of that particular environment.

Under the Proposed Action, proposed access road repair activities would require the consumption of limited amounts of materials typically associated with road construction (e.g., asphalt, concrete, etc.). In addition, the use of construction vehicles at the locations would result in the consumption of additional limited amounts of fuel, oil, and lubricants. Due to the anticipated limited use of these resources, their use is not a significant irreversible or irretrievable commitment of resources.

5.2 RELATIONSHIP BETWEEN LOCAL SHORT-TERM USE OF THE HUMAN ENVIRONMENT AND MAINTENANCE AND ENHANCEMENT OF LONG-TERM NATURAL RESOURCE PRODUCTIVITY

NEPA requires an analysis of the relationship between a project’s short-term impacts on the environment and the effects that these impacts may have on the maintenance and enhancement of the long-term productivity of the affected environment. Impacts that narrow the range of beneficial uses of the environment are of particular concern. This refers to the possibility that choosing one development option reduces future flexibility in pursuing other options, or that giving over a parcel of land or other resource to a certain use often eliminates the possibility of other uses at that site.

The Proposed Action/Alternative 1 and Alternative 2 would repair existing access roads and thus would not constitute a new use for the project area. Therefore, the Proposed Action/Alternative 1 and Alternative 2 would not result in any impacts that would reduce environmental productivity, permanently narrow the range of beneficial uses of the environment, or pose long-term risks to health, safety or the general welfare of the public.

5.3 MEANS TO MITIGATE AND/OR MONITOR ADVERSE ENVIRONMENTAL IMPACTS

With the implementation of SCMs as presented in Section 2.6 into the project design, the Proposed Action/Alternative 1 and Alternative 2 would not result in any significant adverse environmental impacts.

5.4 ANY PROBABLE ADVERSE ENVIRONMENTAL EFFECTS THAT CANNOT BE AVOIDED AND ARE NOT AMENABLE TO MITIGATION

This EA has determined that the Proposed Action/Alternative 1 and Alternative 2 would not result in any significant impacts with the implementation of the SCMs; therefore, there are no probable adverse environmental effects that the Proposed Action/Alternative 1 and Alternative 2 cannot avoid or mitigate.

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7 PERSONS AND AGENCIES CONTACTED

Persons and agencies contacted in the course of preparing this EA are as follows.

Agencies

Federal

U.S. Fish and Wildlife Service

U.S. Army Corps of Engineers

State

California Coastal Commission

California Department of Fish and Wildlife

California State Historic Preservation Office

San Diego County

County of San Diego Air Pollution Control District

8 LIST OF PREPARERS

This EA was prepared by Cardno under the direction of MCB Camp Pendleton-MCI West and NAVFAC SW. Members of the project team follow:

MCB Camp Pendleton-MCI West

John Biondolillo, Environmental Planner
Environmental Security Department

Robert Haase, Wildlife Biologist
Environmental Security Department

Mathew Lorne, Consultation Section Head
Environmental Security Department

Deana Sherill, Supervisor Range Planner/Department Director
Range & Training Area Management Division, AC/S G-3/5 Operations, Plans, and Training

Kristin Thomas, Environmental Planner
Environmental Security Department

NAVFAC SW

Gretchen Ward, NEPA Planner
Central IPT

Cardno

Project Management and Quality Assurance

Stella Acuna, Project Manager, 28 years' experience
B.A., Environmental Design and Planning

Douglas Billings, Program Manager, 28 years' experience
B.S., Physical Geography/Geologic Sciences

Ryan Pingree, Project Manager, 20 years' experience
M.S., Environmental Science and Management

Technical Analysts

Selena Buoni, Environmental Analyst, Air Quality, 10 years' experience
M.Pl., Urban and Regional Planning

Christine Davis, Environmental Analyst, Air Quality, 16 years' experience
M.S., Environmental Management

Mike Dungan, Senior Ecologist, Biological Resources, 33 years' experience
Ph.D., Ecology and Evolutionary Biology

Jason Harshman, GIS Specialist, 9 years' experience
B.A. Geography

Theresa Rudolph, Senior Archaeologist, 35 years' experience
MA, Anthropology

Claudia Tan, Document Production, 13 years' experience
A.A. Liberal Arts and Sciences

Melissa Tu, Biologist, 12 years' experience
B.A., Environmental Science/Biology

Subcontractors

Arthur Davenport, Davenport Biological Services (California Gnatcatcher, Stephens' Kangaroo Rat, and Parkinson's Pocket Mouse Surveys), 20 years' experience

Carolyn Martus (Rare Plant Survey), 6 years' experience

Margie Mulligan, San Diego Natural History Museum (Rare Plant Survey), 10 years' experience

Mark Becker, ASM Affiliates (Cultural Resources), 22 years' experience

APPENDIX A
PUBLIC INVOLVEMENT (to be provided)

APPENDIX B
AGENCY CORRESPONDENCE

STATE OF CALIFORNIA – NATURAL RESOURCES AGENCY

ARNOLD SCHWARZENEGGER, GOVERNOR

CALIFORNIA COASTAL COMMISSION
45 FREMONT, SUITE 2000
SAN FRANCISCO, CA 94105-2219
VOICE (415) 904-5200
FAX (415) 904-5400
TDD (415) 597-5885

September 11, 2009

Lt. Colonel D.F. Levi
Deputy, AC/S Environmental Security
U.S. Marine Corps
Marine Corps Base Camp Pendleton
ATTN: Mark Anderson
Box 555008
Camp Pendleton, CA 92055-5008

Subject: Negative Determination ND-053-09 (Repairs to access roads at Marine Corps Base Camp Pendleton, San Diego County)

Dear Lt. Colonel Levi:

The Coastal Commission staff has reviewed the above-referenced negative determination. The Marine Corps proposes to undertake repair activities on 24 existing training area access roads within Marine Corps Base Camp Pendleton. Repairs to the compacted dirt, gravel, and sand roads are necessary in order to improve safe access for training range users and emergency vehicles and to reduce the frequency of access road maintenance. Proposed repair work consists of road improvements, drainage improvements, slope stabilization, and installation of signs and guardrails. While an estimated 54 miles of roadway are involved in the proposed project, only intermittent roadway segments would be subject to repair work. Only one proposed repair project (Red Beach Access Road improvement) is located near the shoreline; the remaining projects are located well inland of the coastal zone. No new access roads are proposed as a part of this project.

The Marine Corps will develop and implement a Storm Water Pollution Prevention Plan to control erosion and sedimentation during all construction activities. Following construction, the Marine Corps will landscape and revegetate all disturbed project areas. The Marine Corps will also implement the project in accordance with the U.S. Fish and Wildlife Service's 1995 *Programmatic Riparian/Estuarine Biological Opinion* and the Marine Corps' 2007 *Integrated Natural Resources Management Plan* for Camp Pendleton. The Marine Corps submitted a *Biological Assessment* to the U.S. Fish and Wildlife Service, anticipates receiving a *Biological Opinion* for the proposed project, and will incorporate the terms and conditions of the *Biological Opinion* into the project to avoid, minimize, and compensate for any adverse effects on protected species. The repair projects will not affect public access to or recreational use of the coastal zone as Marine Corps Base Camp Pendleton is closed to general public use due to military security restrictions.

The Commission staff agrees that the proposed access road repair project will not adversely affect coastal zone resources. We therefore **concur** with your negative determination made pursuant to 15 CFR 930.35 of the NOAA implementing regulations. Please contact Larry Simon at (415) 904-5288 should you have any questions regarding this matter.

Sincerely,

(for) PETER M. DOUGLAS
Executive Director

cc: CCC – San Diego Coast District
California Department of Water Resources
Governor's Washington, D.C., Office

UNITED STATES MARINE CORPS
MARINE CORPS BASE
BOX 555008
CAMP PENDLETON, CALIFORNIA 92055-5008

IN REPLY REFER TO
5090
ENVSEC
August 25, 2009

Mr. Mark Delaplaine
State of California
California Coastal Commission
45 Fremont, Suite 2000
San Francisco, CA 94105-2219

Dear Mr. Delaplaine:

SUBJECT: NEGATIVE DETERMINATION FOR REPAIR OF 24 ACCESS ROADS AT MARINE CORPS BASE CAMP PENDLETON, CALIFORNIA

Introduction

Per the Federal Coastal Zone Management Act (CZMA) of 1972 as amended, Section 307c(1), the Marine Corps has determined that proposed repair activities to 24 existing access roads at Marine Corps Base Camp Pendleton (MCB CamPen) would not affect the coastal zone. Therefore, no Consistency Determination is required. We request your concurrence on a coastal Consistency Negative Determination for the Proposed Action.

An Environmental Assessment (EA) for the Proposed Action has been prepared in accordance with Marine Corps regulations that implement the National Environmental Policy Act. The EA contains detailed analysis of the Proposed Action. The analysis contained in the EA determined that the Proposed Action would not result in significant impacts to coastal or other environmental resources. The EA contains agency correspondence supporting this determination.

Project Purpose and Need

The purpose of the Proposed Action is to: (1) improve access for both range users and emergency vehicles, (2) reduce the frequency of access road maintenance, and (3) increase user safety by improving the access roads. MCB CamPen needs to repair and stabilize the access road network as current erosion and maintenance problems have seriously degraded the condition of the range access roads.

The access roads are located on sloping coastal terraces, hillsides, and valleys dissected by gullies, ravines, and swales. The soils underlying the roads are susceptible to erosion. Episodes of heavy rainfall cause loose soil on the roads to erode each year, making many road sections impassable to vehicles and treacherous for foot traffic. Short-term repairs consisting of regrading and the placement of fill soils within the existing roadbeds typically occur each year, sometimes repeatedly within a year, to allow safe and effective use of the roads.

Erosion damage creates a safety hazard to personnel, especially during periods of inclement weather. Deteriorated roads also reduce vehicle longevity. Proposed improvements to the access roads would ensure safe, reliable access for training units to various training ranges, which is critical to the development of combat readiness skills. These repairs would also improve the safety of tactical vehicle operations during and after rainfall events and facilitate the transit of emergency vehicles.

Project Description

The Proposed Action is to conduct several types of road repairs and enhancements to improve safety, minimize erosion, and lessen the need for maintenance on and adjacent to 24 existing unpaved training area access roads throughout MCB CamPen's training ranges (Figure 1). The roads provide access to ranges in support of amphibious and inland training activities. An estimated 84 miles of roads are involved in the Proposed Action. The roads proposed for repair contain surfaces of compacted dirt, gravel, and sand in varying conditions of maintenance. As shown in Table 1, proposed access road improvements would consist of road improvements (e.g., regrading), drainage improvements (e.g., culvert repair), stabilization activities (e.g., installing riprap), and road delineation (e.g., posting signs).

Table 1. Proposed Road Repair Projects

REPAIR TYPE	PROJECT	COUNT
Road Improvements	Regrade	53
	Resurface	59
	Road realignment	3
	All-weather crossings	31
Drainage Improvements	Ditch/Swale	56
	Culverts/Headwalls	155
	Other	8
Stabilization	Slope stabilization/riprap	27
	Revetment/retaining wall	3
Delineation	Signage	20
	Vegetation maintenance	13
	Guardrail	2

The actual improvements would not take place along the entire length of the access roads; only intermittent road segments would be subject to repairs. The improvement projects would involve pockets of construction activity along the roadways.

Coastal Consistency Determination

The Proposed Action would occur outside the coastal zone as defined in Section 304 of the CZMA, which does not include "lands the use of which is by law subject solely to the discretion of or which is held in trust by the Federal government." The Department of the Navy and the Marine Corps wholly own and operate MCB CamPen; however, the Marine Corps recognizes that actions outside the coastal zone may affect land or water uses or natural resources along the coast and therefore, are subject to the provisions of the CZMA. Consequently, the Marine Corps conducted an analysis of the impacts of the Proposed Action on the coastal zone. Based upon analysis contained in the EA, it was determined that proposed repair activities to the 24 existing access roads would have no effect on coastal zone resources, including public access, recreation, the marine environment, natural resources, cultural resources, or aesthetics.

Public Access and Recreation

Proposed access road repair activities would not affect public access to, or commercial or recreational use of the coastal zone. The project area is located on a military installation with restricted access to the public. The Proposed Action would not affect traffic or pedestrian routes leading directly to or from the coastal zone, beach access points, or recreation or transportation in the coastal zone.

Marine Environment

Proposed access road repair activities would not affect the marine environment. During construction, contractors would control erosion and associated sedimentation by developing and implementing a Storm Water Pollution Prevention Plan (SWPPP). Following construction, the Assistant Chief of Staff, Environmental Security (AC/S ES) would develop and implement a plan for landscaping and re-vegetation to increase soil stability in the disturbed areas.

Based on conceptual site plans, the Proposed Action would directly affect approximately 0.1 acre of wetlands and 3.0 acres of non-wetland jurisdictional waters of the U.S. MCB CamPen would obtain the necessary authorization from the U.S. Army Corps of Engineers (USACE) via a Nationwide Permit for this loss of jurisdictional waters and wetlands. As part of the Proposed Action, repair and stabilization activities would incorporate all provisions of the USACE Nationwide Permit.

Measures to avoid and minimize impacts to jurisdictional waters may include installing silt fencing, straw bales, water diversion and retention areas, and velocity control devices. Culverts

would maintain the flow of storm water through these drainages following the repair of the access roads. The majority of waters and wetlands located away from the roads would not receive direct impacts from repair activities, but indirect impacts may occur due to construction activity and runoff; however, implementation of the aforementioned SWPPP would minimize these indirect effects.

Land Resources

Proposed access road repair activities would not affect land resources in the coastal zone, as the project area is located on a semi-disturbed property outside of the coastal zone. MCB CamPen prepared and submitted a Biological Assessment (BA) to the U.S. Fish and Wildlife Service (USFWS) to initiate formal consultation regarding known threatened and endangered species in and adjacent to the project area. The Proposed Action would follow design measures, including construction restrictions, re-vegetation, storm water/erosion management, habitat restoration, and exotic species control to reduce potential impacts to threatened and endangered species. The USFWS is currently reviewing the BA and MCB CamPen anticipates receiving a Biological Opinion (BO). MCB CamPen would incorporate the terms and conditions of the USFWS BO into the project to avoid, minimize, and compensate for any effects on protected species.

The ACIS ES would review the landscaping plan to verify that contractors plant native plants in accordance with the Base Exterior Architecture Plan.

The California State Historic Preservation Officer (SHPO) reviewed the cultural survey report. MCB CamPen assumed concurrence based on a lack of response from the SHPO within the regulatory review and response timeframe; therefore, the Proposed Action would not significantly affect cultural resources.

Aesthetics

Proposed access road repair activities would not affect aesthetics or visual resources of the coastal zone. Proposed access road repair activities would occur on existing access roads throughout MCB CamPen and would be visually consistent with the existing access roads.

Conclusion

Per Title 15 of the Code of Federal Regulations §930.35(d), which implemented the CZMA, the Marine Corps contends this Negative Determination demonstrates that a Consistency Determination is not required as proposed access road repair activities would not affect land use, water use or quality, or natural resources of the California coastal zone.

5090
ENVSEC
August 25, 2009

Thank you for your prompt consideration of this matter. For future correspondence, your point of contact is Mr. Mark Anderson at the AC/S ES office, (760) 725-9936.

Sincerely,

D. T. DEVI
Lieutenant Colonel, U.S. Marine Corps
Deputy, AC/S Environmental Security
By direction of the Commanding Officer

Enclosure 1. Figure 1 Access Roads Overview

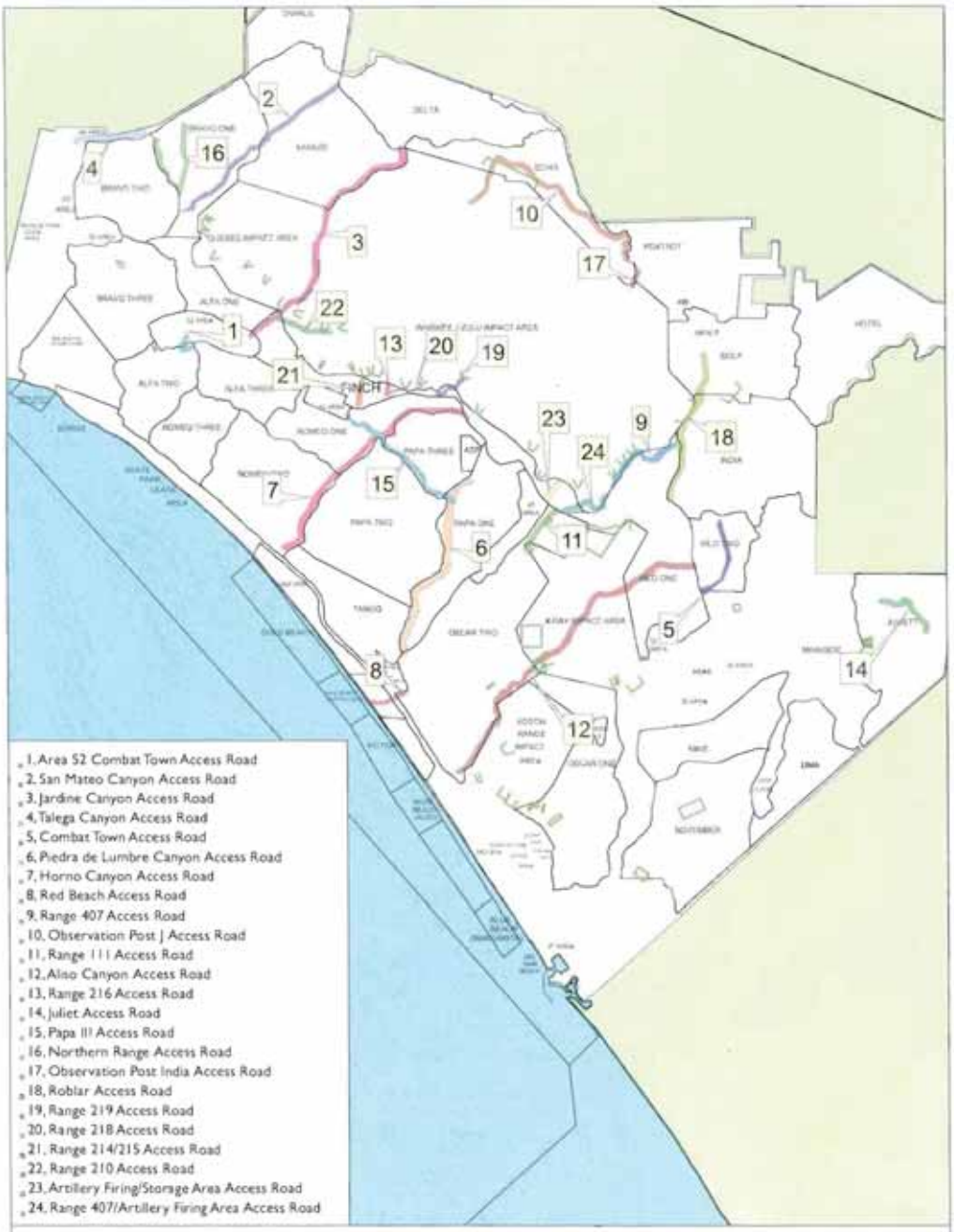

Figure 1

Access Roads
Overview

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
Carlsbad Fish and Wildlife Office
2177 Salk Avenue, Suite 250
Carlsbad, California 92008

In Reply Refer To:
FWS-MCBCP-09B0334-09F0946

OCT 05 2015

Mr. Dean Levi
Natural Resources Division Head
Environmental Security
MCIWEST-Marine Corps Base Camp Pendleton
P.O. Box 555010
Camp Pendleton, California 92055-5010

Subject: Formal Section 7 Consultation for the Repair of 24 Access Roads Project, Marine Corps Base Camp Pendleton, San Diego County, California

Dear Mr. Levi:

This document transmits our biological opinion based on our review of the U.S. Marine Corps' (Marine Corps) proposed 24 Access Roads Project (24 Roads project or project) on Marine Corps Base Camp Pendleton (MCBCP), San Diego County, California, and its effects on the federally endangered arroyo toad [*Anaxyrus californicus* (*Bufo microscaphus c.*), arroyo toad], least Bell's vireo (*Vireo bellii pusillus*, vireo), and Stephens' kangaroo rat (*Dipodomys stephensi*, SKR) and the federally threatened coastal California gnatcatcher (*Polioptila californica californica*, gnatcatcher), in accordance with section 7 of the Endangered Species Act of 1973 (Act), as amended (16 U.S.C. 1531 *et seq.*). We received your letter requesting formal consultation (5090.17, ENVSEC/523) and the biological assessment for the project (dated April, 2009) on May 1, 2009. Completion of consultation on this project was delayed due to an emphasis on other major MCBCP consultations completed between 2010 and 2013 and subsequent higher priority workload with the Marine Corps.

In your May 1, 2009, letter requesting formal consultation, the Marine Corps proposed to repair, improve, and maintain segments of 24 existing unpaved access roads throughout MCBCP training ranges. However, repairs and improvements within 4 of the 24 Access Roads (Roads 10, 16, 18, and 22) have been completed [1] and are no longer included as part of this proposed project.

In your May 1, 2009, letter, and subsequent correspondence,[2] the Marine Corps determined that the project will have no effect on the federally endangered Riverside fairy shrimp (*Streptocephalus woottoni*), California least tern [*Sternula antillarum browni* (*Sterna a. b.*)], and Pacific pocket mouse (*Perognathus longimembris pacificus*) or the federally threatened western snowy plover [*Charadrius nivosus nivosus* (*C. alexandrinus n.*)]. We concur with these determinations because no occupied habitat for these species is present within or near the project area.

[1] Email from Mike Rouse, MCBCP, to Tannika Engelhard, CFWO, December 5, 2011.
[2] Email from Mike Rouse, MCBCP, to Tannika Engelhard, CFWO, August 16, 2012.

The Marine Corps also determined that the project is not likely to adversely affect (NLAA) the federally threatened thread-leaved brodiaea (*Brodiaea filifolia*, brodiaea) or the federally endangered tidewater goby (*Eucyclogobius newberryi*, goby), southwestern willow flycatcher (*Empidonax traillii extimus*, flycatcher), and San Diego fairy shrimp (*Branchinecta sandiegonensis*, SDFS). In our June 30, 2009, initiation response letter (FWS-MCBCP-09B0334-09TA0947), we concurred with your NLAA determination for brodiaea, flycatcher, and goby because of your commitment to implement avoidance measures proposed in the *Final Biological Assessment, Repair of 24 Access Roads at Marine Corps Base Camp Pendleton* (BA, dated April 2009) (Thread-Leaved Brodiaea Measure 1, Southwestern Willow Flycatcher Measures 1 and 4-7, and Tidewater Goby Measures 1-3).

The Marine Corps made the NLAA determination[3] for SDFS because most of the roads in the project footprint[4] are outside of known areas of occurrence for SDFS and impacts to one SDFS-occupied vernal pool will be avoided. The Marine Corps has concluded that unsurveyed wet depressions along Roads 5 and 7 are highly disturbed road ruts unlikely to support SDFS based on the lack of suitable habitat (e.g., too small/dry) and the absence of the species in the vicinity of these roads. Protocol and non-protocol[5] surveys of the 43 mapped wet depressions/pools within the Road 8 footprint documented 37 pools with Lindahl's fairy shrimp (*B. lindahli*), 5 pools that were unoccupied, and 1 pool with SDFS (Lorne 2015, pers. comm.).

In addition to the general conservation measures (CMs) identified below in the "Description of the Proposed Action" section, the following species-specific CMs will be implemented to avoid impacts to SDFS.

CM 1. To avoid direct effects to SDFS and their habitat, the SDFS-occupied pool on the northwest side of Road 8 will be avoided. Prior to ground disturbing activities associated with Road 8, the project biologist will identify the boundary of the pool, including the pool-specific microwatershed, with exclusion fencing or markers, and be present during construction activities to ensure that the fenced/marked area is avoided. The designated project biologist for measures associated with SDFS will have at least 2 years of independent experience conducting SDFS surveys.

CM 2. Prior to ground disturbing activities, specific best management practices (BMPs)[6] (e.g., sediment fencing intended to protect vernal pools) will be implemented to avoid and minimize indirect effects to the SDFS-occupied pool on the northwest side of Road 8. MCBCP Environmental Security (ES) will review the BMPs before they are implemented to avoid unintended adverse impacts (e.g., altered hydrologic regime) to

[3] Email from Deborah Bieber, MCBCP, to Tannika Engelhard, CFWO, August 23, 2012.
[4] For the purposes of this biological opinion, "project footprint" is defined to include the disturbance footprint associated with each of the road repair segments along the 20 access roads plus a 100-foot buffer.
[5] Non-protocol surveys of these pools included 1 wet season survey instead of 2 wet season surveys or 1 wet and 1 dry season survey. In addition, Lindahl's fairy shrimp in 1 pool was documented only during a single survey effort instead of the complete wet season
[6] Includes BMPs outlined in the Stormwater Pollution Prevention Plan (per CM 7) and others deemed necessary by ES.

the occupied pool and determine whether special post-BMP measures are warranted (e.g., revegetation of temporarily impacted areas).

CM 3. Prior to impacting[7] any pool within 500 feet of the pool with SDFS in the Road 8 project footprint, protocol surveys will be conducted in these pools, and the results will be provided to the Carlsbad Fish and Wildlife Office (CFWO).

Based on the information provided by the Marine Corps, there is only one pool with SDFS in the project footprint. This pool occurs adjacent to the existing roadbed for Road 8. Protocol and non-protocol surveys along Road 8 have documented only Lindahl's fairy shrimp within the great majority of pools. With implementation of the proposed minimization measures, direct impacts to the SDFS-occupied pool will be avoided, and potential indirect impacts, such as changes to the pool's hydrology or reduction in water quality due to sedimentation or pollution, will be reduced to a level of insignificance (i.e., unable to be meaningfully measured, detected, or evaluated). Protocol and non-protocol surveys within the Road 8 project footprint documented only Lindahl's fairy shrimp in the great majority of these pools. Based on these survey results, it is possible, although unlikely, that SDFS also occurs in some of these pools since these species sometimes co-occur. Therefore, protocol surveys will be completed prior to impacting any pools in the Road 8 project footprint that are within 500 feet of the SDFS-occupied pool to ensure that these pools are not occupied by SDFS. Therefore, based on the implementation of the conservation measures described above, we concur with the Marine Corps' NLAA determination for SDFS, and SDFS is not addressed further in this biological opinion.

This biological opinion is based on information provided in the BA; site visits, correspondence, and notes; and other information compiled during the course of our consultation with the Marine Corps on this project. This information and other references cited in this biological opinion constitute the best available scientific information on the status and biology of the species considered. The complete file for this consultation is maintained at the CFWO.

CONSULTATION HISTORY

We received your letter to initiate formal consultation on May 1, 2009. Site visits were conducted on June 9, August 2, and August 31, 2009, and June 29, 2011, and included staff from the Marine Corps and CFWO.

We acknowledged the initiation of formal consultation in our response letter (FWS-MCBCP-09B0334-09TA0947) dated June 30, 2009. Our respective staffs have exchanged email correspondence and met periodically to clarify the project description and update the status of listed species in the action area from the initiation of consultation to completion of this biological opinion. Completion of consultation on this project was delayed due to an emphasis on the Grow the Force Permanent Bed-Down Facilities (GTF), Basewide Utilities Infrastructure (BUI), and

[7] "Impacting" includes activities such as grading/filling, staging equipment, walking through, or driving through the pool or its watershed.

Basewide Water Infrastructure (BWI) consultations that were completed between 2010 and 2013. We provided a draft of the project description to the Marine Corps on November 25, 2014, and incorporated all comments received into this biological opinion, as appropriate. Additional coordination between our staff took place in 2015 to clarify project-related impacts to SKR and arroyo toad and develop additional measures to minimize impacts to these species.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

The proposed action is to repair/improve and maintain segments of 20 unpaved access roads throughout MCBCP training ranges (Roads 1-9, 11-15, 17, 19-21, 23-24; BA Figure 2-1). Repair/improvement and maintenance activities will occur within intermittent segments of each road (BA Figures 2-2 to 2-10). The roads proposed for repair/improvement and maintenance consist of compacted dirt, gravel, and sand in varying conditions of maintenance, which are highly susceptible to erosion. Heavy rainfall causes road erosion each year, making many roads impassable to vehicles and difficult for normal foot traffic. The Marine Corps typically performs temporary repairs of these roads consisting of re-grading and the placement of fill soils within the existing roadbeds each year, sometimes repeatedly within a year, to allow safe and effective use of the roads. The Marine Corps has proposed several types of road repairs to improve safety, minimize erosion, and lessen the need for maintenance of these roads. These repairs/improvements will provide erosion protection for several years (under normal rainfall conditions), thereby greatly reducing potential impacts to adjacent sensitive habitats.

Access Road Repair and Improvements (Construction)

Construction associated with access road repairs and improvements include general road improvements, drainage improvements, stabilization, and road delineation. General road improvements will include re-grading and resurfacing designated segments of the roads, filling road ruts, and constructing all-weather crossings (AWCs). Road segments that are subject to severe erosion and that support a high amount of foot and vehicle traffic will receive new asphalt or concrete pavement surfaces. Road improvements include grading a slight crown in the roads to direct runoff laterally, further reducing the potential for erosion. To provide a smooth transition to existing topography and minimize erosion potential, construction activities include slight side grading (less than a 2:1 slope) of roadway edges. Proposed road improvements will also involve a limited number of small road realignments to smooth out sharp corners and cross severely eroded drainages on steep slopes. Road realignments will require minor amounts of cut and fill of soil to establish new road platforms. Where roads cross wide, shallow drainages, crossings such as concrete AWCs, bridges, or culverts will be constructed across the length of each crossing, reducing the potential for erosion. The AWCs may include “Arizona crossings,” concrete structures slightly raised from the streambed allowing low-flow water passage generally with riprap placed on the downstream side of the concrete structure to control erosion.

Drainage improvements will include installation of culverts, headwalls, ditches, swales, and erosion control measures to divert runoff and storm water from roadways and into nearby drainage conveyances. New or replacement culverts will be designed and installed to convey floodwaters under the roads, where deemed necessary to reduce undercutting and erosion. In addition, the new or replacement culverts will be installed at or just below the existing grade to reduce the potential for undercutting or erosion around the culverts. Ditches and drainage swales will be placed to convey runoff into natural drainage features and culverts. Where necessary, the drainage area upstream and downstream of the culvert will be cleared and re-contoured with riprap and/or headwalls to provide a stable drainage under the road. Energy dissipaters (riprap or similar hard materials) will be installed to absorb the energy of flowing water and reduce erosion.

Stabilization activities will include building retaining walls and installing riprap protection, revetments, and cut and fill of soil to create more stable grades. These slope stabilization projects will preserve or restore the existing slopes and prevent future erosion by decreasing runoff intensities.

Road delineation activities include installing signs that indicate upcoming turns and speed limits, installing guardrails along curves with narrow or steep road segments, and trimming vegetation from blind corners and overgrown areas. These road delineation actions will improve visibility, vehicle access, and safety along the roadways.

The project is a “Design-Build” project, and final designs are not currently available; therefore, the Marine Corps has provided a preliminary project description in the BA that includes impacts that are likely to be greater than those that will actually occur (i.e., impacts are based on a “worst case scenario”). Construction will not result in widening of existing roads, but small road realignments to remove sharp corners may cause ground disturbance up to 100 feet outside of the existing roadbed. While the actual limits of disturbance are likely to be constrained and substantially smaller due to topography, geology, hydrologic conditions, or vegetation surrounding the project sites, the 100-foot buffer is intended to encompass all project activities while accommodating any potential minor design modifications.

Typical construction equipment includes excavators, compactors, motor graders, dump trucks, concrete mixers, trucks for hauling equipment and materials, and contractor vehicles. Staging areas for vehicle and equipment parking, vehicle refueling, materials storage, soil and debris stockpiling, and general personnel support will be located within the 100-foot buffer in previously disturbed areas (i.e., areas devoid of native vegetation and containing previously compacted soils), and vehicles/equipment will be transported to the site using existing roads. Therefore, placement and ingress/egress to and from staging areas will not result in additional impacts to native vegetation.

Construction activities are anticipated to begin in 2015 and continue for about 10 years. Construction activities will not occur simultaneously within all of the roads; rather, at any given time only a portion of the roads will be under construction.

Routine Maintenance

Routine maintenance activities along the 20 roads will include road resurfacing and vegetation management (i.e., vegetation/debris removal around bridges; cleaning swales and culverts; cleaning upstream of culverts; repairing energy dissipaters and slopes; and concrete repair at low water crossings, headwalls and wingwalls, and retaining walls). Road maintenance activities, such as those listed above, conducted in riparian vegetation outside the riparian bird breeding season (defined as March 15 to August 31 in the Riparian BO[8]) are authorized as Class III and Class IV[9] activities under the Riparian BO.

In addition, the Marine Corps is proposing to conduct the following maintenance activities not authorized under the Riparian BO: (1) vegetation management (i.e., mowing and brush trimming/cutting) in riparian vegetation during the riparian bird breeding season, (2) vegetation management (i.e., mowing and brush trimming/cutting) in non-riparian vegetation during any season, and (3) road resurfacing in non-riparian vegetation during any season. Because the maintenance activities identified in this paragraph are not addressed in the Riparian BO, the effects of implementing these activities are analyzed in this biological opinion.

Vegetation management will be conducted annually, as needed, using a large mower or tractor with an arm-type extension piece to mow or trim vegetation within 10 feet of either side the road. Road resurfacing (i.e., filling road ruts) will be conducted within the roadbed every 3 to 5 years using equipment such as a dump truck, front end loader, grader, compactor, and water truck.

Vegetation management and road resurfacing activities associated with the 20 roads will be conducted during daylight hours and are anticipated to be completed within 1 to 3 days from initiation of the maintenance activity along a particular road segment. Staging areas for vehicle and equipment parking, vehicle refueling, materials storage, debris stockpiling, and general personnel support will be located within previously disturbed areas (i.e., areas devoid of native vegetation and containing previously compacted soils), and vehicles/equipment will be transported to the site using existing roads. Therefore, staging of maintenance equipment/vehicles and ingress/egress of maintenance equipment/vehicles to and from staging areas will not result in additional impacts to native vegetation beyond those anticipated during construction activities.

Conservation Measures[10]

The Marine Corps and its contractors will implement the following CMs to avoid, minimize, and compensate for the effects of the proposed action on the arroyo toad, vireo, gnatcatcher, and

[8] Biological Opinion for Programmatic Activities and Conservation Plans in Riparian and Estuarine/Beach Ecosystems on Marine Corps Base, Camp Pendleton (Riparian BO, 96B0003-96F0002, formerly 1-6-95-F-02).
[9] Class III and Class IV activities do not require project by project coordination with the Service and are summarized in annual reporting provided by the Marine Corps.
[10] Numbering of CMs is sequenced taking into account the three prior species-specific measures for SDFS identified in the introduction section of this document.

SKR. The "General Conservation Measures" address avoidance and minimization of impacts (e.g., erosion, water quality, weeds, trash, and dust) common to most projects and as such will also reduce direct and indirect impacts to the arroyo toad, vireo, gnatcatcher, and SKR and their habitats during construction and maintenance. The "Species-Specific Conservation Measures" address avoidance and minimization of specific project impacts on arroyo toad, vireo, gnatcatcher, and/or SKR individuals and their associated habitats during construction and maintenance activities.

General Conservation Measures - Construction

CM 4. A primary project biologist will oversee avoidance and minimization measures specified within these conservation measures. Different project biologists may be designated for specific measures listed based on the qualifications necessary to satisfy the specific measure. If multiple project biologists are required, their activities will be coordinated through one primary project biologist. The primary project biologist will have sufficient training and experience to identify all of the federally listed species and their habitats that are likely to be encountered within or near the project footprint. The project biologist(s) will have experience and training necessary to conduct tasks described in this biological opinion.

a. The project biologist designated for CM 16 will be a trained wetland biologist, with at least 2 years of independent experience in making wetland delineations in southern California.

b. The project biologist for CM 19 will be knowledgeable of and able to identify weed species listed in the California Invasive Plant Inventory.

c. The project biologist for measures associated with the arroyo toad will have at least 2 years of independent experience conducting arroyo toad surveys and have demonstrated experience in handling arroyo toads.

d. The project biologist for measures associated with the vireo or gnatcatcher will be a trained ornithologist with at least 40 hours of observation in the field of vireo or gnatcatcher and documented experience locating and monitoring nests of these species.

e. The project biologist for measures associated with SKR will have at least 2 years of independent experience conducting SKR surveys and have demonstrated experience handling SKR.

CM 5. The primary project biologist will monitor all construction activities to ensure compliance with the conservation measures outlined in this biological opinion and keep the project engineer and ES informed of construction activities that may threaten sensitive biological resources, particularly arroyo toad, vireo, gnatcatcher, and SKR and

their habitats. The project biologist will record daily activities and provide electronic versions of weekly biological monitoring reports to ES.

CM 6. The project biologist will have the ability to halt construction activities, if necessary, to avoid impacts to listed species or jurisdictional waters that are not in compliance with this biological opinion. If it is necessary to halt construction activities, the project biologist will contact ES immediately to discuss appropriate actions. As needed, ES staff will confer with the CFWO to ensure the proper implementation of protection measures for sensitive species and habitat.

CM 7. In conjunction with final design, and as required, a Stormwater Pollution Prevention Plan (SWPPP) will be prepared for the road project segments and submitted to the Regional Water Quality Control Board. The SWPPP will incorporate BMPs for erosion and sedimentation controls, including techniques to diffuse and slow the velocity of storm water runoff. All construction activities with the potential to impact water quality due to the runoff from the site will be conducted in accordance with SWPPP requirements.

CM 8. Invasive weeds[11] will be controlled by hand weeding or herbicide application in accordance with MCBCP's Integrated Pest Management Plan in disturbed areas as necessary to prevent their establishment.

CM 9. Grading during the rainy season (November 1 to May 1) will be minimized to the extent feasible. Where it is not feasible to avoid grading during the rainy season, erosion and sedimentation BMPs will be installed and maintained immediately downslope of work areas until work is completed and graded areas have been re-contoured, physically stabilized, and planted. See species-specific CMs for arroyo toad and SKR for additional measures during the rainy season.

CM 10. Erosion and sedimentation controls will be monitored and maintained during construction and until disturbed areas are stabilized and not susceptible to further erosion, as determined by ES.

CM 11. Construction-related dust will be minimized by reducing vehicle speeds and traffic in newly cleared areas and covering or lightly spraying exposed soil piles with water when weather conditions warrant. Concrete discharge will not reach surrounding water bodies or pools unless specifically authorized in a Clean Water Act discharge permit.

CM 12. Vehicle and equipment staging and the deposition of soil and debris will be confined to previously disturbed areas (i.e., areas devoid of vegetation and containing compacted soils) within the project footprint.

[11] For the purposes of this biological opinion, invasive plants with overall moderate and high ranking in the most current California Invasive Plant Council Inventory will be considered "weeds."

CM 13. Prior to initiation of construction activities, the maximum project footprint boundaries, including vehicle and equipment staging areas, will be clearly delineated by flagging, stakes, survey laths, or fencing to reduce human disturbance of adjacent native vegetation. Contractors will be provided with digital files and hardcopy maps showing the centerlines and project limits that were used for the environmental analyses in the BA and this biological opinion and will be informed that construction activity must be confined within those limits. Digital files and hardcopy maps will also include the locations of federally listed species, sensitive habitats (including vernal pools), and jurisdictional waters of the U.S.

CM 14. The project site will be kept as clean as possible to avoid attracting predators. All food-related trash will be placed in sealed bins or removed from the site regularly. All construction-related debris will be disposed of properly and will not be discarded on site.

CM 15. Fueling of equipment will be conducted in accordance with applicable Range Regulations as well as with the MCBCP Spill Prevention, Control and Countermeasures Plan.

CM 16. All construction personnel will receive environmental training from ES personnel or the primary project biologist[12] before commencing work. Environmental training will include a description of sensitive species and habitats occurring within or near the project site, details of each species' habitat requirements, protective measures to be implemented for each species, the role of the project biologist(s), and the responsibility of those on site to protect biological resources. The training will also describe the requirements and boundaries of the project and the importance of complying with conservation measures within this biological opinion, or any additional measures specified in the BA or by ES, as well as the consequences of non-compliance.

CM 17. Project design will minimize, to the maximum extent feasible, direct and indirect impacts to riparian vegetation and jurisdictional waters. The limits of jurisdictional waters will be clearly marked in the field with markers or exclusion fencing, and these restricted areas will be monitored by the project biologist during construction activities to ensure that these areas not being directly or indirectly impacted by project activities.

CM 18. Construction activities at night will be avoided to the maximum extent feasible. Where it cannot be avoided, nighttime lighting will be shielded so that light dispersal into adjacent native vegetation is significantly reduced. Other methods of reducing light pollution (e.g., dusk-to-dawn sensor activation, motion-sensitive activation, low-lumen or limited-spectrum lighting) will also be applied as feasible. See species-specific CMs for arroyo toad and SKR for additional limitations on nighttime construction activities.

[12] If training will be provided by the project biologist, then the training material will be reviewed by ES in advance.

CM 19. Construction workers will be prohibited from bringing domestic pets to project sites to ensure that domestic pets do not disturb or depredate wildlife in adjacent native vegetation.

CM 20. To control the spread of weeds that may degrade native vegetation on MCBCP, all construction equipment and vehicles will be thoroughly power-washed before entering MCBCP. The project biologist will identify weed species that become established at the various project sites. The project biologist will report all new weed species invasions (whether they are new to MCBCP or new to the specific project site area) to ES.

Species-Specific Conservation Measures - Construction Activities

Arroyo Toad

The CMs listed below will be implemented within the project footprint in occupied arroyo toad habitat (defined as riparian and upland vegetation within 1,640 feet from any documented arroyo toad breeding locations documented during basewide surveys).

CM 21. Stream crossings in channels with arroyo toad breeding will be limited to two crossings on Road 1 and one crossing on Road 2.[13] These crossings will include culverts across the width of the stream channel to minimize the impacts of the crossings on upstream and downstream hydrology and sediment transport. The proposed design of the culverts will be provided to the CFWO for review and approval prior to construction to ensure that the structures will not result in unanticipated impacts to arroyo toads or their habitat. Rock protection associated with these crossings will be limited to the amount necessary to protect the crossing and prevent downstream erosion.

CM 22. Bank stabilization in stream channels with arroyo toad breeding will be restricted to a single location on Road 4.[14] The proposed design of the road repair and bank stabilization at this location will be provided to the CFWO for review and approval prior to construction to ensure that the improvements will not result in unanticipated impacts to arroyo toads or their habitat.

CM 23. Construction activities will be scheduled, to the maximum extent feasible, to avoid the breeding/juvenile maturation period as defined within the Riparian BO (March 15 to August 15).

[13] The two crossings on Road 1 are identified as 1-4-Rd and 1-6-Rd on Figure 2-2 of the BA. The crossing on Road 2 is identified as 2-17-Rd on Figure 2-3 of the BA.

[14] The in-stream bank protection in arroyo toad breeding habitat is identified as 4-7-Sb on Figure 2-4 of the BA. Other proposed stabilization activities on Roads 1, 2, 3, and 4 on Figures 2-2, 2-3, and 2-4 of the BA will be removed or modified so that they do not impact stream channels that support arroyo toad breeding. Modifications will include moving the roadbed further from the stream and inserting sheet piling in upland habitat adjacent to the roadway instead of placing rock protection in the stream channel.

CM 24. All nighttime construction activities will be prohibited in or adjacent to occupied arroyo toad habitat. Project-related vehicle travel in occupied arroyo toad habitat will also be limited to daylight hours, as arroyo toad movement across roadways occurs primarily during nighttime hours.

CM 25. The project biologist will oversee the installation of temporary silt fencing around the perimeter of all construction areas within arroyo toad occupied habitat. Fencing will be installed at least 14 days prior to construction activities to allow enough time for arroyo toad surveys to be completed during optimal weather conditions.

a. Fencing will consist of woven nylon netting about 3 feet in height attached to wooden stakes in a location and of duration necessary to prevent entry into the site.

b. Prior to installing the fencing, a narrow trench about 6 inches deep will be excavated and the fence buried to prevent arroyo toads from burrowing beneath the fence.

c. If trenching is not feasible or if fencing will be installed in sandy terraces or creek beds, the bottom lip of the fence will have sand bags laid against it sufficient to deter arroyo toads from breaching the fence.

d. All fencing materials (i.e., mesh stakes) will be removed following construction activities.

e. Ingress and egress of construction equipment and personnel will be kept to a minimum, but when necessary, equipment and personnel will use a single access point to the site. This access point will be as narrow as feasible and be closed off by exclusionary fencing when personnel are not on the project site.

f. Excavation units and trenches that have not been backfilled at the end of the day will be completely covered with rigid and durable materials to exclude arroyo toads and avoid entrapment and will be checked each morning by the project biologist.

g. The excavated soil and debris stockpiles will be completely covered with a tarp and secured with sandbags to deter arroyo toads from burrowing under the tarps at the end of the day and will be checked each morning by the project biologist.

CM 26. Prior to construction activities, but after exclusionary fencing has been installed, the project biologist will conduct at least three pre-construction surveys for arroyo toads within the fenced areas.

a. Surveys will be conducted during appropriate climatic conditions and during the appropriate hours (i.e., evening, nights, and mornings) to maximize the likelihood of encountering arroyo toads. If climatic conditions are not highly suitable for

arroyo toad activity, arroyo toad habitat in the project footprint will be watered to encourage aestivating arroyo toads to surface.

b. Any arroyo toads found within the project footprint during surveys will be captured and released by the project biologist to the closest area of suitable habitat outside the project footprint but in the same watershed.

c. Upon completion of these surveys and prior to initiation of construction activities, the project biologist will report the capture and release locations of all arroyo toads found and relocated during these initial surveys to ES who will then provide the information (via email or mail) to the CFWO prior to initiation of construction activities.

CM 27. Prior to ground disturbing activities, the project biologist will monitor the inside perimeter of the fence to ensure no arroyo toads have breached the fence and check the project ingress/egress area for arroyo toads prior to vehicular movement. The project biologist will also monitor the removal of excavation unit covers and soil stockpile tarps each morning. In the event soil piles have not been covered properly, the project biologist will sift through the top 8 inches of soil to ensure arroyo toads are not present. The project biologist will also be present at the end of the day to ensure that the excavations are properly covered to prevent toads from entering any open pits and trenches.

CM 28. Any arroyo toads found within the project footprint during construction activities will be captured and released by the project biologist to the closest area of suitable habitat outside the project footprint but in the same watershed.

CM 29. The project biologist will also be on call and available as needed at other times in the event that an arroyo toad is encountered during project activities. The project biologist will be present on site full-time for the 3 days following any measurable rainfall event (i.e., 0.05 inch or greater) or other appropriate climatic conditions (e.g., high relative humidity and moderate temperatures) that are likely to elicit above-ground arroyo toad movement.

CM 30. Dust control measures (i.e., water truck spraying) will be conducted in a manner that does not attract arroyo toads into the project site (e.g., avoid over-spraying). Near occupied habitat, spraying will occur only after arroyo toad exclusion fence has been installed.

CM 31. The project biologist will document and submit a weekly report to ES on all arroyo toad related activities and actions taken during the period of active construction activities.

CM 32. Impacts to arroyo toad habitat will be minimized to the maximum extent practicable. All impacts to arroyo toad-occupied riparian vegetation (up to 9.83 acres of permanent impact and 12.87 acres of temporary impact) will be offset as specified in the Riparian BO.[15]

CM 33. Temporary impacts to up to 6.27 acres of arroyo toad-occupied upland vegetation will be offset through restoration (e.g., re-contouring, planting, and weeding) of upland vegetation in the project footprint. Prior to initiating restoration activities, ES will provide a copy of the restoration plan to the CFWO for comment, review, and approval. The plan will include a map showing the existing vegetation communities that will be impacted and the native vegetation communities that will be restored, the methods that will be used in the restoration, monitoring requirements and time periods, success criteria, and follow-up measures if needed. Restoration will begin within 12 months of completion of construction activities in each road segment in riparian vegetation.

CM 34. Permanent impacts to up to 8.68 acres of occupied arroyo toad upland vegetation in the project footprint will be offset at a ratio of 0.5:1 (restored:impacted) by restoring 4.34 acres of riparian vegetation that has been invaded by nonnative plant species on MCBCP. Restoration will be conducted as specified in the Riparian BO.

CM 35. The final acreages of riparian vegetation that are cleared (woody or herbaceous) will be reported to ES for recording into the Riparian BO annual report.

Least Bell's Vireo and Coastal California Gnatcatcher

CM 36. The project biologist will be present during construction activities in and adjacent to riparian and coastal sage scrub (CSS) vegetation to direct vegetation clearing and removal activities to minimize the potential for injury or death of vireos and gnatcatchers, should they be present. Initial removal of vegetation within 500 feet of occupied vireo or gnatcatcher habitat will take place outside of the breeding seasons for the vireo (estimated to be March 15 to August 31) and gnatcatcher (estimated to be February 15 to August 31) to the maximum extent feasible. If the project is conducted in gnatcatcher habitat during the non-breeding season, the project biologist will survey suitable habitat within the project footprint 1 day prior to any vegetation disturbance to determine the location and numbers of gnatcatchers.

When breeding season avoidance is not feasible, the following additional measures will be implemented:

[15] All impacts to riparian vegetation, regardless of listed species presence, will be offset in accordance with the Riparian BO. Compensation for individual impacts to habitat occupied by arroyo toads and vireos is not additive because some areas may be occupied by more than one species. Compensation is based on the total amount of riparian vegetation impacted.

a. Weekly surveys for vireos or gnatcatchers will be conducted by the project biologist in areas of suitable habitat within 500 feet of the construction footprint from February 15 to August 31 (or until juveniles have fledged). The purpose of the surveys will be to identify the limits of occupied habitat and breeding status of individuals. The CFWO will be notified (via email) at least 7 days prior to the initiation of surveys.

   If no nests, nesting behavior, or brood rearing activities are detected within 500 feet of the project footprint, work may commence. Prior to and during work activities, the Project Biologist will locate any individual vireos or gnatcatchers on site and direct operators to begin in an area away from the birds. The pattern of brushing/grubbing activities will be designed to optimize opportunities for flushed birds to be directed towards the open space areas in the vicinity of the project footprint.

b. If an active vireo or gnatcatcher nest occurs within 500 feet of the active construction footprint, the project biologist will use the distance to the project limits and local topography to determine if construction activities are likely to directly damage a nest or significantly disturb nesting activities. If nest damage or significant disturbance is unlikely, the work may proceed.

c. If damage or disturbance of any gnatcatcher or vireo nest(s) is likely, the Marine Corps will implement further measures to avoid the likelihood of nest destruction or disturbance, including temporarily halting clearing activities until nesting is completed and directing construction activities to other areas further from the active nest(s).

CM 37. After the initial vegetation clearing, ongoing construction activities in or adjacent to riparian and CSS vegetation within 500 feet of occupied vireo or gnatcatcher habitat will occur outside of the breeding seasons for the vireo (estimated to be March 15 to August 31) and gnatcatcher (estimated to be February 15 to August 31) to the maximum extent feasible. When breeding season avoidance is not feasible, the measures outlined above in CM 35 will be implemented.

CM 38. Removal of riparian vegetation that could support vireos will be minimized. All temporary and permanent impacts to riparian vegetation (up to 28.64 and 3.77 acres, respectively) will be offset according to measures described in the Riparian BO.

CM 39. The final acreage and type of riparian vegetation that are permanently and temporarily impacted by each project will be reported to ES for recording into the Riparian BO annual report.

CM 40. Removal of CSS that could support gnatcatchers will be minimized. Temporary and permanent impacts to CSS will be offset as follows:

a. Temporary impacts to up to 81.0 acres of CSS will be offset through restoration (e.g., re-contouring, planting, weeding) of CSS in the project footprint. Prior to initiating restoration activities, ES will provide a copy of the restoration plan to the CFWO for comment, review, and approval. The plan will include a map showing the existing vegetation communities that will be impacted and the native vegetation communities that will be restored, the methods that will be used in the restoration, monitoring requirements and time periods, success criteria, and follow-up measures if needed. Restoration will begin within 12 months of completion of construction activities in each road segment in CSS.

b. Permanent impacts to up to 12.66 acres of CSS will be offset at a 2:1 ratio by restoring 25.32 acres of CSS on MCBCP at the Lima CSS Mitigation Area or by conserving CSS off MCBCP at the Buena Creek Conservation Bank (as described below). Prior to initiating restoration activities, ES will provide a copy of the restoration plan to the CFWO for comment, review, and approval. The plan will include a map showing the existing vegetation communities that will be impacted and the native vegetation communities that will be restored, the methods that will be used in the restoration, monitoring requirements and time periods, success criteria, and follow-up measures if needed. Restoration will begin within 12 months of completion of construction activities in each road segment in CSS.

Alternatively, the Marine Corps may offset permanent impacts to up to 12.66 acres of CSS off MCBCP by purchasing credits at the Buena Creek Conservation Bank at a 3:1 ratio for impacts to CSS on coastal terraces[16] and a 2:1 ratio for impacts to more inland CSS. Based on the estimated project footprint, all 12.66 acres of occupied CSS that will be permanently impacted by the project is on coastal terraces; therefore, this impact would be offset by purchasing 37.98 credits of CSS at the Buena Creek Conservation Bank. Credits at the Buena Creek Conservation Bank will be purchased within 12 months of completion of construction activities in CSS habitat.

Stephens' Kangaroo Rat

CM 41. The project biologist will be on site during construction site fencing, trenching, and other construction-related activities with the potential to impact SKR. Any SKR found during construction activities will be relocated by the project biologist to suitable habitat outside of the project footprint.

[16] "Coastal CSS" as defined by the USFS coastal terraces ecological unit of California delineated on the "USMC Camp Pendleton General Climate Zone Map" produced by CFWO, August 29, 2013.

CM 42. Since small mammal populations are not static temporally or spatially, all survey data, including the most current SKR survey data for MCBCP, will be compiled and used in identifying areas to be potentially avoided during construction activities.

CM 43. Within 2 weeks prior to initiation of construction activities, the project biologist will conduct a preliminary SKR survey within all areas of the project footprint likely to be occupied by SKR. The project biologist will mark all active and potentially active SKR burrows within or adjacent to the area that will be affected by construction activities and create a 10 to 15-foot buffer around the burrow to encompass the entire underground portion of the burrow. Burrow locations and other SKR sign will be mapped and provided to ES and the CFWO prior to initiation of construction activities. A table will be included showing the anticipated permanent and temporary impacts to SKR burrowing and foraging habitat based on final project designs.

CM 44. If SKR sign is found during pre-construction surveys in or immediately adjacent to any part of the project footprint not previously identified as occupied SKR habitat, this area will be mapped and reported to ES upon completion of surveys. ES will provide this survey information to the CFWO to ensure the amount of SKR habitat that will be impacted by the project does not exceed the amount anticipated in this biological opinion.

CM 45. The schedule and final design of the project in SKR potential habitat will be reviewed and approved by ES before construction activities are initiated. Road construction in suitable and occupied SKR habitat will use a minimal design strategy, with minimal cut and fill, ditches on only one side of the access road, little or no base material application in ditches, and gaps of natural soil (with no ditching), where runoff is naturally diverted away from the access road.

CM 46. The destruction of potential SKR burrows that show signs of current use or occupancy and patches of occupied habitat will be avoided to the maximum extent feasible. The status of burrows potentially occurring in areas of construction activities will be determined by the project biologist. All burrows and patches of occupied habitat to be avoided will be flagged by the project biologist before the initiation of construction activities and indicated on project maps provided to the contractor.

CM 47. All nighttime construction activities will be prohibited in and/or adjacent to areas occupied by SKR. This includes transportation to and from the project site when the route passes through or adjacent to occupied SKR habitat.

CM 48. No construction activities within occupied SKR habitat will occur during rainy periods when burrows may be more susceptible to collapse and degradation from vehicular and foot traffic.

CM 49. Stockpiled soils will be covered with plastic or other material deemed suitable by the project biologist, and the edges will be held in place by sandbags at the end of each

work day. The project biologist will inspect covered stockpiles daily for gaps or sign that small mammals, including SKR, have accessed the soils underneath and will be present when these covers are removed. If burrows characteristic of SKR are found, the burrows will be excavated and any SKR found will be relocated by the project biologist to suitable habitat adjacent to the project footprint.

CM 50. Open trenches will be covered each evening at the completion of work. Trench covers will consist of rigid boards or plates that cover all openings into the exposed trench. The project biologist will be present when the boards or plates are removed and relocate any SKR that may have entered the trench during the night to suitable habitat adjacent to the project footprint.

CM 51. The Marine Corps will cover washout containers with plywood sheets when not in use.

CM 52. Vehicles parked on the project site overnight will be parked on concrete or fire roads/disturbed areas outside of SKR habitat.

CM 53. The project biologist will inspect the construction area each morning before the start of activities and monitor subsequent construction activities in potential SKR habitat. Torpid or injured animals (unable to flee) may be temporarily held and transported to an ES and CFWO-approved location for care and/or rehabilitation. Recovered animals will be returned to an ES and CFWO-approved release site.

CM 54. All vehicles and equipment, including personnel vehicles, will be checked for SKR prior to start-up and being moved.

CM 55. All road watering activities will be restricted to only the areas in need of compaction (to hard pack areas of roads and work areas and not over-spray in adjacent grasslands). This watering will be conducted with a hose. Watering into the edges of the site (weeded/grassy/vegetated areas) will be minimized as much as possible. Water trucks will be limited to 5 miles per hour, and no other vehicles will follow the water truck for at least 5 minutes after spraying to minimize mortality of SKR attracted to the sprayed area.

CM 56. Temporary impacts to up to 15.10 acres of occupied SKR habitat in the project footprint of Roads 5, 9, 12, 23, and 24 will be restored. Examples of vegetation restoration options include: mowing of exotic grasses (e.g., *Bromus diandrus*) when their seed heads are up and still immature, ensuring all cut grasses are windrowed and removed or otherwise collected during mowing, and mechanically removing the aerial portion of the sweet fennel *(Foeniculum vulgare)* and spot treating the base with an appropriate herbicide. Prior to initiating restoration activities, ES will provide a copy of the restoration plan to the CFWO for comment, review, and approval. The plan will include a map showing the existing vegetation communities that will be impacted and the native vegetation communities that will be restored, the methods that will be used in the restoration, monitoring requirements and time periods, success criteria,

and follow-up measures if needed. Restoration will begin within 12 months of completion of construction activities in each road segment in SKR habitat.

CM 57. SKR exclusionary fencing may be installed and maintained around portions of the project footprint adjacent to high quality SKR habitat to minimize the likelihood that SKR will enter the project footprint and be crushed or trapped during project construction. The need for exclusionary fencing will be determined on a case by case basis at the discretion of ES in coordination with the project biologist.

CM 58. SKR trapping and relocation may be conducted in limited instances where it is determined that any SKR trapped may be safely relocated outside the project footprint within a portion of its likely home range. The need for trapping and relocation will be determined on a case by case basis at the discretion of ES in coordination with the project biologist.

CM 59. The Marine Corps will offset permanent impacts to up to 3.18 acres of occupied SKR habitat at a 2:1 ratio through expansion of SKR habitat on MCBCP in the Juliette SKR Management Area by up to 6.36 acres. This expanded area will be restored and maintained to provide SKR habitat. Prior to initiating restoration activities, ES will provide a copy of the restoration plan to the CFWO for comment, review, and approval. The plan will include a map showing the existing vegetation communities that will be impacted and the native vegetation communities that will be restored, the methods that will be used in the restoration, monitoring requirements and time periods, success criteria, and follow-up measures if needed. Restoration will begin within 12 months of completion of construction activities in each road segment SKR habitat.

Alternatively, the Marine Corps may offset permanent impacts to up to 3.18 acres of occupied SKR habitat in the project footprint at a 3:1 ratio through purchase of SKR credits from the Southwestern Riverside County Multi-Species Reserve Mitigation Bank. Based on permanent impacts to an estimated 3.18 acres of occupied SKR habitat, 9.54 acres of SKR credits would be purchased. The Marine Corps could apply to the 9.54-acre total the 3.27 acres of available credits that were purchased in August 2011 to compensate for impacts from the 25 Area Combat Town project but never used. These credits will be purchased within 12 months of completion of project construction activities in SKR habitat.

General Conservation Measures - Routine Road Maintenance[17]

CM 60. All maintenance activities, including vehicle traffic, vehicle and equipment staging, and the deposition of debris will be confined to previously disturbed areas (i.e., areas devoid of vegetation and containing compacted soils) within the project footprint.

CM 61. Fueling of equipment will be conducted in accordance with applicable Range Regulations as well as with the MCB Camp Pendleton Spill Prevention, Control and Countermeasures Plan.

CM 62. Maintenance activities will be conducted during daylight hours only. This includes transportation to and from the project site when the route passes through or adjacent to occupied arroyo toad or SKR habitat.

CM 63. All maintenance personnel will receive environmental training from ES personnel or the primary project biologist[18] before commencing work in arroyo toad, vireo, gnatcatcher, and SKR habitat. The primary project biologist will have sufficient training and experience to identify all of the federally listed species and their habitats that are likely to be encountered within or near the project footprint. Environmental training will include a description of sensitive species and habitats occurring within or near the project site, details of each species' habitat requirements, protective measures to be implemented for each species, the role of the project biologist(s), and the responsibility of those on site to protect biological resources. The training will also describe the requirements and boundaries of the project and the importance of complying with conservation measures within this biological opinion, or any additional measures specified in the BA or by ES, as well as explaining the consequences of non-compliance.

CM 64. Maintenance workers will be prohibited from bringing domestic pets to work sites to ensure that domestic pets do not disturb or depredate wildlife in adjacent native vegetation.

CM 65. To control the spread of weeds that may degrade native vegetation on MCBCP, all maintenance equipment and vehicles will be thoroughly power-washed before entering MCBCP.

Species Specific Conservation Measures - Routine Road Maintenance

Least Bell's Vireo and Coastal California Gnatcatcher

CM 66. Maintenance activities in or adjacent to riparian or CSS vegetation within 100 feet of occupied vireo or gnatcatcher habitat will take place outside of breeding seasons for the

[17] Routine maintenance associated with the 20 access roads addressed in this biological opinion includes only vegetation management (i.e., mowing and brush trimming/cutting) within 10 feet of the road and road resurfacing within the existing roadbed. No ground disturbing maintenance activities are addressed by this biological opinion.
[18] If training will be provided by the project biologist, then the training material will be reviewed by ES in advance.

vireo (estimated to be March 15 to August 31) and gnatcatcher (estimated to be February 15 to August 31) to the maximum extent feasible.

When breeding season avoidance is not feasible, the following measures will be implemented:

a. Weekly surveys for vireos and gnatcatchers will be conducted by the project biologist in areas of suitable habitat within 100 feet of the project footprint from February 15 to August 31 (or until juveniles have fledged). The purpose of the surveys will be to identify the limits of occupied habitat and breeding status of individuals. The CFWO will be notified (via email) at least 7 days prior to the initiation of surveys.

   If no nest(s), nesting behavior, or brood rearing activities are detected within 500 feet of the project footprint, work may commence. Prior to and during work activities, the Project Biologist will locate any individual gnatcatchers on site and direct operators to begin in an area away from the birds. The pattern of brushing/grubbing activities will be designed to optimize opportunities for flushed birds to be directed towards the open space areas in the vicinity of the project footprint.

b. If an active vireo or gnatcatcher nest occurs within 100 feet of the maintenance activities, these activities will be delayed until the project biologist determines that the nest has failed or that the young have fledged from the nest, unless the Marine Corps and CFWO evaluate the circumstances and mutually agree that disturbance is not likely.

Action Area

According to 50 CFR § 402.02 pursuant to section 7 of the Act, the "action area" means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action. Subsequent analyses of the environmental baseline, effects of the action, and levels of incidental take are based upon the action area. For this project, the action area is defined to include the project footprint (disturbance footprint associated with each of the road segments along the 20 access roads plus a 100-foot buffer in which project-related activities may occur). The action area also includes the surrounding habitat within 500 feet of the project footprint of each road segment that may be exposed to project-related effects such as increased noise, light, and dust levels and human activity during construction and maintenance activities.

In addition, the action area includes areas outside of the project footprint on and off MCBCP that will be restored or conserved to offset impacts to arroyo toad, vireo, gnatcatcher, and SKR habitat as described above in the "Conservation Measures" section. Areas that may be restored outside the project footprint on MCBCP include up to 4.34 acres of riparian vegetation to enhance arroyo toad breeding habitat, up to 25.32 acres of CSS (in the Lima Mitigation Area) to

provide gnatcatcher habitat, and up to 6.36 acres (in the Juliette SKR Management Area) to provide SKR habitat. Off MCBCP, the Marine Corps may offset permanent impacts to gnatcatcher habitat through purchase of up to 37.98 acres of CSS credits at the Buena Creek Conservation Bank and to SKR habitat through purchase of up to 9.54 acres of SKR credits at the Southwestern Riverside County Multi-Species Reserve Mitigation Bank.

STATUS OF THE SPECIES

The status of the arroyo toad rangewide has been described in a proposal to downlist the species from endangered to threatened (Service 2014) at http://www.gpo.gov/fdsys/pkg/FR-2014-03-27/pdf/2014-06665.pdf, the completed 5-year review for the species (Service 2009) at http://ecos.fws.gov/docs/five_year_review/doc2516.pdf, and in the species' recovery plan (Service 1999) at http://ecos.fws.gov/docs/recovery_plan/990724.pdf. The status of the vireo rangewide has been described in the completed 5-year review for the species (Service 2006) at http://ecos.fws.gov/docs/five_year_review/doc781.pdf and in the species' draft recovery plan (Service 1998) at http://ecos.fws.gov/docs/recovery_plan/980506.pdf. The status of the gnatcatcher rangewide has been described in the completed 5-year review for the species (Service 2010a) at http://ecos.fws.gov/docs/five_year_review/doc3571.pdf. The status of the SKR rangewide has been described in the completed 5-year review for the species (Service 2011) at http://ecos.fws.gov/docs/five_year_review/doc3775.pdf and in species' draft recovery plan (Service 1997) at http://ecos.fws.gov/docs/recovery_plan/970623.pdf. Please refer to these documents for detailed information on the life history requirements, threats, and conservation needs of these species.

The distribution and numbers of arroyo toad, vireo, and gnatcatcher on MCBCP was recently described in our biological opinion on the BUI project (Service 2010b), and the distribution and numbers of SKR on MCBCP was recently described in our biological opinion on the 25 Area Combat Town Project (Service 2010c). A summary of these species' distribution and numbers rangewide and on MCBCP is provided below.

Arroyo Toad

An estimated 25 populations of arroyo toad are known in the United States, from Monterey County south to Baja California, Mexico (Service 2014). These populations persist primarily as small, isolated populations in the headwaters of streams. MCBCP supports arroyo toad populations in the Santa Margarita, San Onofre, and San Mateo drainages. These populations appear to be large and robust and are unique in that their breeding habitat extends to the coast (Service 1999, Brehme *et al*. 2006). A review of the status of the arroyo toad by the Service determined that management actions implemented since the original listing have led to an increase in the arroyo toad population rangewide; based on its improved status, the Service has proposed that the arroyo toad be downlisted from endangered to threatened status (Service 2014).

Least Bell's Vireo

The vireo population in the U.S. has increased 10-fold since its listing in 1986, from 291 to 2,968 known territories as of 2006 (Service 2006). Most of the vireo breeding sites are located in southern California between the Tehachapi Mountains in Kern and Ventura counties south to northwestern Baja California, Mexico (Service 2006).

Along with the vireo population at the Prado flood control basin in Riverside County, the Santa Margarita River on MCBCP supports the largest population of breeding vireos throughout its distribution, and other riparian habitat on MCBCP also supports a large number of breeding vireos (Service 2006, Lynn and Kus 2013). As few as 15 vireo territories existed on MCBCP in 1980 (Service 1980), but with consistent management of the threats to this species on MCBCP, the population has grown substantially, fluctuating between about 600 and 1,100 territories from 1995 through 2013 (Lynn and Kus 2013). A review of the status of the vireo in 2006 determined that management actions implemented since the original listing have led to an increase in the vireo population (Service 2006); the growth of the vireo population on MCBCP has been a significant part of this overall population growth. Based on its improved status, the Service has recommended the vireo be downlisted from endangered to threatened status (Service 2006).

Coastal California Gnatcatcher

Gnatcatchers occur in CSS and associated vegetation from southern Ventura County to Baja California, Mexico. In 1993, the Service estimated that about 2,562 gnatcatcher pairs remained in the United States, with the highest densities occurring in Orange and San Diego counties (Service 1993). In a study using more rigorous sampling techniques, Winchell and Doherty (2008) estimated there were 1,324 gnatcatcher pairs (95 percent confidence interval: 976 to 1,673) over an 111,006-acre area on public and quasi-public lands in Orange and San Diego counties. Their sampling frame covered only a portion of the U.S. range, focusing on the coast, and was limited to 1 year. Winchell and Doherty (2008) estimated nearly as many gnatcatchers in the portion of the U.S. range sampled in their study as was originally estimated for the entire U.S. range. Although it is not valid to extrapolate beyond the sampling frame, especially in light of known differences in population densities across the range of the gnatcatcher (Atwood 1992), based on Winchell and Doherty (2008) it is likely there are more gnatcatchers in the U.S. portion of the range than was suggested by earlier estimates. We are not aware of any recent estimates of gnatcatcher populations in Baja California.

Basewide surveys for gnatcatchers conducted about every three years since 1994 have documented between 316 and 668 gnatcatcher pairs on MCBCP (Atwood *et al*. 1999; Griffiths Wildlife Biology 1997, 2004, 2008; Tetra Tech 2010, 2014). The Marine Corps has estimated that 47,211 acres of CSS are suitable for gnatcatchers on MCBCP (Marine Corps 2004), although not all of this habitat is occupied.

The Buena Creek Conservation Bank is located in northern San Diego County, about 12 miles southeast of MCBCP. The bank was established in 2012 to allow public and private development

projects to offset permitted impacts to gnatcatcher habitat through the purchase of CSS conservation credits. The 125-acre property contains suitable gnatcatcher habitat and is occupied by the species.

Stephens' Kangaroo Rat

The historic and current geographic distribution of SKR coincides with the inland valleys of cismontane in the San Bernardino, Riverside, and San Diego counties of southern California. The Service has recently estimated that SKR occupies about 54,909 acres of habitat across its entire range (Service 2010d). In the most-recent 5-year review for SKR (Service 2011), we found that the threats to SKR are similar to those identified at the time of listing in 1988, with additional threats from non-native plants and climate change. However, the primary threat at the time of listing, habitat destruction from urban and agricultural development patches, has been largely addressed through the conservation and management of SKR habitat in the Southwestern Riverside County Multi-Species Reserve Mitigation Bank, implementation of the Western Riverside County Multiple Species Habitat Conservation Plan, and implementation of Integrated Natural Resource Management Plans (INRMPs) at MCBCP and Naval Weapons Station Seal Beach Detachment Fallbrook. Based on the progress made in protecting and conserving SKR habitat, the Service has recommended downlisting SKR from endangered to threatened status (Service 2011).

Brehme *et al*. (2013) estimate that SKR occupy about 479 acres of habitat on MCBCP. The occupied habitat can be grouped roughly into western, central, and eastern "core population areas" (Tetra Tech 1999). The western core population area consists of occupied habitat located within Range 115, 225, 227, 407, 408, 409, and along Roblar Road. The western area supports the most occupied habitat and contains the highest number of SKR detections on MCBCP. The central core population area is in Kilo 2; it is about a quarter of the size of the western area, but consistently supports SKR. The eastern core population is in the Juliette Area. It supports the least amount of occupied habitat and the fewest number of SKR. The population in the Juliette Area has experienced a substantial decline in the amount of occupied habitat since 1999 (Brehme *et al*. 2013), but it is also the site of a successful SKR translocation effort in which 21 translocated SKR have multiplied to at least 92 individuals (London 2014, pers. comm.).

The Southwestern Riverside County Multi-Species Reserve Mitigation Bank is located in Riverside County, about 20 miles northeast of MCBCP. The approximately 14,000-acre reserve is currently occupied by various sensitive species, including SKR. The reserve was established in 1992 to allow public and private development projects to offset permitted impacts to sensitive species, including SKR, and their habitats through the purchase of conservation credits.

ENVIRONMENTAL BASELINE

Regulations implementing the Act (50 CFR § 402.02) define the environmental baseline as the past and present impacts of all Federal, State, or private actions and other human activities in the action area. Also included in the environmental baseline are the anticipated impacts of all

proposed Federal projects in the action area that have undergone section 7 consultation and the impacts of State and private actions that are contemporaneous with the consultation in progress.

In May 2014, three wildfires (Tomahawk, Las Pulgas, and San Mateo) on MCBCP and Naval Weapons Station Fallbrook, collectively known as the Basilone Complex fires, burned about 21,900 acres (nearly 18 percent) of MCBCP. Although portions of the project footprint may have burned during these fires, the habitats and species addressed by this biological opinion are expected to recover. Also, since project construction will be implemented over an estimated 10-year period and include long-term maintenance, we are analyzing potential impacts to these habitats and species based on pre-fire conditions.

Information in this section is based primarily on the BA for the project and additional data and information provided by the Marine Corps during the consultation process. For the following description, species occurrence is provided for the project footprint. However, based on discussions during this consultation, the Marine Corps has determined that actual project impacts associated with construction and maintenance of the 20 access roads will be no more than 53 percent of the impacts anticipated in the BA (Table 1). The actual location of construction along the 20 access roads will vary within the project footprint to provide flexibility in project placement; however, the 53 percent reduction in impacts within the project footprint should improve avoidance of federally listed species, as described below in the "Effects of the Action" section.

Arroyo Toad

Arroyo toad riparian habitat includes all riparian vegetation within 1,640 feet of arroyo toad breeding habitat. For this consultation and others on MCBCP, arroyo toad riparian habitat is referred to as arroyo toad breeding habitat; it includes the stream channels where breeding occurs and the riparian habitat adjacent to these streams. Because potential impacts in stream channels that support arroyo toad breeding are a small subset of impacts to arroyo toad riparian habitat in general, these impacts are calculated separately in Table 1 and in the effects analysis.

Arroyo toad upland habitat, used for foraging, burrowing, and dispersal, is defined as upland vegetation (excluding disturbed/developed) within 1,640 feet of the nearest arroyo toad breeding habitat. Arroyo toads have been documented as far as 0.7 mile from the nearest arroyo toad breeding habitat, but the majority of occurrences are within 1,640 feet (Holland and Sisk 2001).

Table 1. Summary of project impacts to habitat occupied by listed species.

Species		Roads with Occupied Habitat	Impact Type (acres)[5]		Total Impacts[6] (acres)
			Permanent	Temporary	
Arroyo Toad[1]	Riparian vegetation (breeding habitat)	1, 2, 3, 4	12.87	9.83	22.70
	Stream channels with arroyo toad breeding[2]		0.43	1.07	1.50
	Upland vegetation		8.68	6.27	14.95
Vireo[3]		1, 6-8, 11-15, 20, 21, 23	3.77	28.64	32.41
Gnatcatcher[3]		3, 5-9, 12	12.66	81.0	93.66
SKR[4]		5, 9, 12, 23, 24	3.18	15.10	18.28

[1] Impacts to riparian and upland vegetation for arroyo toad are based on Cunningham 2013, pers. comm.

[2] Impacts in stream channels with arroyo toad breeding are a subset of the impacts to all arroyo toad-occupied riparian vegetation (breeding habitat). Impacts to stream channels with arroyo toad breeding are estimated based on Christensen 2015, pers. comm. and Haase 2015, pers. comm.

[3] Impact acreages for vireo and gnatcatcher are based on a 53 percent reduction in impact acreages estimated in the BA.

[4] Impact acreages for SKR are based on a 53 percent reduction in impact acreages estimated by CFWO (as described in the "Stephens' Kangaroo Rat" section below).

[5] Impact acreage columns cannot be totaled due to overlap of species habitat (e.g., arroyo toad upland habitat and gnatcatcher habitat).

[6] Permanent impacts include vegetation that will be impacted within 10 feet of the road segment due to routine maintenance.

While arroyo toad surveys were not conducted specifically for the project, we have information on arroyo toad occurrences on MCBCP from surveys conducted basewide and for other MCBCP projects from 1995 to 2013 [MCBCP and CFWO Geographic Information System (GIS) databases]. Based on these survey data, arroyo toads have been documented in the project footprint of Roads 1, 2, 3, and 4 (Table 1).[19] These roads are located in the San Onofre Creek (Roads 1 and 3) and San Mateo Creek (Roads 2 and 4) watersheds, both of which are known to contain arroyo toad breeding and upland habitats for foraging, burrowing, and dispersal. Road 1 crosses the mainstem of San Onofre Creek, which is an intermittent stream at the crossing, and

[19] The estimates of arroyo toad occupied habitat in Table 1 are based on arroyo toad survey data through 2012. Because arroyo toad breeding has been documented in almost all suitable breeding habitat on MCBCP, incorporating data through 2013 is unlikely to alter these estimates.

Road 3 crosses several ephemeral upland tributaries and drainage ditches in the San Onofre Creek watershed. Road 2 crosses several intermittent upland tributaries and ephemeral drainage ditches that drain downstream to San Mateo Creek, and Road 4 runs along Talega Creek, an intermittent stream that drains to Cristianitos Creek, a major tributary to San Mateo Creek.

The project is estimated to impact up to 37.65 acres of arroyo toad-occupied habitat (14.95 acres of upland vegetation and 22.70 acres of riparian vegetation, including 1.50 acres within stream channels with arroyo toad breeding) in the footprint of Roads 1, 2, 3, and 4 (Table 1). Some of the occupied arroyo toad habitat within the footprints of Roads 2 and 4 may already be subject to ongoing or future impacts associated with the previously approved projects, including the BUI and GTF projects (Service 2010b and 2010e), although the majority of the proposed impacts do not overlap with these projects. Cumulatively, BUI and GTF will harm, kill, or injure up to 333 arroyo toads and permanently impact up to 0.34 acre of arroyo toad-occupied riparian and 30.19 acres of arroyo toad-occupied upland habitat. These projects will also temporarily impact substantial areas of arroyo toad riparian and upland habitat.

Although a large number of arroyo toads may occur in the project footprints of these previously approved projects, we do not expect the number of arroyo toads or the amount of arroyo toad habitat within the action area for the 24 Roads project to be substantially reduced by these approved projects for the following reasons: 1) limited overlap exists between the 24 Roads project and previously approved projects (Figure 1); 2) the projects include measures to move arroyo toads out of the project footprint, substantially reducing the number of toads that will be killed or injured; 3) the projects are being implemented over a period of at least several years, so the number of toads impacted in any one year is a fraction of the total number anticipated to be impacted; 4) most of the project-related impacts are temporary and will be restored immediately following project impacts; and 5) the number of arroyo toads that will be impacted, although substantial, represents a fraction of the total population in each of the affected watersheds.

To estimate the number of arroyo toads that may occur in occupied riparian and upland vegetation in the footprints of Roads 1, 2, 3 and 4, we applied density estimates calculated for the San Mateo Creek and San Onofre Creek watersheds [as described in our biological opinion on the BUI project (Service 2010b)].

Based on an estimated density of 21 arroyo toads/acre in occupied riparian vegetation and 0.47 arroyo toads/acre in upland vegetation, we estimate that up to 484 arroyo toads (21 toads/acre × 22.70 acres of riparian habitat + 0.47 toads/acre × 14.95 acres of upland habitat) arroyo toads (metamorphs, subadults, and adults) may occur in occupied riparian and upland vegetation, respectively, in the project footprint of Roads 1, 2, 3, and 4.

Least Bell's Vireo

For the purpose of this consultation, vireo-occupied habitat is defined as riparian vegetation (BA Table 3-1) that supports vireo breeding, feeding, and sheltering within 500 feet of a documented vireo location. Surveys were not conducted specifically for the project; however, we have

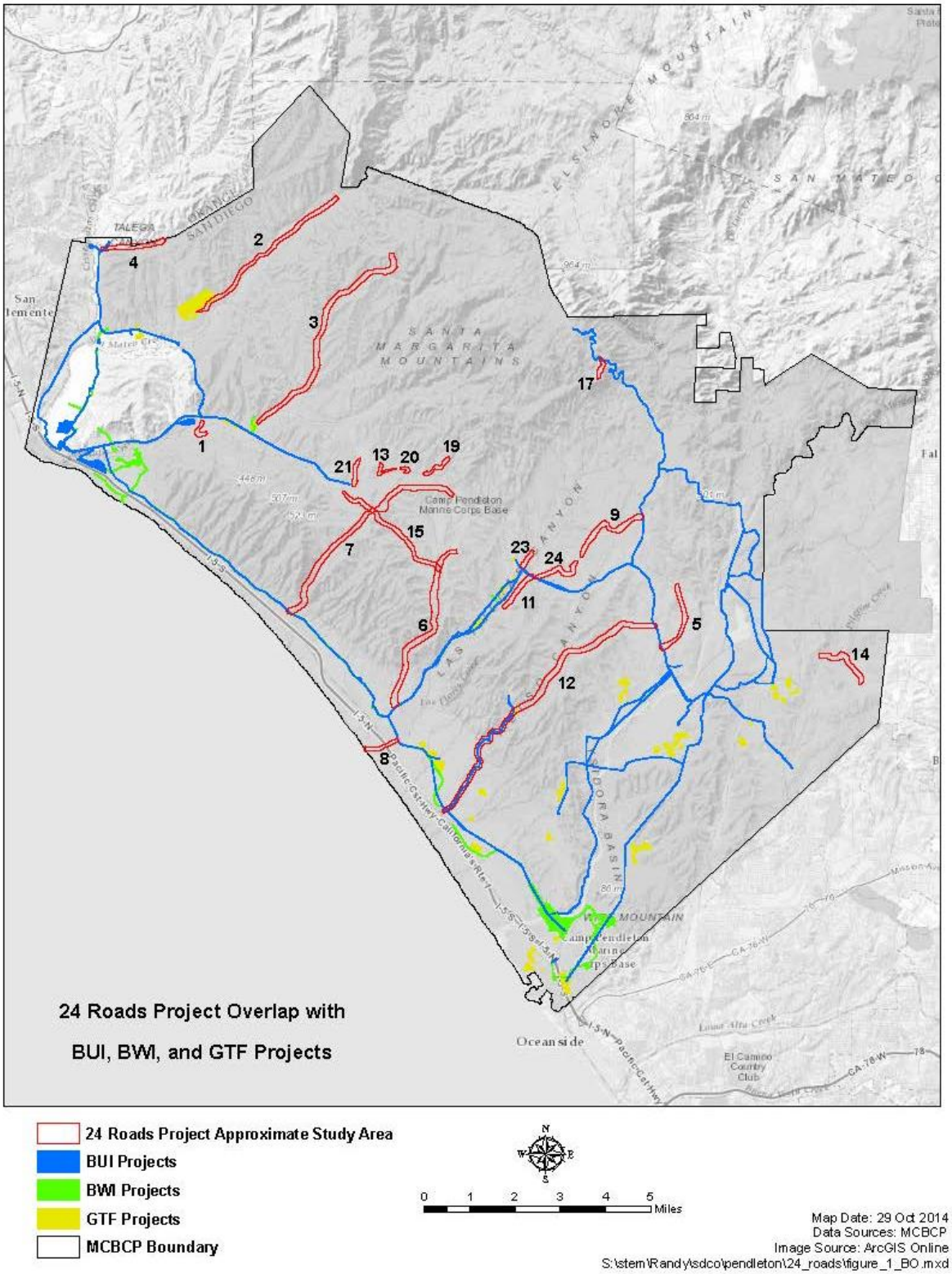

Figure 1. 24 Roads Project overlap with BUI, BWI, and GTF Projects

information on vireo occurrences on MCBCP from surveys conducted basewide in accordance with the Riparian BO and for other MCBCP projects from 1995 through 2014 (MCBCP and CFWO GIS databases). Based on this survey data, vireos have been documented in the project footprint of Roads 1, 6-8, 11-13, 15, 20, 21, and 23 (Table 1).[20]

The project is estimated to impact up to 32.41 acres of vireo-occupied riparian vegetation in the footprint of Roads 1, 6-8, 11-15, 20, 21, and 23 (Table 1). Some of the occupied vireo habitat within Roads 11 and 12 may already be subject to ongoing or future impacts associated with previously approved projects, including the BUI project (Service 2010b). The BUI project will harm, kill, or injure up to 18 vireo pairs and permanently impact up to 5.94 acre of vireo-occupied riparian vegetation. As described for arroyo toad above, however, we do not expect the BUI project or other previously approved projects to substantially reduce the number of vireos or available habitat in the 24 Roads action area.

To estimate the number of vireo pairs that may occur in the project footprint, we used GIS to map the vireo territory locations documented in 2013 that overlap with the project footprint. We applied an average vireo territory size of 1.9 acres based on estimates in the species recovery plan (Table 1 in Service 1998). We then counted the number of territories that overlap with the project footprint. Using this methodology, we estimate that 10 vireo territories overlap with the project footprint.

To estimate the number of vireos that will be substantially impacted by habitat loss resulting from the project, we calculated the number of vireo territories documented within 500 feet of the project footprint in 2014 that will directly lose habitat totaling 20 percent or more of their estimated territory. While we have little information regarding the effect of different amounts of habitat removal on vireo reproductive output, we used our best professional judgment to estimate that the loss of more than 20 percent of vireo habitat within a territory will substantially increase the risk of mortality or interfere with breeding, feeding, and sheltering activities, whereas loss of less than 20 percent of a territory may force a vireo pair to adjust its territory boundaries slightly or result in a limited increase in territorial interactions with neighboring pairs, but will not result in a substantial increase in mortality or reproductive output (i.e., effects would not rise to the level of "take"). We applied an average vireo territory size of 1.9 acres based on estimates in the species recovery plan (Table 1 in Service 1998). We then counted the number of territories that overlap with the project footprint. Using this methodology, we estimate that 9 vireo territories located in 2013 overlap substantially with the project footprint. However, because impacts to vireo habitat within the project footprint are anticipated to be reduced by 53 percent, we estimate that no more than 5 pairs of vireo (rounding up to the nearest whole number) will be substantially impacted by the project.

[20] Calculations of occupied vireo habitat in Table 1 are based on vireo survey data through 2012. Because these calculations include annual surveys dating back to 1995, which have documented vireo occupation in almost all suitable habitat on MCBCP, incorporating data through 2014 would not meaningfully change these estimates.

Coastal California Gnatcatcher

For the purpose of this consultation, gnatcatcher-occupied habitat is defined as CSS (referred to as "Coastal Sage" in BA Table 3-1) that supports gnatcatcher breeding, feeding, and sheltering within 500 feet of a documented gnatcatcher location. Gnatcatcher presence was determined using data from basewide surveys conducted once every 3 to 5 years on MCBCP from 1989 through 2014. Based on these survey data, the project is estimated to impact up to 93.66 acres of gnatcatcher-occupied CSS in the footprint of Roads 3, 5-9, and 12 (Table 1).[21]

Some of the occupied gnatcatcher habitat within Road 12 may already be subject to ongoing or future impacts associated with previously approved projects, including the BUI project (Service 2010b). The BUI project will harm, kill, or injure up to 14 gnatcatcher pairs and permanently impact up to 25.41 acres of gnatcatcher-occupied CSS. This project will also temporarily impact substantial areas of gnatcatcher habitat; however, temporarily impacted habitat will be restored immediately following project impacts, so it is likely that this restored habitat will again be suitable for gnatcatchers by the time the 24 Roads project is implemented. As described for arroyo toad above, we do not expect the BUI project or other previously approved projects to substantially reduce the number of gnatcatchers or available habitat in the 24 Roads action area.

To estimate the number of gnatcatcher pairs that may occur in the project footprint, we used GIS to map the gnatcatcher territory locations documented in 2014 that overlap with the project footprint. We applied an estimated gnatcatcher territory size of 5.7 acres based on Atwood *et al*. (1998). Atwood *et al*. (1998) found that, while gnatcatcher territory size varies substantially with habitat conditions and other variables, estimated gnatcatcher territory size in Rancho Palos Verdes, which is similar to the project area based on habitat characteristics and distance from the coast, is about 5.7 acres. We then counted the number of estimated territories that overlap with the project footprint. Using this methodology, we estimate that 6 gnatcatcher territories overlap with the project footprint.

To estimate the number of gnatcatcher territories that will be substantially impacted by habitat loss resulting from the project, we calculated the number of gnatcatcher pairs documented within 500 feet of the project footprint in 2014 that will directly lose habitat totaling 20 percent or more of their estimated territory. Similar to vireo, because we have little information regarding the effect of different amounts of habitat removal on gnatcatcher reproductive output, we estimate that the loss of more than 20 percent of gnatcatcher habitat within a territory will substantially increase the risk of mortality or interfere with breeding, feeding, and sheltering activities, whereas loss of less than 20 percent of a territory may force a gnatcatcher pair to adjust its territory boundaries slightly or result in a limited increase in territorial interactions with neighboring pairs, but will not result in a substantial increase in mortality or reproductive output

[21] Calculations of occupied gnatcatcher habitat in Table 1 are based on gnatcatcher survey data through 2010 (i.e., they do not include data from the 2014 surveys). Because these calculations include surveys every three to four years dating back to 1989, incorporating one year of additional data is unlikely to meaningfully change these estimates.

(i.e., effects would not rise to the level of "take"). Using this methodology, we estimate that 3 territories overlap substantially with the project footprint of Roads 6, 7, and 12. However, because impacts to gnatcatcher habitat within the project footprint are anticipated to be reduced by 53 percent, we estimate that the project will substantially impact no more than 2 pairs of gnatcatchers (rounded up to the nearest whole number).

Stephens' Kangaroo Rat

In 2006, Brehme *et al*. (2006) defined about 7,204 acres of "high", "medium", and "low" suitability SKR habitat on MCBCP using previously mapped SKR habitat and established soil and vegetation associations. Brehme *et al*. (2011) state that almost all of the known SKR populations on MCBCP are restricted to high suitability habitat. They also state that most of the low suitability habitat was unsuitable for SKR and that the few SKR found in the medium suitability habitat occurred in proximity to the high suitability stratum. Therefore, we consider only those areas of the project footprint containing high suitability habitat to be suitable for SKR. Based on Brehme *et al*. (2006), high suitability habitat occurs in the footprints of Roads 2, 5, 9, 12, 14, 23, and 24.

A basewide monitoring program for SKR on MCBCP was first implemented from 1996 to 2002, during which established grids were surveyed every other year (1996, 1998, 2000, and 2002) (Montgomery *et al*. 1997, Montgomery 2002, 2004). Using a revised survey protocol, SKR monitoring has been conducted annually since 2005 (except 2011), and we have SKR survey data through 2013 (MCBCP and CFWO GIS databases). According to the BA, prior SKR surveys documented the presence of SKR in the footprints of Roads 9, 12, and 24. However, according to the CFWO GIS database, the SKR record associated with Road 24 appears to be from 1992 and not within the action area of the project. Project-specific surveys for SKR were conducted in suitable habitat along Roads 3, 5, 9, 12, 13, and 14 in 2008 (Davenport Biological Services 2008) during which 32 SKR were found in or near the project footprint of Roads 5, 9, and 12. SKR were also documented in the Road 5 footprint during 2008 and 2009 surveys conducted for the Kilo 2/Area 25 Burn Pit and Kilo 2 Training Area Power Line project and in the Road 9 footprint in 2009 during surveys conducted for the BUI project (CFWO GIS database). SKR have been documented in the Road 2 footprint; however, these occurrences are presumed extirpated (see Service 2010b for further discussion). Although project-specific SKR surveys were not conducted for Road 23 and 24, we consider these areas to be occupied by SKR for the purpose of this analysis based on the presence of high suitability habitat and the observation of SKR in proximity to each of the roads.

The project is estimated to impact 18.28 acres of SKR habitat in the footprint of Roads 5, 9, 12, 23, and 24 (Table 1). Some of the SKR habitat within Roads 5, 12, and 24 may already be subject to ongoing or future impacts associated with previously approved projects, including the BUI and 25 Area Combat Town projects (Service 2010b, 2010c). Cumulatively, these projects will impact up to 13 SKR and permanently and temporarily impact about 1.0 acre and 11 acres of SKR-occupied habitat, respectively. Temporarily impacted SKR habitat will be restored and should be re-occupied by SKR soon after project completion. As described for arroyo toad

above, we do not expect the BUI and 25 Area Combat Town projects to substantially reduce the number of SKR or available habitat in the 24 Roads action area.

Because the most recent project-specific surveys were conducted in 2008 and SKR populations vary from year to year, it is difficult to determine the precise number of SKR currently in the project footprint. Since monitoring began in 2005, densities have fluctuated from 2 to 12 SKR/acre (Brehme *et al*. 2013). During the 2012/2013 monitoring period, density was about 2 SKR/acre and was significantly lower than the previous year (about 9 SKR/acre) in 2011/2012.

To estimate the number of SKR that may occur in the project footprint, we averaged the SKR densities calculated for 2005 to 2013 by Brehme *et al*. (2013). The average SKR density during this time period was 5.9 SKR/acre. We then multiplied this density by the amount of high suitability habitat in the project footprint. Using this approach, we estimate that about 108 SKR (5.9 SKR/acre x 18.28 acres) may occur in the project footprints of Roads 5, 9, 12, 23, and 24.

EFFECTS OF THE ACTION

Effects of the action refer to the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated and interdependent with that action that will be added to the environmental baseline. Interrelated actions are those that are part of a larger action and depend on the proposed action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration. Indirect effects are those that are caused by the proposed action and are later in time but are still reasonably certain to occur.

Project activities will permanently and temporarily impact up to about 180 acres of arroyo toad, vireo, gnatcatcher, and SKR habitat (Table 1). Maintenance activities are anticipated to have minor impacts to arroyo toads, vireos, gnatcatchers, and SKR. Since road resurfacing will be conducted within the roadbed, we do not anticipate additional impacts to vegetation associated with this maintenance activity beyond those anticipated during construction activities. Vegetation management activities will not result in ground disturbance, but vegetation within 10 feet of the road will be subject to annual disturbance by mowing or brush trimming/cutting. Therefore, areas subject to vegetation management activities are considered permanently impacted.

Arroyo Toad

Construction-Related Death and Injury and Habitat Loss

Based on the analysis provided in the “Environmental Baseline” section above, we estimate that up to 484 arroyo toads may occur in riparian and upland vegetation within the project footprints of Roads 1, 2, 3, and 4. However, as described below, we anticipate that avoidance and minimization measures will substantially reduce the number of arroyo toads that are killed or injured during project activities.

Access to the site will be via existing access routes, and construction activities will be avoided during nighttime hours, when arroyo toads are most active. Also, prior to the initiation of construction activities, a project biologist will oversee installation of arroyo toad exclusionary fencing around the perimeter of the project area and conduct three surveys within the fenced area. Any arroyo toads found in the project footprint will be captured and released into the nearest suitable habitat by the project biologist. As described in the "Conservation Measures" section above, if climatic conditions are not highly suitable for arroyo toad activity during the survey period, the project biologist may water the areas that will be impacted to cause arroyo toads in the project footprint to surface.

Capture and relocation measures have the potential to effectively minimize death and injury of arroyo toads during project construction. Toads often release their bladder contents upon capture (Stebbins and McGinnis 2012) and may experience increased stress levels; these responses could reduce arroyo toad survival and reproduction following capture and relocation. However, foraging and aestivating arroyo toads are not known to be territorial, so individuals have the potential to continue foraging or aestivating without substantial disruption following relocation.

A capture and relocation effort was implemented successfully during the construction of the Rincon Harrah's Casino in 2001 when about 144 arroyo toads were removed from the casino footprint prior to construction. Of the 144 toads removed, 50 were implanted with Passive Integrated Transponders (PIT tags) and translocated to adjacent, suitable habitat on the Rincon Reservation. Follow-up surveys conducted in 2006 (5 years post-translocation) located 3 of the PIT-tagged toads (6 percent of the total number of marked toads) within the vicinity of the translocation site. Because few toads survive past 5 years in the wild, it is likely that many of the PIT-tagged toads died prior to the 2006 follow-up surveys. However, the 2006 identification of 3 of the PIT-tagged arroyo toads shows that some proportion of the marked toads were able to survive the pre-construction relocation efforts, thereby minimizing project-related impacts to arroyo toads.

We have little data on the proportion of arroyo toads likely to be captured during pre-project surveys. A pitfall trapping study of arroyo toads on MCBCP documented few adults and subadults during the period from August through December, when there is generally little precipitation, but noted that the only times that arroyo toads were captured during this interval was when there were rainfall events (Holland and Sisk 2001). Although we have little data regarding the percentage of arroyo toads that can be successfully moved out of a project footprint, based on our best professional judgment, we believe that with appropriate climatic conditions and/or repeated watering, it is likely a majority of arroyo toads (roughly 75 percent) in the impact area will surface and be relocated.

If 75 percent (or 363 individuals) of the 484 arroyo toads in the project footprint are successfully removed, then an estimated 25 percent (or 121 individuals) of the arroyo toads within the impact area will remain. We assume that all arroyo toads remaining in the impact area will be killed or injured, but because these individuals are likely to be aestivating and will be crushed by heavy equipment, few, if any, will be seen. We estimate that no more than 12 arroyo toads

(10 percent of the estimated 121 remaining individuals) will be observed killed or injured during construction activities.

In addition to being killed or injured during construction activities, arroyo toads could be killed or injured if they become entangled or trapped within exclusionary fencing and as a result of capture and relocation efforts. However, fence placement and trapping and relocation efforts will be conducted by individuals with at least 2 years of independent experience using methods that have been implemented successfully during construction of other projects in arroyo toad-occupied habitat. Therefore, we anticipate that no more than 5 percent of the relocated individuals (18 individuals) will be observed killed or injured during trapping and relocation efforts.

Project activities will permanently impact up to 12.87 acres of occupied riparian vegetation and 8.68 acres of occupied upland vegetation and temporarily impact up to 9.83 acres of occupied riparian and 6.27 acres of occupied upland vegetation (Table 1). The roadways are located adjacent to and/or within two major drainages (Cristianitos/San Mateo creeks and San Onofre Creek) occupied by arroyo toads. Including the 1,640 feet of arroyo toad habitat mapped on either side of these drainages, the estimated width of occupied arroyo toad habitat along these major drainages ranges from about 3,314 to 6,234 feet, most of which is outside the action area. Thus, while the project may impact a large number of arroyo toads, due to the amount of suitable habitat on MCBCP, the number of arroyo toads actually occurring in the project footprint likely represents only a fraction of the arroyo toads within the affected populations. In addition, during the approximately 10-year project period, only a portion of the roads will be under construction at any given time, reducing the proportion of arroyo toad populations on MCBCP that will be impacted at any point in time. Furthermore, temporarily impacted habitat will be restored, and permanent impacts to arroyo toad will be offset through restoration of breeding habitat, which is anticipated to maintain or increase the amount and quality of available breeding habitat on MCBCP. Therefore, we expect that individuals removed from the population will be replaced by breeding in subsequent years, and we do not expect this temporary reduction in the arroyo toad population in the action area to appreciably reduce the numbers, reproduction, or distribution of the species on MCBCP or rangewide.

Permanent project impacts will primarily occur in narrow strips on either side of existing roadways. Therefore, these impacts will result in an incremental increase in habitat fragmentation on MCBCP, but because the impacts will be small relative to the amount of available habitat and will be spread throughout MCBCP, they are not anticipated to increase the vulnerability of any particular locale to extirpation or create any major barriers to dispersal. The primary effects of the temporary impacts are the project-related death, injury, and displacement of individuals in the project footprint, which are described above. Temporary impacts to up to 9.83 acres of riparian and 6.27 acres of upland will be restored upon project completion, and because arroyo toads are not dependent on mature vegetation in either the riparian or upland environment, we expect temporarily impacted areas to be re-occupied shortly following project completion.

Permanent impacts to riparian vegetation (up to 12.87 acres) will be offset as specified in the Riparian BO (through removal of non-native invasive plant species and restoration of riparian vegetation), and the permanent loss of upland arroyo toad habitat (up to 8.68 acres) will also be offset by restoring 4.34 acres of riparian vegetation that has been invaded by nonnative plant species on MCBCP. The permanent loss of up to 8.68 acres of upland vegetation will result in the incremental loss of upland arroyo toad habitat on MCBCP. However, the permanent loss of up to 8.68 acres of upland vegetation represents a small fraction of the available arroyo toad upland habitat on MCBCP. In addition, the proposed restoration of riparian vegetation will result in an increase in the amount and quality of arroyo toad breeding habitat on MCBCP.

In addition to the impacts to arroyo toad upland and riparian habitat, the project will result in impacts within stream channels where arroyo toad breeding occurs. These impacts include three improved crossings (two on Road 1 and one on Road 2) and bank stabilization on Road 4. Estimated impacts within these channels total 0.43 acre of permanent impacts and 1.07 acres of temporary impacts. The improved crossings will be located within areas that are subject to repeated disturbance because they are currently being used by vehicles as unimproved crossings. The area where bank stabilization will occur is also subject to periodic disturbance when road conditions degrade to the point where it is necessary to regrade the road, which includes construction activity within the stream channel.[22] Because the stream channels that will be impacted by the project are already subject to repeated disturbance, the permanent loss of this habitat is not expected to have a substantial impact on arroyo toad breeding and may reduce the likelihood that arroyo toad eggs and larvae are crushed by vehicles driving through unimproved crossings. Improvements within the stream channel also have the potential to affect stream hydrology and sediment transport, which is further discussed in “Indirect Effects” below.

Indirect Effects

Arroyo toads could be indirectly impacted by increased sedimentation, erosion, lighting, and noise associated with construction and maintenance activities and use of the improved crossings. Construction and maintenance activities in arroyo toad breeding habitat could result in changes in water quality associated with increased sedimentation, erosion, and introduction of potential pollutants such as oil and asphalt. Use of the improved stream crossings has the potential to result in increased turbidity and introduction of pollutants; however, vehicles already cross the stream at these locations, so providing an improved crossing is likely to reduce the amount of sediment and pollutants that may occur as a result of vehicles driving through the creek. Vegetation management is not anticipated to result in ground-disturbance and, therefore, will not impact water quality. Changes in sedimentation dynamics can reduce the suitability of arroyo toad breeding habitat. Siltation can asphyxiate eggs and larvae (Service 1999). Changes to the water quality (temperature and chemical composition) can lead to reduced oxygen uptake, reduced feeding, and a general decline in species health, which can lead to disease, decreased growth and reproduction, or death.

[22] Impacts to arroyo toad from ongoing use of the existing unimproved crossings and minor road repairs in riparian habitat are addressed by the Riparian BO.

To minimize the potential for water quality impacts in occupied arroyo toad breeding habitat in Cristianitos, San Mateo, and San Onofre creeks from the proposed project, construction and maintenance activities near these creeks will be minimized during the rainy season to the maximum extent feasible. Measures to prevent construction-related siltation and runoff from entering these areas will also be implemented in these areas. Temporary erosion control measures such as silt fencing, sand bags, and straw matting will be installed during construction and maintenance activities. These BMPs will avoid and minimize soil erosion, sedimentation, and run-off pollutants, reducing potential for degradation of the adjacent breeding habitat. With the proposed measures in place, we anticipate that effects to water quality will be reduced to the point where they are insignificant (i.e., effects will not rise to the level of take and cannot be meaningfully measured, detected, or evaluated). In addition, the improvements along the existing 20 access roads are anticipated to generally reduce the frequency of maintenance needed in the future, thereby further reducing impacts to water quality in arroyo toad-occupied habitat.

The improved stream crossings and stream bank protection have the potential to negatively impact arroyo toad habitat by altering the hydrology and sediment transport along the creek. For example, stream crossings can act as dams, trapping sediment upstream and leading to erosion of the streambed downstream. However, the crossings that will be installed in association with this project will include culverts across the entire width of the stream channel to facilitate passage of water and sediment under the crossings during low and moderate flows. The stream crossings and the proposed stream bank protection will be designed in a manner to minimize potential effects on hydrology and sediment transport, and the final designs will be submitted to the CFWO for review and approval to ensure that anticipated impacts to arroyo toad breeding habitat from these project elements are consistent with this analysis. With regular maintenance, including removal of debris from culverts under the stream crossings, we anticipate that project-related effects to arroyo toad breeding habitat from changes in hydrology and sediment transport will be reduced to the point where they are insignificant.

Habitat adjacent to construction and maintenance areas may be exposed to increased lighting and noise. Increased ambient lighting and noise levels can indirectly affect arroyo toads through increased predation risk and disruption of normal behaviors in adjacent breeding, foraging, and dispersal habitat. To minimize the impacts of lighting and noise on arroyo toads, construction and maintenance activities within arroyo toad-occupied habitat will not occur at night, eliminating adverse effects from lighting and noise impacts to arroyo toads, which are active at night. No new permanent lighting along the roadways is proposed as part of this project. With implementation of the proposed minimization measures, we anticipate that arroyo toad habitat that is currently occupied will continue to be used by arroyo toads and that potential effects to arroyo toads resulting from lighting and noise are likely to be insignificant.

Arroyo toads could also be indirectly affected by the introduction of invasive species and wildfire during construction, maintenance, and operation of the improved roads. However, temporarily impacted areas will be restored with native vegetation immediately following construction, which will substantially reduce the potential for introduction of invasive species in disturbed areas. In addition, the proposed project involves improvements along existing roads, so

operation of these facilities is not anticipated to result in an increased risk of invasive species and wildfire relative to existing conditions, and any habitat degradation associated with these factors is likely to be insignificant.

Maintenance

This biological opinion addresses the following maintenance activities not already addressed by the Riparian BO: (1) vegetation management (i.e., mowing and brush trimming/cutting) in riparian vegetation during the riparian bird breeding season, (2) vegetation management (i.e., mowing and brush trimming/cutting) in non-riparian vegetation during any season, and (3) road resurfacing in non-riparian vegetation during any season. Vegetation management in riparian habitat is already covered under the Riparian BO, and changing the timing of the vegetation management (i.e., conducting it during the bird breeding season) will not substantively change potential effects to arroyo toads. Road resurfacing could impact arroyo toads due to decreases in water quality, but the Marine Corps will employ BMPs to ensure that water quality is protected. It is possible that proposed vegetation management in upland habitat could kill or injure arroyo toads adjacent to the roadway. However, the mowing will be conducted using a long attachment that allows the vehicle to stay on the road while the mowing takes place; all maintenance activities will be conducted during daylight hours in dry weather when toads are less active; and vehicle access to the sites will be via existing access routes. Therefore, we anticipate that implementation of these measures will minimize the potential for death or injury of arroyo toads from maintenance to the extent that the potential for death or injury is discountable (i.e., extremely unlikely to occur).

Habitat Restoration

Potential effects to arroyo toad associated with restoration of riparian vegetation are addressed in the Riparian BO. Potential effects to arroyo toad associated with restoration of upland vegetation may include disturbance of foraging and dispersing individuals, but the habitat restoration plan will include measures to avoid impacts to arroyo toads, such as conducting surveys for arroyo toads and installing fencing to exclude individuals from entering the restoration project area. Therefore, restoration activities in upland vegetation are not anticipated to substantially interfere with arroyo toad foraging or dispersal, and the potential for arroyo toads to be killed or injured during restoration activities in upland habitat is discountable.

Effect on Recovery

The primary goal described in the arroyo toad recovery plan (Service 1999) is the protection of existing populations; a secondary goal includes the restoration and management of habitat. The project will impact a substantial amount of habitat and a large number of arroyo toads. However, the project-related impacts will be avoided and minimized, and unavoidable impacts will be offset through habitat restoration. About 40 percent of the project-related impacts to arroyo toad habitat will be temporary. Because arroyo toads are not dependent on mature vegetation, restored

areas will immediately be available to these animals once the project is completed, and we expect temporarily impacted areas to be re-occupied shortly following project completion.

Additionally, because the great majority of arroyo toads in the affected populations will be relocated nearby, we anticipate that individuals removed from the population as a result of the project will likely be replaced by breeding in subsequent years. Therefore, the project is not anticipated to increase the risk of extirpation for any of the affected populations in the action area or on MCBCP.

The Marine Corps will offset permanent impacts to arroyo toad habitat through restoration of riparian vegetation, which will help sustain the robust populations of arroyo toads on MCBCP and support recovery for this species. Therefore, with the implementation of the proposed conservation measures, we conclude that the project is consistent with the recovery strategy for arroyo toads described in the arroyo toad recovery plan (Service 1999).

In addition, based on a review of the status of the arroyo toad (Service 2014), the Service determined that management actions implemented since the original listing have improved the status of arroyo toads throughout much of their distribution. Consistent with this assessment, the arroyo toad populations on MCBCP appear to be large and robust (Brehme *et al*. 2006), which supports the assessment that the mortality of a portion of the arroyo toads in the project footprint will not have long-term effects on arroyo toad population or distribution on MCBCP or rangewide.

<u>Least Bell's Vireo</u>

Construction-Related Death and Injury and Habitat Loss

As described in the "Environmental Baseline" section above, we estimate that 10 vireo territories overlap with the project footprint of roads in vireo habitat (Roads 1, 6-8, 11-15, 20, 21, and 23) and that, of these 10 territories, up to 5 vireo pairs will be substantially impacted by project activities, meaning that the project will impact riparian vegetation totaling at least 20 percent of an estimated territory for each of these pairs. We anticipate that implementation of proposed conservation measures will avoid and minimize project-related impacts to vireos within and adjacent to the project footprint.

If construction activities must be conducted during the breeding season, focused surveys will be conducted in vireo habitat prior to initiation of activities, and measures will be implemented to avoid impacts to nests and young or substantial disturbance of breeding vireo pairs. Therefore, we do not expect that vireo adults, eggs, or nestlings will be killed or injured during construction.

To minimize impacts to vireo habitat, construction activities, including vegetation clearing, grading, and siting of staging areas, will be confined to the project footprint. In addition, vehicle access to construction sites will be via existing access routes. The project biologist will remain

on site during all construction activities in occupied vireo habitat to monitor activities and ensure proper implementation of avoidance and minimization measures outlined in this biological opinion.

Project activities are estimated to permanently and temporarily impact up to 3.77 acres and 28.64 acres of riparian vegetation, respectively (Table 1). Although construction-related vegetation removal within occupied vireo habitat will be conducted outside the vireo nesting season, vireo pairs usually return to the same breeding territory each year (Lynn and Kus 2013), and removal of a substantial portion of a vireo pair's territory will force the pair to expand their existing territory or establish a new territory. Vireos are distributed throughout much of the suitable habitat on MCBCP (Lynn and Kus 2013); therefore, it is likely that displaced vireos will be forced to compete with resident vireos when attempting to expand an existing territory or establish a new territory.

If displaced birds cannot find suitable habitat to forage and shelter in, we anticipate they will be more vulnerable to predation and otherwise may die or be injured. Vireos that successfully establish territories in adjacent habitat are expected to experience reduced productivity (e.g., delayed initiation or prevention of nest building, fewer nesting attempts per season, and/or overall reduction in reproductive output) due to reduced availability of foraging and breeding habitat and increased territorial interactions. For example, surveys conducted during the 2004 and 2006 breeding seasons on San Diego Creek in Orange County found that vireos occupying an area where habitat had been removed to address flood risk had lower productivity in the breeding season immediately following vegetation removal than 2 years later, after vegetation was allowed to recover. Only 1 fledgling (0.33 young/pair) was produced in 2004 immediately following vegetation removal, and 14 fledglings (2.33 young/pair) were produced in the same area in 2006 (Bloom 2004, Chambers Group 2006).

Permanent project impacts will primarily occur in narrow strips on either side of existing roadways. Thus, while construction-related impacts will result in an incremental increase in habitat fragmentation, they are not anticipated to increase the vulnerability of any particular locale to extirpation or create any major barriers to dispersal. Therefore, this analysis focuses primarily on the amount of habitat loss and the number of vireo pairs that will be impacted by the project. We estimate that 5 vireo territories will be substantially impacted by the project and that all 5 pairs will be displaced and experience increased mortality and/or loss of reproduction.

About 88 percent of the project-related impacts will be temporary, and temporarily impacted habitat will be restored upon completion of construction activities in each road segment. Consistent with the Riparian BO, the 3.77 acres of riparian vegetation that will be permanently impacted will also be offset by restoring riparian vegetation on MCBCP that has been degraded by nonnative riparian plant species. Thus, following completion of restoration, the project will result in no net loss in the amount or quality of vireo habitat on MCBCP.

We anticipate that restored riparian vegetation will recover and be capable of supporting vireo in about 2 to 7 years, depending on the conditions of the habitat prior to initiating restoration. Within the project footprint, some areas will be exposed to minor disturbance and will retain a

portion of the vegetation, and other areas will be completely denuded. Therefore, we expect habitat conditions in the project footprint to improve incrementally after restoration such that vireo will re-occupy some areas soon after project completion, and other areas will be re-occupied only after several years.

Impacts to 5 pairs of vireos represent a small portion (less than 1 percent) of the estimated 724 vireo territories on MCBCP as of 2013 (Lynn and Kus 2013). Similarly, the 3.77 acres of riparian vegetation that will be permanently impacted represents a fraction of the available vireo habitat on MCBCP. In addition, during the approximately 10-year project period, only a portion of the roads will be under construction at any given time, reducing the proportion of the vireo habitat that will be impacted at any point in time. Because MCBCP supports such large vireo populations and a large amount of habitat, the affected populations can sustain the temporary loss of vireo pairs and habitat resulting from the project. Vireos will remain in suitable habitat adjoining the temporarily impacted areas, and as soon as the habitat recovers sufficiently, we anticipate that it will be re-occupied by breeding vireos. Thus, the project will temporarily reduce vireo numbers and reproduction, but over time, there will be no net loss of habitat, and no long-term impacts to the number of vireo supported on MCBCP. Therefore, we do not expect this temporary reduction in vireo numbers and reproduction in the action area to appreciably reduce the numbers, reproduction, or distribution of the species on MCBCP or rangewide.

Maintenance

Of the maintenance activities addressed by this biological opinion, road resurfacing and vegetation management in non-riparian vegetation are not anticipated to affect vireos. Vegetation management during the vireo breeding season could result in destruction of nests, death or injury of nestlings and adults, and disturbance of breeding activity. However, focused surveys will be conducted in vireo habitat prior to initiation of activities, and measures will be implemented to avoid impacts to nests and young or substantial disturbance of breeding vireos. Therefore, potential effects of the maintenance activities addressed in this biological opinion are likely to be insignificant.

Habitat Restoration

Potential effects to vireo associated with restoration of riparian vegetation are addressed programmatically by the Riparian BO. Potential effects to vireo associated with restoration include occasional displacement or disturbance of foraging and dispersing vireos, but the habitat restoration plan will include measures to avoid impacts to nesting vireos, such as avoiding intensive restoration activities adjacent to active nests. Therefore, restoration activities are not anticipated to substantially interfere with vireo foraging, sheltering, and breeding behaviors, and potential effects are likely to be insignificant.

Indirect Effects

Habitat adjacent to construction and maintenance areas may be exposed to increased lighting and noise. Light that alters natural light patterns in ecosystems can indirectly affect vireo through increased predation, orientation and disorientation, and disruption of inter-specific interactions (Longcore and Rich 2004). Noise and vibrations associated with the use of heavy equipment during construction and maintenance activities have the potential to disrupt vireo behaviors in adjacent habitat. While vireos often continue to occupy areas subject to noise levels above 60 dBA, studies have documented significantly reduced reproductive success (Marine Corps 1995) and delayed reproduction (BonTerra Consulting 2000) due to noise impacts.

To minimize the impacts of lighting and noise on vireo, construction and maintenance activities will avoid the breeding season to the maximum extent feasible. If the breeding season cannot be avoided, no construction or maintenance activities will occur within 500 feet of an active vireo nest. In addition, construction activities will be avoided at night to the maximum extent feasible, and maintenance activities will be conducted during daylight hours only. Where it cannot be avoided, nighttime lighting will be shielded so that light dispersal into adjacent native vegetation is significantly reduced. No new permanent lighting along the roadways is proposed as part of this project. With implementation of the proposed minimization measures, we anticipate that vireo habitat that is occupied will continue to be used by vireo and that potential effects to vireo resulting from lighting and noise are likely to be insignificant.

Vireos may also be indirectly affected by the introduction of invasive species, increased sedimentation and erosion, and wildfire. However, the proposed project involves improvements along existing roads, so with the proposed conservation measures, including restoration of temporarily impacted areas with native plant species and invasive species control, operation of these facilities is not anticipated to result in an increased risk of invasive species and wildfire relative to existing conditions, and any change in habitat degradation associated with these factors is likely to be insignificant.

Effect on Recovery

The primary goal described in the draft vireo recovery plan (Service 1998) is the protection of existing populations; a secondary goal includes the restoration of habitat to expand existing populations. The project will impact vireos and their habitat; however all temporarily impacted habitat will be restored, and permanent impacts will be offset through restoration on MCBCP. Moreover, as indicated above, vireo numbers have increased since their original listing and the growth of the vireo population on MCBCP has been a significant part of this overall population growth. Based on its improved status, the Service has recommended the vireo be downlisted from endangered to threatened status.

Because the vireo populations are robust on MCBCP, the affected populations can tolerate the impacts, and vireos will re-populate the restored habitat; therefore, we anticipate no long-term loss of vireos or their habitat on MCBCP. The proposed habitat restoration associated with the

project, along with ongoing habitat management conducted consistent with the Riparian BO, will help sustain populations of vireo on MCBCP and support recovery of this species. Therefore, with the implementation of the proposed conservation measures, we believe that the project is consistent with the recovery strategy for vireo described in the draft recovery plan (Service 1998).

Coastal California Gnatcatcher

Construction-Related Death and Injury and Habitat Loss

As described in the "Environmental Baseline" section above, we estimate that 6 gnatcatcher territories overlap with the project footprints of roads in gnatcatcher habitat (Roads 3, 5-9, and 12) and that two pairs of gnatcatchers will be substantially impacted by the project, meaning that the project will impact CSS totaling at least 20 percent of an estimated territory for each pair. However, we anticipate that implementation of the proposed conservation measures will minimize project-related impacts to gnatcatchers.

Construction activities in CSS will occur outside of the breeding season, to the maximum extent feasible. If construction must be conducted during the breeding season, the project biologist will conduct focused surveys in gnatcatcher habitat prior to the clearing, and measures will be implemented to avoid impacts to nests and young or substantial disturbance of breeding gnatcatcher pairs. Therefore, we do not expect that gnatcatcher adults, eggs, or nestlings will be killed or injured during construction activities.

To minimize impacts to gnatcatcher habitat, construction activities including vegetation clearing, grading, and siting of staging areas will be confined to the project footprint. In addition, vehicle access to construction sites will be via existing access routes. The project biologist will remain on site during all construction activities in gnatcatcher-occupied habitat to monitor construction activities and ensure proper implementation of avoidance and minimization measures outlined in this biological opinion.

Project activities are estimated to permanently and temporarily impact up to 12.66 acres and 81.0 acres of occupied CSS, respectively (Table 1). Removal of CSS will be conducted outside the gnatcatcher breeding season, to the maximum extent feasible. However, gnatcatchers are non-migratory territorial birds, and removal of a substantial portion of a gnatcatcher pair's territory will force the pair to expand their existing territory or establish a new territory, particularly during the breeding season, when territorial boundaries are better defined (Preston *et al*. 1998). Gnatcatchers are distributed throughout much of the suitable habitat on MCBCP (Griffiths Wildlife Biology 2008); therefore, it is likely that displaced gnatcatchers will be forced to compete with resident gnatcatchers when attempting to expand an existing territory or establish a new territory.

If displaced birds cannot find suitable habitat to forage and shelter in, we anticipate they will be more vulnerable to predation and otherwise may die or be injured. Gnatcatchers that successfully establish territories in adjacent habitat are expected to experience reduced productivity (e.g., delayed initiation or prevention of nest building, fewer nesting attempts per season, and/or

overall reduction in reproductive output) due to reduced availability of foraging and breeding habitat and increased territorial interactions.

Permanent project impacts will primarily occur in narrow strips on either side of existing roadways. Therefore, these impacts will result in an incremental increase in habitat fragmentation on MCBCP, but because the impacts will be small relative to the amount of available habitat and will be spread throughout MCBCP, they are not anticipated to increase the vulnerability of any particular locale to extirpation or create any major barriers to dispersal. Therefore, this analysis focuses primarily on the amount of habitat loss and the number of gnatcatcher pairs that will be temporarily impacted by the project.

We estimate that two gnatcatcher pairs will be substantially impacted by the project, and these pairs will be displaced and experience increased mortality and/or loss of reproduction, resulting in a temporary reduction in gnatcatcher numbers and reproduction in the action area. However, as described below, most of the gnatcatcher population on MCBCP will not be impacted, and the impacted habitat and gnatcatcher population in the action area will recover over time. Thus, we do not expect the temporary reduction in the number and reproduction of gnatcatcher in the action area to appreciably reduce the numbers, reproduction, or distribution of the species on MCBCP or rangewide.

About 86 percent of the project-related impacts to gnatcatcher habitat will be temporary, and temporarily impacted habitat will be restored upon completion of construction activities in each road segment. CSS restoration areas are generally capable of supporting gnatcatchers within 4-5 years (O'Connell and Erickson 1998, Miner *et al*. 1998), but within the project footprint, some areas will be exposed to minor disturbance and will retain a portion of the vegetation, and other areas will be completely denuded. Therefore, we expect habitat conditions in the impacted areas to improve incrementally after restoration such that gnatcatchers will re-occupy some areas soon after project completion, and other areas will be re-occupied only after several years.

Permanent impacts to up to 12.66 acres of gnatcatcher habitat will be offset at a 2:1 ratio by restoring 25.32 acres of gnatcatcher habitat on MCBCP at the Lima CSS Mitigation Area. As an alternative, the Marine Corps may offset permanent impacts to CSS off MCBCP at the Buena Creek Conservation Bank at a 2:1 (for impacts to inland CSS) or 3:1 ratio (for impacts to CSS on coastal terraces). Therefore, we anticipate the project will either result in an increase in the amount of gnatcatcher habitat on MCBCP or in the conservation of gnatcatcher-occupied CSS off MCBCP but in the species' range.

The Buena Creek Conservation Bank has a relatively low density of gnatcatchers compared to portions of the habitat impacted on MCBCP by the project. This difference in density will be offset by the higher credit purchase ratio (3:1) required for project elements within the coastal terrace zone, where gnatcatchers tend to have more densely clustered territories. The purchase of conservation credits at the bank will contribute to the long-term conservation of the gnatcatcher populations in northern San Diego County (i.e., the same region as MCBCP) and support recovery of the species. In addition, while not directly connected to MCBCP, habitat in the bank

may serve as a stepping stone for dispersal between large areas of occupied gnatcatcher habitat on MCBCP and high quality gnatcatcher habitat patches to the north and east of the bank. While conservation of CSS of MCBCP will not directly benefit the gnatcatcher population affected by the project, it will contribute meaningfully to the conservation and management of the gnatcatcher and support recovery throughout its range.

Impacts to 2 pairs of gnatcatchers represents a small portion (less than 0.5 percent) of the estimated 439 gnatcatcher territories on MCBCP as of 2014 (Tetra Tech 2014). Similarly, the estimated 177 acres of gnatcatcher-occupied CSS that will be impacted, although substantial, represents a fraction of the available gnatcatcher habitat on MCBCP. In addition, during the approximately 10-year project period, only a portion of the roads will be under construction at any given time, reducing the proportion of the gnatcatcher habitat that will be impacted at any point in time. Because MCBCP supports a large gnatcatcher population and a large amount of suitable habitat, the affected populations can sustain the temporary loss of gnatcatcher pairs and habitat resulting from the project. Gnatcatchers will remain in suitable habitat adjoining the temporarily impacted areas, and as soon as the habitat recovers sufficiently, we anticipate that it will be re-occupied by breeding gnatcatchers. In addition, depending on the compensation option chosen, the project will either result in an increase in gnatcatcher habitat on MCBCP or in conservation of gnatcatcher habitat off MCBCP but within the species' range.

Maintenance

Of the maintenance activities addressed by this biological opinion, road resurfacing is not anticipated to affect gnatcatchers. Vegetation management in non-riparian habitat could result in destruction of nests, death or injury of nestlings and adults, and disturbance of breeding activity. However, focused surveys will be conducted in gnatcatcher habitat prior to initiation of activities, and measures will be implemented to avoid impacts to nests and young or substantial disturbance of breeding gnatcatchers. Therefore, potential effects of the maintenance activities addressed in this biological opinion are likely to be insignificant.

Habitat Restoration

Potential effects to gnatcatchers associated with restoration of CSS include occasional displacement or disturbance of foraging and dispersing gnatcatchers, but the habitat restoration plan will include measures to avoid impacts to nesting gnatcatchers, such as avoiding intensive restoration activities adjacent to active nests. Therefore, restoration activities are not anticipated to substantially interfere with gnatcatcher foraging, sheltering, and breeding behaviors, and potential effects are likely to be insignificant.

Indirect Effects

Habitat adjacent to construction and maintenance areas may be exposed to increased lighting and noise. Light that alters natural light patterns in ecosystems can indirectly affect gnatcatchers through increased predation, orientation and disorientation, and disruption of inter-specific

interactions (Longcore and Rich 2004). Noise and vibrations associated with the use of heavy equipment during construction and maintenance activities have the potential to disrupt gnatcatcher behaviors in adjacent habitat by masking intraspecific communication and startling birds (e.g., see Dooling and Popper 2007 for a discussion of observed effects of highway noise on birds).

To minimize the impacts of lighting and noise on gnatcatchers, construction and maintenance activities will avoid the breeding season to the maximum extent feasible. If the breeding season cannot be avoided, no construction or maintenance activities will occur within the buffer established by the project biologist for active gnatcatcher nests. In addition, construction activities will be avoided at night to the maximum extent feasible, and maintenance activities will be conducted during daylight hours only. Where it cannot be avoided, nighttime construction lighting will be shielded so that light dispersal into adjacent native vegetation is significantly reduced. No new permanent lighting along the roadways is proposed as part of this project. With implementation of the proposed minimization measures, we anticipate that gnatcatcher habitat that is occupied will continue to be used by gnatcatcher and that potential effects to gnatcatcher resulting from lighting and noise are likely to be insignificant.

Gnatcatchers may also be indirectly affected by the introduction of invasive species and wildfire. However, the proposed project involves improvements along existing roads, so with the proposed conservation measures, including restoration of temporarily impacted areas with native plant species and invasive species control, operation of these facilities is not anticipated to result in an increased risk of invasive species and wildfire relative to existing conditions, and any change in habitat degradation associated with these factors is likely to be insignificant.

Effect on Recovery

There is no recovery plan for the gnatcatcher, but MCBCP supports one of the most significant gnatcatcher populations in the region. Therefore, we have attempted to maintain a consistent approach with respect to MCBCP projects that will facilitate recovery of the gnatcatcher. In general, our approach has been to avoid and minimize impacts to gnatcatchers to the maximum extent feasible and to offset unavoidable impacts through restoration and/or conservation of gnatcatcher habitat at locations that augment existing populations and/or provide habitat connectivity. The project will result in impacts to gnatcatchers and their habitat, but all temporarily impacted habitat will be restored. Because there is a large gnatcatcher population and a large amount of gnatcatcher habitat on MCBCP, the population can tolerate the temporary impacts, and gnatcatchers will re-populate the habitat restored on MCBCP.

Permanent impacts will be offset through restoration of CSS on MCBCP or conservation of gnatcatcher-occupied CSS at the nearby Buena Creek Conservation Bank. With restoration of CSS on MCBCP to offset permanent project impacts, we anticipate an increase in the amount and quality of gnatcatcher habitat and a small increase in the gnatcatcher population on MCBCP. While conservation of CSS at the Buena Creek Conservation Bank will not directly benefit the individual gnatcatchers impacted by this project, it will benefit the population as a whole and support recovery of species. Therefore, the proposed habitat restoration or conservation in

combination with ongoing habitat management conducted consistent with the Marine Corps' INRMP for MCBCP, such as control of nonnative upland weeds, will help sustain the robust population of gnatcatchers on MCBCP and will not impede recovery of this species rangewide.

Stephens' Kangaroo Rat

Construction-Related Death and Injury and Habitat Loss

Based on the analysis provided in the "Environmental Baseline" section above, we estimate that up to 108 SKR may occur within the project footprints of Roads 5, 9, 12, 23, and 24. However, as described below, we anticipate that avoidance and minimization measures will substantially reduce the number of SKR that are killed or injured during project activities.

A project biologist will be present during construction activities to oversee and conduct measures aimed at avoiding and minimizing impacts to SKR. The project biologist will inspect the project footprint for potential burrowing habitat, burrows, and evidence of SKR. Any potential active burrows and burrowing habitat will be identified. These areas will be avoided to the maximum extent feasible and will be clearly marked on project maps and provided to the contractor. Additionally, no nighttime construction is proposed, thus eliminating the potential for impacts to SKR at night when this nocturnal species is most active.

The project biologist will coordinate with ES to determine the need for SKR exclusionary fencing and SKR trapping and relocation. Exclusionary fencing will be installed at locations adjacent to high-quality habitat where it is likely that SKR would otherwise enter the project site after construction is initiated. Trapping and translocation will only be conducted at locations where SKR can be moved outside the SKR exclusionary fencing into an area that is likely part of their home range.

With implementation of the proposed conservation measures, death or injury of many of the estimated 108 SKR in the project footprint will be avoided. Although it is difficult to estimate the proportion of SKR that will be avoided, flexibility in the location of the temporary impact areas along the roadways exists, and kangaroo rat burrows can be identified and avoided. In addition, installation of exclusionary fencing and trapping and relocation at select locations will reduce the number of SKR killed or injured. Therefore, we estimate that about 25 percent of the individuals in the project footprint (no more than 27 SKR) may be killed or injured, and an equivalent amount (no more than 27 SKR) may be captured and translocated or moved out of harm's way during project implementation. Any SKR killed in their burrows will be difficult to observe, limiting the ability to quantify SKR killed or injured during construction activities. Thus, we estimate that no more than 25 percent[23] of the SKR that are killed or

[23] Although the majority of SKR and arroyo toad mortality is anticipated to occur as a result of crushing individuals that are in burrows or aestivating underground, monitoring of a recent project in SKR habitat on MCBCP suggests that SKR are also susceptible to mortality as a result of being trapped in construction equipment and other above-ground hazards (Service 2015). Therefore, we estimate that the observed mortality of SKR will be higher than that for arroyo toads (i.e., 25 percent of the SKR mortality will be observed as opposed to 10 percent of the arroyo toad mortality).

injured (i.e., no more than 7 individuals) will be observed dead or injured as a result of construction activities.

It is possible that SKR captured, transported, and released will die or be injured during trapping or as a result of stress or handling injuries, but the frequency of such occurrences is likely to be low as the project biologist capturing and releasing the SKR will be experts in the care of small mammals. For example, during a recent SKR relocation effort on MCBCP, 21 SKR were captured and held in captivity for over 30 days with no mortality before being released (ENVIRA 2012). Therefore, we anticipate that no more than 5 percent of the 27 SKR that are captured and released (2 individuals; rounded up to the nearest whole number) will be observed killed or injured as a result of capture and release efforts.

SKR whose home range includes a substantial portion of the area of impact but are not killed as a result of construction activity will either be forced to disperse or will be trapped and relocated outside the project footprint, where they will likely experience higher mortality rates as a result of increased predation and territorial interactions with resident SKR. For example, the monthly survival rate of healthy adult Choctawhatchee beach mice (*Peromyscus polionotus allophrys*) in Florida that were translocated into occupied habitat was about 15 percent compared to a monthly survival rate of about 52 percent for resident mice (Van Zant and Wooten 2003). Multiple studies have shown that some SKR are able to survive and reproduce following translocation into unoccupied habitat that has been enhanced for SKR prior to translocation (e.g., Montgomery 1997, Shier and Swaisgood 2011, ENVIRA 2012), but we are unaware of any studies of SKR survivorship following displacement or translocation into occupied habitat such as that surrounding the project site. Based on the above analysis, we assume that all 108 SKR in the area of impact may be harmed by the loss of some portion of their primary feeding, breeding, or sheltering habitat.

Project activities are estimated to impact up to 18.28 acres of SKR habitat, including 3.18 acres of permanent impact and 15.10 acres of temporary impact. This impact represents about 4 percent of the total estimated amount of occupied SKR habitat (479 acres) on MCBCP based on the most recent basewide monitoring report (Brehme *et al*. 2013). Assuming that SKR in occupied habitat in the project footprint are in roughly the same density as the basewide population, the project will kill or injure up to about 1 percent of the total SKR population on MCBCP and will adversely affect (i.e., kill, injure, or displace) up to 4 percent of the population.

Impacts to an estimated 4 percent of the SKR population on MCBCP have the potential to have a long-term effect on the persistence of the population, but several factors are anticipated to minimize the long-term impact of the project on the SKR population on MCBCP. First, during the approximately 10-year project period, only a portion of the roads will be under construction at any given time, reducing the proportion of the SKR population that will be impacted at any point in time. Second, about 82 percent (15.10 acres) of the project-related impacts to SKR habitat will be temporary, and temporarily impacted habitat will be restored upon completion of construction activities. Impacted areas will be restored primarily by controlling nonnative weeds and annual grasses and by planting native grasses and forbes.

SKR prefer habitat with sparse vegetation, so we expect individuals to disperse into restored areas immediately following project impacts. For example, within a year following restoration of former napalm storage sites at Naval Weapons Seal Beach Detachment Fallbrook, SKR had colonized much of the restored habitat (Montgomery and CH2M HILL 2008). Because the proposed conservation measures will minimize the number of SKR killed or injured in the project footprint, we anticipate that many of the displaced SKR will be available to re-colonize the temporary impact area following project completion.

Considering that SKR are anticipated to re-colonize temporarily impacted habitat soon after project completion, the long-term effects to the population will primarily result from the permanent impacts to 3.18 acres of occupied SKR habitat, which is less than one percent of the estimated 479 acres of occupied SKR habitat on MCBCP. These impacts will occur in long linear strips along existing roadways in both the western and central core population areas for SKR. Thus, while construction activities will result in an incremental increase in habitat fragmentation, they are not anticipated to increase the vulnerability of any particular locale to extirpation or create any major barriers to dispersal.

In addition, the 3.18 acres that will be permanently impacted will be offset through expansion of up to 6.36 acres of SKR habitat on MCBCP in the Juliette SKR Management Area. As an alternative, the Marine Corps may choose to offset permanent impacts to 3.18 acres of SKR habitat by acquiring 9.54 acres of SKR credits at the Southwestern Riverside County Multi-Species Reserve Mitigation Bank. Therefore, we anticipate the project will either result in an increase in the amount of SKR habitat on MCBCP or in the conservation of SKR-occupied habitat off MCBCP but in the species' range. While conservation of SKR habitat off MCBCP will not directly benefit the SKR populations affected by the project, it will contribute meaningfully to the conservation and management of SKR and support recovery throughout its range. Based on the above analysis, including the proposed conservation measures, we do not expect project-related impacts in the action area to appreciably reduce the numbers, reproduction, or distribution of the species on MCBCP or rangewide.

Maintenance

Of the maintenance activities addressed in this consultation, only vegetation management along the roadside has the potential to impact SKR. It is possible that SKR along the road edge could be killed or injured by mowing equipment, but the vegetation management will be conducted during daylight hours when SKR are inactive. SKR could be crushed in their burrows by mowing equipment, but all mowing activities within SKR habitat will be conducted using mowing equipment that will drive along the developed and graded road surface and shoulders and will use an extendable arm to trim vegetation in the adjacent habitat. Therefore, we anticipate that the potential for maintenance activities to result in death or injury of SKR due to maintenance is discountable.

Habitat Restoration

Potential effects to SKR associated with habitat restoration include occasional displacement or disturbance of foraging and burrowing activities, but the habitat restoration plan will include measures to avoid impacts to SKR, such as avoiding intensive restoration activities adjacent to active burrows. Therefore, restoration activities are not anticipated to substantially interfere with SKR foraging, sheltering, and breeding behaviors, and potential effects are likely to be insignificant.

Indirect Effects

Habitat adjacent to construction and maintenance areas may be exposed to increased lighting, noise, and vibration. SKR is a nocturnal species, and the alteration of natural light patterns (e.g., the introduction of artificial night lighting) can attract predators and/or increase their effectiveness. However, no permanent lighting will be installed in or adjacent to SKR habitat as a result of the project. Also, nighttime construction activities will be prohibited in and/or adjacent to areas occupied by SKR and maintenance activities will be conducted during daylight hours only, thereby avoiding adverse effects of nighttime lighting. Therefore, with implementation of minimization measures, we do not anticipate that SKR will be impacted by project-related lighting.

Noise and vibrations associated with the use of heavy equipment during construction activities have the potential to disturb SKR aboveground or within their burrows and alter their normal behavior. Since all construction and maintenance activities will occur during daylight hours when SKR are belowground in their burrows, some level of increased noise and vibration is likely to reach SKR within their burrows. However, most should be substantially attenuated by transmission through the soil and is unlikely to substantially disturb SKR or cause any SKR to abandon the surrounding area. Therefore, we conclude that the effects to SKR from noise and vibration will be insignificant.

SKR may also be indirectly affected by the introduction of invasive species and wildfire. However, the proposed project involves improvement to existing infrastructure rather than creation of new facilities. In addition, temporarily impacted habitat that is occupied by listed species will be restored, including controlling non-native invasive species. Thus, any increase in habitat degradation associated with these factors is likely to be insignificant.

Effect on Recovery

The project is not anticipated to impede recovery. The permanent impacts represent a small fraction of the estimated 479 acres of SKR-occupied habitat on MCBCP and the approximately 54,909 acres rangewide (Service 2010d). While construction activities will kill or displace SKR, we expect SKR to repopulate the impact area shortly after project completion. Thus, the project is not anticipated to substantially increase the risk that the affected SKR population will be extirpated.

Moreover, the Marine Corps will implement avoidance and minimization measures to reduce potential impacts to SKR that may be present within the action area. The Marine Corps will also

restore all temporarily impacted SKR habitat and will offset permanent habitat loss by restoring or creating additional SKR habitat on MCBCP or by acquiring SKR credits at the Southwestern Riverside County Multi-Species Reserve Mitigation Bank. Therefore, depending on the compensation option chosen, the project will either increase the amount and quality of SKR habitat on MCBCP or protect and manage additional habitat within the species' range. These efforts will ensure that the project will not significantly impair conservation or recovery of SKR on MCBCP or rangewide.

A recent review of the status of the SKR (Service 2011) determined that management actions implemented since the original listing have improved that status of SKR throughout much of its distribution, and that the species is no longer in danger of extinction throughout all or a significant portion of it range. As such, the Service has recommended the species' status be downlisted from endangered to threatened. On MCBCP, Brehme *et al*. (2013) documented that while density estimates of SKR on MCBCP are highly variable based on rainfall and climate, the total area occupied on MCBCP has been relatively stable since 2007/2008.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act. We are unaware of any non-Federal actions in the area of the proposed project that may affect the species considered in this biological opinion.

CONCLUSION

After reviewing the current status of arroyo toad, vireo, gnatcatcher, and SKR, environmental baseline for the action area, effects of the proposed action, and the cumulative effects, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of the arroyo toad, vireo, gnatcatcher, or SKR. We reached these conclusions by considering the following:

All Species

- Adverse effects to all federally listed species in the action area will be reduced by implementation of the general and species-specific avoidance and minimization measures identified in the "Project Description" of this biological opinion.

Arroyo Toad

- Permanent and temporary impacts of up to 12.87 acres and 9.83 acres, respectively, of arroyo toad riparian habitat will be offset consistent with the Riparian BO. Therefore, the project will result in no net loss in the quantity or quality of arroyo toad breeding habitat on MCBCP.

- Temporary impacts of up to 6.27 acres of arroyo toad upland habitat will be restored upon completion of the project.

- Permanent impacts of up to 8.68 acres of occupied arroyo toad upland habitat will be offset by restoring riparian vegetation that has been invaded by nonnative plant species on MCBCP, thereby maintaining high quality arroyo toad breeding habitat on MCBCP. While the project will result in the permanent loss of up to 8.68 acres of arroyo toad-occupied upland vegetation, this represents a small amount of this type of habitat relative to the thousands of acres of occupied arroyo toad habitat at MCBCP and rangewide.

- Since arroyo toads are not dependent on mature riparian vegetation in either the riparian or upland environment, we expect restored areas will be re-occupied shortly following restoration efforts.

- Permanently and temporarily impacted areas will be spread throughout a large geographic area so that no particular occupied location or arroyo toad population is disproportionately impacted.

- While up to 484 arroyo toads could be present in the project footprint, we anticipate many of these arroyo toads will be moved out of the project footprint and are not expected to be killed or injured by construction activities. Despite the large number of arroyo toads that may be impacted, a much larger number of arroyo toads will remain outside the project footprint and will be able to recolonize most of the project footprint soon after completion of project activities. In addition, during the approximately 10-year project period, only a portion of the roads will be under construction at any given time, reducing the proportion of arroyo toad populations that will be impacted at any point in time. Thus, the removal of individuals from the population during construction is not anticipated to increase extinction risk of affected populations.

- With the proposed conservation measures, the project is not expected to appreciably reduce the numbers, reproduction, or distribution of the species on MCBCP or rangewide and will not impact recovery of the species.

<u>Least Bell's Vireo</u>

- Permanent and temporary impacts to up to 3.77 acres and 28.64 acres of riparian vegetation, respectively, will be offset consistent with the Riparian BO. Therefore, the project will result in no net loss in the quantity or quality of vireo breeding habitat on MCBCP. Also, we anticipate that restored areas will be suitable for vireo breeding and foraging within 2 to 7 years.

- The project will substantially impact up to 5 vireo territories, which represents less than 1 percent of the estimated 724 vireo territories on MCBCP and a fraction of the estimated 2,968 territories rangewide. In addition, during the approximately 10-year project period,

only a portion of the roads will be under construction at any given time, reducing the proportion of the vireo population that will be impacted at any point in time.

- With the proposed conservation measures, the project is not expected to appreciably reduce the numbers, reproduction, or distribution of the species on MCBCP or rangewide and is not anticipated to impact recovery of the species.

Coastal California Gnatcatcher

- Permanent impacts to up to 12.66 acres of gnatcatcher habitat will be offset by restoring 25.32 acres of gnatcatcher habitat on MCBCP, thereby resulting in an increase of gnatcatcher habitat on MCBCP. Alternatively, the Marine Corps may offset permanent impacts to 12.66 acres of CSS through conservation of up to 37.98 acres off MCBCP at the Buena Creek Conservation Bank. While this will not directly benefit the individual gnatcatchers impacted by this project, it will benefit the population as a whole and support recovery of the species.

- If the Marine Corps offsets permanent impacts to 12.66 acres of gnatcatcher habitat through conservation off MCBCP, the permanent loss of up to 12.66 acres of gnatcatcher habitat represents a small amount of this type of habitat relative to the thousands of acres of gnatcatcher habitat at MCBCP and rangewide.

- Temporary impacts of up to 81.0 acres of CSS will be offset by restoring CSS in the project footprint that is anticipated to be suitable for gnatcatcher breeding and foraging within 4 to 5 years.

- The project will substantially impact up to 2 gnatcatcher pairs, which represents a fraction of the estimated 439 gnatcatcher territories on MCBCP as of 2014 (Tetra Tech 2014) and of the roughly 2,562 pairs rangewide (Service 1993).

- With the proposed conservation measures, the project is not expected to appreciably reduce the numbers, reproduction, or distribution of the species on MCBCP or rangewide and is not anticipated to impact recovery of the species.

Stephens' Kangaroo Rat

- Temporary impacts of up to 15.10 acres of SKR habitat in the project footprint will be restored upon competition of the project.

- Permanent impacts of up to 3.18 acres of SKR habitat will be offset by restoring 6.36 acres of SKR habitat on MCBCP, thereby resulting in an increase in SKR habitat on MCBCP. Alternatively, the Marine Corps may offset permanent impacts to 3.18 acres of SKR habitat by acquiring 9.54 credits at the Southwestern Riverside County Multi-Species Reserve Mitigation Bank. While off site conservation will not directly benefit the individual SKR

impacted by this project, it will benefit the population as a whole and support recovery of the species.

- If the Marine Corps offsets permanent impacts to 3.18 acres of SKR habitat through the purchase of credits, the permanent loss of up to 3.18 acres of SKR habitat represents a small amount of this type of habitat relative to the estimated 479 acres of SKR habitat at MCBCP and over 54,909 acres rangewide.

- Since SKR prefer sparsely vegetated areas, we expect restored areas will be re-occupied shortly following restoration efforts.

- Permanently and temporarily impacted areas will be spread throughout a large geographic area so that no particular occupied location or SKR population is disproportionately impacted.

- While up to 108 SKR could be present in the project footprint, all of which may be harmed by habitat removal, with the proposed conservation measures, we anticipate that no more than 27 individuals will be killed or injured as a direct result of construction activities, and no more than 2 will be killed as a direct result of capture and relocation efforts. Despite the large number of SKR that may be impacted, a larger number of SKR will remain outside the project footprint and will be able to recolonize most of the project footprint soon after completion of project activities. In addition, during the approximately 10-year project period, only a portion of the roads will be under construction at any given time, reducing the proportion of the SKR population that will be impacted at any point in time. Thus, the removal of individuals from the population during construction is not anticipated to increase extinction risk of affected populations.

- With the proposed conservation measures, the project is not expected to appreciably reduce the numbers, reproduction, or distribution of the species on MCBCP or rangewide and is not anticipated to impact recovery of the species.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in any such conduct. Harm is further defined by us to include significant habitat modification or degradation that actually kills or injures a listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by us as an action that creates the likelihood of injury to a listed species by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and 7(o)(2) of the Act, such incidental take is not considered a prohibited taking under the Act, provided that such taking is in compliance with this incidental take statement.

AMOUNT OR EXTENT OF TAKE

Arroyo Toad

The exact distribution and population size of arroyo toads is difficult to determine due to the dynamic conditions associated with their habitat and biology and because detection of arroyo toads outside of the breeding season is very difficult. However, as described in the "Environmental Baseline" section, we estimate that up to 484 arroyo toads could occur within upland and riparian vegetation in the project footprint. We anticipate that 75 percent or 363 arroyo toads will be captured and relocated and 25 percent or 121 arroyo toads will be subject to some form of take through injury or mortality during construction activities or through stress or dehydration leading to increased mortality following capture and relocation.

Take of arroyo toad associated with construction activities is exempted as follows:

- Capture and relocation of up to 363 adult and/or juvenile arroyo toads;

- Death or injury of up to 18 adult and/or juvenile arroyo toads as a result of capture and relocation efforts, including arroyo toads entangled or trapped within exclusionary fencing; and

- Harm, death, or injury of up to 121 arroyo toads from construction activities, including permanent (12.87 acres) and temporary (9.83 acres) impacts to 22.7 acres of arroyo toad riparian habitat and permanent (8.6 acres) and temporary (6.27 acres) impacts to 14.95 acres of arroyo toad upland habitat along Roads 1, 2, 3, and 4.

The amount or extent of incidental take will be exceeded if more than 363 adult and/or juvenile arroyo toads are captured and relocated; more than 18 adult and/or juvenile arroyo toads are killed and injured as a result of trapping and relocation efforts; or more than the specified amount of arroyo toad habitat is impacted along Roads 1, 2, 3, and 4. In addition, because it is unlikely that individuals injured or killed by construction activity will be detected, the amount or extent of incidental take will be exceeded if more than 12 arroyo toads (10 percent of the anticipated 121 arroyo toads impacted) are observed dead or injured within the construction footprint of Roads 1, 2, 3, and 4.

Least Bell's Vireo

The estimated level of take for vireo is based on the number of vireo pairs estimated to occur in the project footprint and the amount of occupied habitat that will be impacted by construction activities.

Take of vireo associated with construction activities is exempted as follows:

- Take in the form of harm of up to five vireo pairs due to the permanent removal of 3.77 acres of occupied vireo habitat and the temporary removal of 28.64 acres of occupied vireo habitat along Roads 1, 6-8, 11-15, 20, 21, and 23.

The amount or extent of incidental take will be exceeded if more than the specified amount of habitat or more than five vireo territories are substantially impacted along Roads 1, 6-8, 11-15, 20, 21, and 23.

Coastal California Gnatcatcher

The estimated level of take for gnatcatcher is based on the number of gnatcatcher pairs estimated to occur in the project footprint and the amount of occupied habitat that will be impacted by construction activities.

Take of gnatcatcher associated with construction activities is exempted as follows:

- Take in the form of harm of two pairs of gnatcatchers due to the permanent removal of 12.66 acres of occupied gnatcatcher habitat and the temporary removal of 81.0 acres of occupied gnatcatcher habitat along Roads 3, 5-9, and 12.

The amount or extent of incidental take will be exceeded if more than the specified amount of habitat or more than two gnatcatcher territories are substantially impacted along Roads 3, 5-9, and 12.

Stephens' Kangaroo Rat

The exact distribution and population size of SKR is difficult to determine because their detection is very difficult due to their nocturnal and burrowing behaviors. However, as described in the "Environmental Baseline" section, we estimate that up to 108 SKR could occur in the project footprint. We anticipate that all 108 SKR may be subject to some form of take through injury or mortality during construction activities, capture and relocation efforts, and loss of their foraging and breeding habitats. With the proposed avoidance and minimization measures, we anticipate that no more than 27 SKR will be killed or injured as a direct result of construction activities. We will not be able to effectively monitor the survival of SKR that are displaced from the project footprint or the total number of SKR that are killed or injured in the construction footprint since most individuals will likely remain underground within their burrows during project implementation. Therefore, we have established levels of take based on the number of SKR trapped and relocated from the project footprint (27 SKR), observed death or injury of SKR, estimated to be one quarter of the SKR killed or injured as a result of construction activities (7 SKR), and the amount of SKR habitat that is impacted.

Take of SKR associated with construction activities is exempted as follows:

- Capture and relocation of up to 27 SKR;
- Death or injury of up to 2 SKR as a result of capture and relocation efforts, including arroyo toads entangled or trapped within exclusionary fencing; and
- Harm, death, or injury of up to 108 SKR from construction activities, including permanent impacts to 3.18 acres of SKR habitat and temporary impacts to 15.10 acres of SKR habitat along Roads 5, 9, 12, 23, and 24.

The amount or extent of incidental take will be exceeded if more than 27 SKR are captured and relocated; more than 2 SKR are killed and injured as a result of trapping and relocation efforts; or more than the specified amount of SKR habitat is impacted along Roads 5, 9, 12, 23, and 24. In addition, because it is unlikely that individuals injured or killed by construction activity will be detected, the amount or extent of incidental take will be exceeded if more than 7 SKR (25 percent of the anticipated 27 SKR impacted) are observed dead or injured within the construction footprint of Roads 5, 9, 12, 23, and 24.

EFFECT OF TAKE

In the accompanying biological opinion, we determined that these levels of anticipated take are not likely to result in jeopardy to the arroyo toad, vireo, gnatcatcher, or SKR.

REASONABLE AND PRUDENT MEASURES

The Marine Corps will implement conservation measures as part of the proposed action to minimize the incidental take of arroyo toad, vireo, gnatcatcher, and SKR. In addition to these conservation measures, the following reasonable and prudent measures are necessary to monitor and report the effects of the incidental take on arroyo toad, vireo, gnatcatcher, and SKR:

1. The Marine Corps will submit final project designs to the CFWO prior to project implementation to ensure that impacts have been avoided and minimized to the maximum extent feasible and that anticipated construction and maintenance impacts will be consistent with those analyzed in this biological opinion.

2. The Marine Corps will monitor and report on consistency with the exempted amount or extent of take arroyo toad, vireo, gnatcatcher, and SKR associated with construction and maintenance activities.

TERMS AND CONDITIONS

To be exempt from the prohibitions of section 9 of the Act, the Marine Corps must comply with the following terms and conditions which implement the reasonable and prudent measures described above.

All Species

TC-1.1 At least 14 days prior to initiating construction activities along a particular access road that will directly impact habitat that supports listed species or has a high potential to support listed species, the Marine Corps will submit to the CFWO (via email or mail) a figure showing the impact area for each road segment based on final project designs relative to the impact area depicted in the BA. The figure will include vegetation mapping and all federally listed species observations from basewide and project-specific surveys and a table showing the final permanent and temporary impacts by habitat type.

Arroyo Toad

TC-2.1 Prior to initiating construction activities along a particular access road in suitable arroyo toad riparian and upland vegetation, the Marine Corps will provide to the CFWO (via email or mail) the results of the pre-construction arroyo toad surveys, including the number of arroyo toads captured and relocated in association with the individual project, the cumulative arroyo toads captured and relocated as a result of completed projects, the project-specific and cumulative number of individuals killed or injured during capture and relocation efforts, and a map indicating where arroyo toads were captured and released relative to the project area. The purpose of this notification is to ensure that the impacts to arroyo toad from the project do not exceed the exempted amount of take based on number of individuals captured within the project footprint.

TC-2.2 Within 30 days of completing construction activities along a particular access road, the Marine Corps will notify the CFWO (via email or mail) of any arroyo toads that were captured and relocated during construction activities. This notification will include the number of arroyo toads captured and relocated in association with the individual project, the cumulative arroyo toads captured and relocated as a result of completed projects, the project-specific and cumulative number of individuals killed or injured during capture and relocation efforts, the project-specific and cumulative number of individuals killed or injured as a result of construction activities, and a map indicating where arroyo toads were captured and released relative to the project area. The purpose of this notification is to ensure that the impacts to arroyo toad from the project do not exceed the exempted amount of take based on number of individuals captured and relocated, number of individuals killed or injured during capture and

relocation, or number of individuals killed or injured as a result of construction activities.

TC-2.3 Within 30 days of completing removal of arroyo toad riparian and upland vegetation along a particular access road, the Marine Corps will notify the CFWO (via email or mail) of the total amount of arroyo toad riparian and upland habitat removed in association with construction activities along the access road and the cumulative amount of riparian and upland vegetation removed as a result of entire completed project. The purpose of this notification is to ensure that the impacts to arroyo toad habitat from the project do not exceed the exempted amount or extent of take based on impacts to arroyo toad habitat.

TC-2.4 If death or injury of any arroyo toads is observed in association with capture and relocation activities or construction or maintenance activities along a particular access road, the Marine Corps will notify the CFWO within 1 business day and submit a written report (via email or mail) describing the incident within 2 business days so that the activities resulting in take can be reviewed to determine if additional protective measures are required.

Least Bell's Vireo

TC-2.5 Prior to initiating construction activities along a particular access road, the Marine Corps will review the latest annual basewide survey data to verify that no more than five vireo territories (total) will be substantially impacted by the project (i.e., more than 20 percent of a pair's territory will be impacted) by the project. Prior to initiating construction activities, the Marine Corps will provide to the CFWO a map (via email or mail) showing the most recent distribution of vireos relative to the project footprint, an estimate of the number of vireo territories that will be impacted by the project, and the cumulative total of vireo territories impacted by the project to date. The purpose of this notification is to ensure that impacts to vireos from the project do not exceed the exempted amount of take based on the number of vireo territories in the project footprint.

TC-2.6 Within 30 days of completing removal of vireo habitat along a particular access road, the Marine Corps will notify the CFWO (via email or mail) of the total amount of vireo habitat removed in association with each access road and the cumulative amount of riparian vegetation removed as a result of entire completed project. The purpose of this notification is to ensure that the impacts to vireo habitat from the project do not exceed the exempted amount or extent of take based on impacts to vireo habitat.

TC-2.7 Prior to initiating maintenance activities in occupied vireo habitat during the vireo breeding season, the Marine Corps will provide to CFWO the results of pre-project vireo surveys and a map showing the locations of any vireo nests within 500 feet of

the maintenance footprint. The purpose of this notification is to ensure that impacts to vireo from the project do not exceed the exempted amount or extent of take.

Coastal California Gnatcatcher

TC-2.8 Prior to initiating construction activities along a particular access road, the Marine Corps will review the latest annual basewide survey data to verify that no more than one gnatcatcher territory will be substantially impacted by the project (i.e., more than 20 percent of a pair's territory will be impacted) by the project. Prior to initiating construction activities, the Marine Corps will provide to the CFWO a map (via email or mail) showing the most recent distribution of gnatcatchers relative to the project footprint, an estimate of the number of gnatcatcher territories that will be impacted by the project, and the cumulative total of gnatcatcher territories impacted by the project to date. The purpose of this notification is to ensure that impacts to gnatcatchers from the project do not exceed the exempted amount of take based on the number of gnatcatcher territories in the project footprint.

TC-2.9 Within 30 days of completing removal of CSS along a particular access road, the Marine Corps will notify the CFWO (via email or mail) of the total amount of CSS removed in association with construction activities along the access road and the cumulative amount of CSS removed as a result of entire completed project. The purpose of this notification is to ensure that the impacts to gnatcatcher from the project do not exceed the exempted amount or extent of take based on impacts to gnatcatcher habitat.

TC-2.10 Prior to initiating maintenance activities in occupied gnatcatcher habitat during the gnatcatcher breeding season, the Marine Corps will provide to CFWO the results of pre-project vireo surveys and a map showing the locations of any gnatcatcher nests within 500 feet of the maintenance footprint. The purpose of this notification is to ensure that impacts to gnatcatcher from the project do not exceed the exempted amount or extent of take.

Stephens' Kangaroo Rat

TC-2.11 Prior to initiating construction activities along a particular access road, the Marine Corps will provide the results of the pre-construction SKR surveys efforts to the CFWO (via email or mail). The purpose of this notification is to ensure that the impacts to SKR from the project do not exceed the exempted amount of take based on the estimated number of SKR in the project footprint.

TC-2.12 Within 30 days of completing removal of SKR habitat along a particular access road, the Marine Corps will notify the CFWO (via email or mail) of the total amount of SKR habitat removed in association with construction activities along the access road and the cumulative amount of SKR habitat removed as a result of entire completed

project. The purpose of this notification is to ensure that the impacts to SKR from the project do not exceed the exempted amount or extent of take based on impacts to SKR habitat.

TC-2.13 Within 30 days of completing construction activities along a particular access road, the Marine Corps will notify the CFWO (via email or mail) of any SKR that were captured and relocated during construction or maintenance activities. This notification will be provided each time construction or maintenance activities along a particular access road is completed and will include the number of SKR captured and relocated in association with the individual project, the cumulative SKR captured and relocated as a result of completed projects, the project-specific and cumulative number of individuals killed or injured during capture and relocation efforts, the project-specific and cumulative number of individuals killed or injured as a result of construction activities, and a map indicating where SKR were captured and released relative to the project area. The purpose of this notification is to ensure that impacts to SKR from the project do not exceed the exempted amount of take based on number of individuals captured and relocated, number of individuals killed or injured during capture and relocation, or number of individuals killed or injured as a result of construction activities.

TC-2.14 If death or injury of SKR is observed in association with capture and relocation activities or construction or maintenance activities along a particular access road, the Marine Corps will notify the CFWO within 1 business day and submit a written report (via email or mail) describing the incident within 2 business days so that the activities resulting in take can be reviewed to determine if additional protective measures are required.

DISPOSITION OF SICK, INJURED, OR DEAD SPECIMENS

Upon locating dead, injured, or sick individuals of threatened or endangered species, initial notification must be made to our Division of Law Enforcement in either San Diego, California, at 619-557-5063, or in Torrance, California, at 310-328-6307. The CFWO should also be notified via telephone (760-431-9440) and in writing via email or mail.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. We have the following conservation recommendations (CR):

CR 1. Instead of installing Arizona crossings with culverts, we recommend that bridges spanning the entire width of the streambed be installed whenever such crossings are

necessary. In particular, we recommend that bridges be installed at locations where roads cross arroyo toad breeding habitat. Bridges would minimize mortality of arroyo toads that may be present on wet crossings and reduce potential effects of the crossings on stream hydrology and sediment transport.

CR 2. We recommend that maintenance activities along the 20 roads addressed by this consultation be conducted outside of the breeding seasons for vireo and gnatcatcher (estimated to be February 15 to August 31).

REINITIATION NOTICE

This concludes formal consultation on the 24 Roads project as outlined in materials submitted to us. As provided in 50 CFR §402.16 reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; and (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

If you have any questions regarding this letter, please contact Jonathan Snyder, Division Chief, at 760-431-9440, extension 307.

Sincerely,

G. Mendel Stewart

G. Mendel Stewart
Field Supervisor

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APPENDIX C
DELINEATION OF WETLANDS AND WATERS OF THE U.S. REPORT

Delineation of Wetlands and Other Waters of the U.S.

24 Range Access Road Repairs

Marine Corps Base, Camp Pendleton, California

Prepared by TEC, Inc.
1819 Cliff Drive, Suite F
Santa Barbara, CA 93109

March 2008

DELINEATION OF WETLANDS AND OTHER WATERS OF THE U.S. FOR 24 RANGE ACCESS ROAD REPAIRS

MARINE CORPS BASE, CAMP PENDLETON CALIFORNIA

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1 Introduction

The purpose of this report is to document the occurrence of wetlands and other potential waters of the U.S. that may be subject to the regulatory jurisdiction of the U.S. Army Corps of Engineers (USACE) under section 404 of the Clean Water Act (33 CFR, parts 320-330), in areas that may be affected by the proposed action. The proposed action is to repair and refurbish 24 range access roads located throughout Marine Corps Base (MCB) Camp Pendleton, California. The proposal consists of a variety of repair designs including regrading/resurfacing, slope stabilization, signage, culverts, drainage ditches, rip rap protection, and all-weather crossings.

The determinations herein are subject to verification by the Land Management Branch of Marine Corps Base (MCB) Camp Pendleton, by Naval Facilities Engineering Command Southwest (NAVFAC SW), and ultimately by the USACE.

Under section 404 of the Clean Water Act, wetlands are defined as areas that are "inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas." Wetlands are recognized as a special aquatic site under the section 404(b)(1) guidelines, and a "no net loss" policy continues to guide federal regulatory actions affecting wetlands under section 404.

Section 404 wetlands are identified and delineated according to the USACE's (1987) Wetlands Delineation Manual, which requires that, under normal conditions, positive indicators of wetland hydrology, soil, and vegetation are all present. In 2006, USACE released the Arid West Regional Supplement (USACE 2006). The Regional Supplement provides additional technical guidance for identifying and delineating wetlands, while accounting for regional climate, geology, soils, and hydrology in the southwestern states and southern California.

The jurisdictional limits of section 404 of the Clean Water Act extend to 1) **navigable waters,** which are all waters subject to the ebb and flow of the tides, and waters that are presently used, have been used in the past, or may be susceptible for use to transport interstate or foreign commerce; 2) **tributaries to navigable waters within the limits of ordinary high water**, defined as a line on the shore or other evidence that was "established by the fluctuations of water and indicated by physical characteristics such as clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas" (33 CFR, part 328.3); and **3) wetlands adjacent to navigable waters and their tributaries**.

Navigable waters, their tributaries, and adjacent wetlands are specified as jurisdictional waters in the CWA. However, the exact definition of tributaries and adjacent wetlands is a matter of some debate. The situation is further complicated in a Mediterranean climate, in which water bodies are highly variable both seasonally and annually.

The project area was examined in the context of recent case law SWANCC v United States (121 S. Ct. 751; 2001) and Rapanos et al. v. United States (126 S.Ct.2208; 2006) and guidance specific to the Arid West region of the United States (USACE 2006). The decisions from these references have special bearing on the extent of jurisdictional limits over water bodies and wetlands.

Water bodies with a significant nexus to traditional navigable waters are considered jurisdictional. Generally, the EPA and USACE will not assert jurisdiction over swales, erosional features, and ditches wholly in uplands that do not carry a relatively permanent flow of water. For ephemeral waters in the arid west, the jurisdictional determination can be based on evidence of a significant nexus to downstream waters. A significant nexus may be based on flow characteristics of a water body, ecological functions, and potential effects on chemical, physical, and biological integrity of downstream waters.

The jurisdictional limit extends to wetlands adjacent to jurisdictional water bodies. As defined in the legislature and case law, adjacency includes contiguous wetlands and wetlands that are similarly situated or neighboring, but not necessarily directly abutting another water body.

Isolated bodies of water, including wetlands, without a relationship to interstate commerce or hydrologic connection to a water of the U.S., are generally not considered jurisdictional under current federal policy. Jurisdiction may be asserted over some intra-state, isolated waters where a distinct relationship to some other facet of interstate commerce is evident [33 CFR 328.3(a)(3)]. The small roadside drainages in the current proposal do not support any activity that would trigger a connection with interstate commerce, but the project was reviewed with this consideration in mind.

2 Methodology

The survey areas have been configured at each proposed repair or refurbishment project along the 24 access roads. The survey area includes an additional 100-ft buffer extending from the edge of each project footprint. The 100-ft buffer is included to capture incidental effects and to accommodate future modifications that may be required as the project is designed and implemented. The actual limits of construction and disturbance may be smaller based on topography, geology, hydrologic conditions, or vegetation surrounding the project sites, but it is presumed that 100 ft is more than adequate for general planning purposes. The 100-ft buffer was reduced in a small number of cases where steep slopes, incised drainages, or large paved roads provide a distinct boundary around the project footprint.

Initial inspection was conducted at the sites in fall/winter 2006. Site visitation indicated the potential presence of wetlands or other jurisdictional waters of the U.S. at several areas along the roadways subject to repair action. Full wetland delineation was conducted in from December 2006 through August 2007, during and following the winter rainy period. Water bodies in the project area were evaluated for proximity to other relatively permanent water bodies, potential to carry floodwaters and/or pollutants downstream, and relative continuity of aquatic and/or riparian habitat. Precipitation during 2006 and 2007 was below average; the analysis of field data accounts for this.

Each drainage area constituting a potential water of the U.S. overlapped by the Proposed Action was evaluated as a potential wetland or other water of the U.S. Jurisdictional wetlands were identified using the 3-parameter approach of the USACE (1987) Wetlands Delineation Manual and additional technical guidance provided in the Arid West Regional Supplement (USACE 2006), which may be consulted for additional details on specific criteria. Jurisdictional wetlands have, under normal conditions, positive indicators of wetland hydrology, hydric soils, and hydrophytic vegetation. Each criterion is explained briefly below.

- Wetland vegetation is defined as the prevalence of hydrophytic vegetation, meaning that the dominant species comprising the plant community within the area under consideration are adapted to life in saturated soil conditions. Meeting this criterion requires that more than 50% of the dominant plant species have at least facultative (FAC, FACW, or OBL) wetland indicator status,

based on the National List of Plant Species that Occur in Wetlands (Reed 1988). The updated plant list (USFWS 1996) is not formally approved, but was consulted for species that are insufficiently described in the 1988 list. Dominant species were identified with tree, shrub, herb, and vine layers according to the "50/20 Rule" (USACE 1987, 2006).

- Wetland hydrology is present when a site has a continuing hydrologic regime that provides periods of inundation or soil saturation during the growing season. Observations can include direct observation of inundation/saturation within 12 inches of the surface during the growing season, or other indicators of inundation/saturation such as flow lines, sediment deposits, drainage patterns, water-stained leaves, and oxidized root channels (see USACE 1987, 2006 for further discussion). The indicators of wetland hydrology may be observable throughout the year. However, observations during or shortly after the rainy season provide stronger indicators of the presence or absence or recent inundation/saturation events. In the Arid West region, climatic variability throughout the year and among years may obscure indicators of wetland hydrology during drought, or result in "false positives" during unusually wet periods. As a result, recent climate conditions and soil and vegetative features that may more accurately reflect long-term conditions all need to be considered in evaluations of wetland hydrology (USACE 2006).
- The presence of hydric soils is determined by excavating a soil pit at least 12 inches deep and evaluating the soil for indicators of persistent saturated conditions. Such indicators include high organic content or organic streaking in sandy soils, and gleyed or low chroma colors and mottling in the soil due to reduced iron and/or magnesium (see USACE 1987, 2006 for further discussion).

Vegetation is the most obvious indicator of potential jurisdictional wetlands. Coastal sage scrub, coyote brush scrub, and upland grassland communities found within the study area are dominated by non-wetland plants and are not jurisdictional wetlands. No further evaluation of potential wetlands was conducted in areas dominated by non-wetland plant species. Such areas may include unvegetated waters of the U.S., but they are not wetlands. These areas were inspected for evidence of drainage channels or pooling water.

The study area also contains areas of mixed willow scrub, mulefat scrub, oak woodlands, sycamore floodplains, and mixed grasslands. These plant communities were inspected for drainage channels, standing water, or evidence of prolonged saturation. At points within potential wetlands, based on vegetation and proximity to a source of inundation or saturation such as a channel for flowing water, USACE Arid West Wetland Determination data forms were completed to determine whether the plant community in question was or was not a jurisdictional wetland. Consistent with the protocol, 1) vegetation was evaluated as described above using the 50/20 rule to determine the dominance and prevalence of hydrophytic vegetation; 2) hydrology was evaluated by visual observations and soils characteristics (see next item); and 3) soil characteristics were evaluated by digging a pit at least 12 inches deep (the rooting zone of vegetation) and carefully evaluating soil texture, color (by reference to color charts), and other features. Using the above criteria, wetlands and other potential waters of the U.S. were identified and delineated within or in the vicinity of the road improvement projects.

As discussed in the Introduction above, the jurisdictional status of seasonally ponded depressions hinges on whether they are important to interstate commerce, e.g., are adjacent to and/or hydrologically connected to a jurisdictional water of the U.S. To make this determination, each wetland was inspected to assess its potential connection downstream to a water of the U.S. For a non-wetland area to be confirmed as a water of the U.S., at minimum, both of the following two indicators had to be observable (33CFR 328):

- Evidence of flow in a defined channel, including actual surface water flow and bed-and-bank topography, an ordinary high-water mark, differences in substrate or vegetation associated with scouring, and deposits of sediment or vegetative debris associated with flowing water.

- Evidence of a direct connection, either by way of a continuing channel down-gradient, or a connecting jurisdictional wetland, to another water body that is clearly a water of the U.S. by virtue of its connection to navigable waters.

Note that these criteria can be indicative of wetland hydrology, but they relate to only one of three parameters defining wetlands.

A sub-meter geographic positioning system (GPS) was used to map potential jurisdictional features. Areas which were inaccessible due to steep slope or dense vegetation were mapped using visual observation combined with topographic maps, existing GIS data, digital aerial photographs taken in 2003 and 2007, and other natural resource data provided by MCB Camp Pendleton. Representative points were sampled in the field and extrapolated to inaccessible areas. Topographic maps and existing hydrologic data from MCB Camp Pendleton were used in tandem with the field evaluation to determine connectivity with downstream water bodies.

Areas with jurisdictional features, together with the project footprint and a plant community map prepared for the project site by TEC, are plotted onto the 2003 aerial photographic base map at a scale of 1 inch equals 400 feet. Previous wetland delineation conducted at Road 8 in 2005 and 2006 was used to supplement and verify the field condition in 2007. Supporting data forms and photographs are attached in Attachments 1 and 2.

3 Results

There are several drainages, creeks, and tributaries in the project area. In most cases, the drainages represent jurisdictional waters, but not wetlands. Prominent bed-and-bank topography is evident in the drainage channels with scoured banks and sediment deposits. The roadside ditches and channels run downstream to larger water bodies. The drainages showed evidence of flow and hydrologic connectivity with downstream water bodies, but very few sites had standing water. The jurisdictional limits were often lost at culverts; in these cases, the jurisdictional feature stops at the culvert opening. In other cases, a well-defined channel continues upstream from the culvert and the jurisdictional limit crosses through the culvert under the roadway.

The proposed project would require large stream modifications at a few locations. The largest jurisdictional stream crossings in the project area are:

- Road 1 passes through San Onofre Creek, a jurisdictional water. The all-weather crossing (AWC) proposed at this location would likely require dredge, cut, and fill.
- Road 2, along a San Mateo Creek tributary, would use AWCs to cross the jurisdictional water.
- Road 4 runs along Talega Creek, a tributary of San Mateo Creek. At one point, the road is almost completely washed away by the creek crossing. A resurfacing and slope stabilization project would require work to be performed within the boundaries of the jurisdictional water.
- Road 14 crossed Pilgrim Creek at an existing bridge. The bridge would not be modified, but the road leading to it would be resurfaced up to the boundary of the jurisdictional waters.

A small number of seasonally ponded depressions were found in road ruts and other manmade excavations along some of the roads. The ponded depressions did not support hydrophytic vegetation, were isolated from the other drainages and did not flow into other waterways; thus, the depressions were considered non-jurisdictional and are not delineated further in this report.

Riparian species such as mulefat and arroyo willow were common in many drainages, but few sites showed a true hydrophytic plant community and hydric soils. The eroded ditches and roadside culverts provide conveyance and drainage with little chance to retain ponding water. Soils in the drainage channels were often sandy and well-drained. Small areas of wetlands were identified and delineated at Roads 8, 9, 10, 14, and 21. The wetlands are within or adjacent to jurisdictional water bodies and are, therefore, also considered jurisdictional.

A description of each road is provided below. A majority of the roads cross over ephemeral drainages and intermittent stream channels that drain downstream. Figure F-1 provides a watershed map of MCB Camp Pendleton showing the road locations and major drainage patterns.

Road 1

Road 1 is located south of Basilone Road in the lower reaches of the San Onofre Watershed. It crosses the mainstem of San Onofre Creek. At the road crossing, San Onofre is an intermittent stream.

Road 2

Road 2 runs along San Mateo Canyon, located within the San Mateo watershed. The road crosses over several intermittent upland tributaries and ephemeral drainage ditches that drain downstream to San Mateo Creek.

Road 3

Road 3 runs along Jardine Canyon, which contains a seasonal tributary to San Onofre Creek. The road is found within the San Onofre watershed and crosses over ephemeral upland tributaries and drainage ditches.

Road 4

Road 4 is located in the San Mateo watershed. Road 4 runs along Talega Creek, an intermittent stream which drains to Cristianitos Creek, a major tributary to San Mateo Creek. A large, scoured road crossing is washed out by the creek crossing and proposed for repair.

Road 5

Road 5 crosses an intermittent drainage that flows parallel to Basilone Road and drains southwest to the Santa Margarita watershed. The drainage channel is conveyed through culverts under the dirt road.

Road 6

Road 6 runs along Piedra de Lumbre Canyon which contains Pulgas Lake and Piedra de Lumbre Creek. The canyon, which is located in the Las Flores watershed, drains to Las Pulgas Creek and eventually to Las Flores Creek. The road crosses the ephemeral creek bed and drainage ditches found in the canyon.

Road 7

The lower portion of Road 7 is located in Horno Canyon, containing an ephemeral stream which drains to the coast. This portion of the road crosses the ephemeral creek bed and drainage ditches found in the canyon. The upper portion of the road runs along the ridge that separates the Las Flores and San Onofre watersheds.

Road 8

The wetland at Road 8 is adjacent to Las Flores Creek, which flows from the east along Red Beach Road. Wetlands alongside Red Beach Road were delineated previously in 2006. Additional field work was performed in 2007 to address the current project area.

The main drainage of Las Flores Creek is a braided stream channel with a hydrophytic plant community characterized by riparian and wetland species. Hydrophytic vegetation, hydric soils, and wetland hydrology were present within the swale, but not above the eroded soil line. Wetlands were delineated surrounding the hydrophytic plant community and drainage patterns. Inside the concrete box culvert, some wetland vegetation is present in a thin layer of soil sediments. The soil is only a few inches deep above the concrete floor. This part of the channel is considered a jurisdictional water of the U.S., but not a wetland.

Sediment bars and the banks of Las Flores Creek form a freshwater marsh and are populated to varying degrees by wetland vegetation. Data forms were completed at four points along the Creek. Hydrophytic vegetation, hydric soils, and wetland hydrology were present in the sediment bars and within the first eroded terrace adjacent to the stream. These areas were determined to be jurisdictional wetlands. The second eroded terrace did not show evidence of all three wetland parameters and is not considered a jurisdictional wetland. However, the second terrace is within a drift line of plant debris and a high-water mark as indicated by scoured sand and fine sediment deposits. The second stream terrace is a jurisdictional water of the U.S., as bounded by the high-water mark.

Las Flores Creek captures runoff from three metal pipe culverts to the east of the railroad. Runoff from the railroad platform and the old dirt roadway flows through a channel to the culverts, where the channel joins Las Flores Creek. Standing water was present in the center of the channel in summer. The wetted channel was several inches deep and 0.5 to 4 ft wide through the study area. Hydrophytic vegetation, hydric soils, and wetland hydrology were present in the trough of the channel. Outside of the trough, upland species (*Baccharis pilularis*) become more dominant, while wetland plants are absent. The drift line, indicating wetland hydrology, ends at approximately the same location as the plant community boundary. Wetland determination was made following the edge of the drift-line and wetland plant community.

The mouth of Las Flores Creek is recognized by MCB Camp Pendleton as an estuarine management zone. The plant community is dominated by cattails (*Typha* spp.) and bulrush (*Schoenoplectus* spp.). Immediately upslope of the cattails, the vegetation changes to a patchily distributed mosaic of pickleweed (*Salicornia virginica*), alkali heath (*Frankenia salina*), and willows. The margin of the jurisdictional wetland was delineated at the border between the lower cattail-pickleweed-alkali heath communities and the upper willow community.

Road 9

The wetland at Road 9 is located in a low-lying fold in the topography. The wetland channel is within the upper reaches of the Aliso Canyon watershed. The low area at the project site forms a channel with a culvert crossing under Road 9. The plant community is dominated by facultative wetland plants: hemlock (*Conium maculatum*), mulefat (*Baccharis salicifolia*), and mugwort (*Artemisia douglasiana*). The soil profile included redoximorphic mottles and a depleted soil matrix, indicating periods of inundation and anoxia. Root channels were also oxidized.

Drift patterns were evident in the dense vegetation downstream (south) of the road culvert. The wetland boundary is delineated at the limits of wetland hydrology, where the drainage channel becomes smoother and fennel (*Foeniculum vulgare*) becomes more dominant in the plant community.

On the upstream (north) side of Road 9, the landscape was burned, likely within the last year. This recent burning may have obscured drift lines or high water marks. The wetland boundary was delineated in this area based on surviving woody vegetation and respouting hydrophytic specimens.

Road 10

Road 10 passes through or near a number of wetland channels and adjacent seeps. At the western end of Road 10, a drainage channel passes through the road and the substrate is washed out. Although this exact area does not appear to be part of the initial project proposal, this area may require repair in the future. Wetland points were sampled within the drainage and along the adjacent uplands. Soil in the drainage was heavy clay and very compacted. Bright redox features are present in the upper strata. Vegetation is dominated by *Juncus effusus*, an obligate wetland species. The wetland vegetation and redox features are lost in the adjacent upland.

Wetland and riparian plant species run along the course of the drainage in both directions. The drainage runs downstream, across Road 10, eventually leading to the north fork of San Onofre Creek. This drainage feature continues upstream along Road 10. Although the bed-and-bank structure is intermittent, a hydrologic connection can be inferred in wet years. The intermittent channel connects with the fishing pond near Case Springs. The channel is delineated as a jurisdictional water of the U.S. where wetland vegetation and hydric soil indicators are sparse, but a channel is present.

A hillside seep was delineated alongside this drainage. At this location, a distinctive stand of mulefat, *Juncus effusus*, and *Oenothera elata*, emerge from a plant community that is otherwise dominated by exotic upland grasses. The soil pit within the seep showed redoximorphic features. Because the seep area is located alongside the channel, the site is considered an adjacent wetland. This area is at the fringes of the 100-ft project buffer and would not necessarily be directly affected by proposed construction.

Further east on Road 10, the drainage leading into the fishing pond shows wetland indicators. Although the north side of the roadway was recently burned, resprouting wetland vegetation is present. The site shows indicators of frequent inundation with alternating dry periods. The drainage is delineated as a jurisdictional wetland.

At two locations along the road shoulder, wetland seeps and ditches are present. These areas are strongly dominated by the same vegetation community (*Juncus effusus*, *Oenothera elata*) noted in wetlands at the drainage crossing and hillside seep. The soil type is equivalent and local hydrology collects and diverts water to these locations. The road platform itself and off-road vehicle tracks next to the road appear to change the drainage pattern slightly, obscuring the hydrologic connection with downstream waters. However, outside of the disturbed road corridor, the drainage channels resume, eventually leading downstream to San Onofre Creek. These seep and diversion areas are delineated as jurisdictional wetlands.

Road 11

Road 11 runs to the southeast from Basilone Road in Las Pulgas Canyon along Las Pulgas creek, which drains to Las Flores Creek. The road runs parallel to the creek channel and is hydrologically separated from it by an old road bed. A single culvert drains under the road to the main stream channel at Basilone Road.

Road 12

Road 12 runs along Aliso Canyon in the Aliso watershed. The road crosses the Aliso Creek bed and ephemeral drainage ditches within the canyon.

Road 13

Road 13 is located just north of Basilone Road in the south fork of San Onofre Canyon. It is located next to and crosses an ephemeral tributary to San Onofre Creek.

Road 14

The wetlands at Road 14 are associated with Pilgrim Creek. At the metal bridge crossing over Pilgrim Creek, the vegetation within the creek channel is hydrophytic, dominated by willows, spikerush (*Eleocharis macrostachya*) and other herbaceous wetland obligates. The soil was saturated due to close proximity to the main stem of Pilgrim Creek. This area was delineated as a jurisdictional wetland, while the main Creek channel is a jurisdictional water of the U.S.

Road 14 runs along a tributary channel to Pilgrim Creek. Ground cover is sparse due to a thick oak canopy. Further upstream, several wetland patches were delineated along Pilgrim Creek tributaries. These wetland patches are moist areas within the creek channel where hydrology and soil conditions promote the accumulation of water. The soil is high in organic matter and is nearly black (10 YR 2/1) in color. The fine textured soil in the lower horizon contained a small number of iron and manganese concretions. The wet pools along the tributary were delineated as wetlands, while the remainder of the tributary in the project area is a jurisdictional water of the U.S.

Wetlands and waters of the U.S. were delineated at the southeastern end of Road 14, outside of the project area and 100-ft buffer. These areas were surveyed to identify the drainage network and wetland indicators in the general project vicinity. The proposed action is not likely to affect these areas unless additional road repairs are amended to the project.

Road 15

Road 15 connects Horno Canyon with Piedra de Lumbre Canyon, intersecting Roads 6 and 7. The southeastern end of the road crosses ephemeral tributaries which drain to Pulgas Lake and Las Flores Creek. The road runs northeast from Pulgas Lake and ends near Basilone Road, crossing small ephemeral waters that lead to San Onofre watershed.

Road 16

Road 16 is located in the San Mateo watershed north of San Mateo Creek. The road crosses over ephemeral upland tributaries and drainage ditches that drain to San Mateo Creek.

Road 17

Road 17 runs along a high ridge in the upper reaches of the Las Flores watershed. The topography is steep and rocky. No major stream channels or ephemeral water bodies are located in the project area. Surface drainage is conveyed off of the roadway into the surrounding landscape without defined channels.

Road 18

Road 18 runs north from Basilone Road, crossing the Aliso watershed and then continuing along the ridge that separates the Santa Margarita watershed from Aliso and Las Flores watersheds.

Road 19

Road 19 intersects and runs to the north of Basilone Road in the San Onofre watershed. It is located in the south fork of San Onofre Canyon and is next to an ephemeral tributary to San Onofre Creek, which it crosses.

Road 20

Road 20 is located between Roads 13 and 19 north of Basilone Road in the San Onofre watershed along the south fork of San Onofre Canyon. It is located next to and crosses an ephemeral tributary to San Onofre Creek.

Road 21

Road 21 runs along a tributary to the south fork of San Mateo Creek. Two culverts running under the road empty to the west in a sloping wet meadow. The plant community is mostly grassy and herbaceous, although occasional mulefat are present. Spikerush and giant wildrye (*Leymus triticoides*) dominate the herbaceous layer. The soil was saturated at a depth of 6 inches, despite no recent rainfall. The water table was not evident in the 16-inch soil excavation. The soil profile included distinct mottles and finer texture with depth.

The wet meadow was delineated as a jurisdictional wetland based on its wetland indicators and adjacency to the San Mateo Creek tributary. Downslope of the wet meadow, the tributary opens with evident bed-and-bank structure. The wet meadow is not directly contiguous with the banks of the tributary, but lies within 20 to 30 feet. Hydrologic connectivity is established based on the wetland indicators, sloping topography, and soil saturation.

The wet meadow was delineated in early spring. The meadow may be colonized by exotics and annual species later in the year, making the area difficult to distinguish from the surrounding landscape during dry months.

Table 1 summarizes the extent of jurisdictional and other waters across all roads in the project area and 100-ft buffer. To control for sinuosity in the drainages and wetlands, the measurements of linear distance are approximated using the central axis of the water body running in the direction of flow.

Road 22

Road 22 is located in the San Onofre watershed. It is in San Onofre Canyon which intersects Jardine Canyon and Road 3. The road crosses the ephemeral creek bed and drainage ditches which drain to San Onofre Creek.

Road 23

Road 23 is located in Las Pulgas Canyon north of Basilone Road at the intersection of Las Pulgas Road. The road crosses over ephemeral upland tributaries and drainage ditches which drain to Las Pulgas Creek and eventually to Las Flores Creek.

Road 24

Road 24 intersects Basilone Road east of Roads 23 and 11, running to the northeast towards Road 9. The area where the road is located drains to Las Flores Creek.

Table 1. Jurisdictional Waters and Wetlands within Project Area and 100-ft Buffer

Road	Waters		Wetlands		Drains to:
	Acres	Linear Feet	Acres	Linear feet	
1	0.57	483	--	--	San Onofre Creek (main stem)
2	0.79	1712	--	--	San Mateo Creek
3	2.55	10,534	--	--	San Onofre Creek tributaries
4	6.10	4,242	--	--	Talega Creek
5	0.21	1,088	--	--	Santa Margarita River tributary
6	1.13	5,480	--	--	Piedra de Lumbre Creek (Las Pulgas Creek tributary)
7	0.68	6,981	--	--	Horno Canyon; Las Pulgas lake tributary
8	0.20	937	4.72	2,154	Las Flores Creek
9	0.07	247	0.18	286	Aliso Creek tributaries
10	0.50	2,929	0.39	1,105	San Onofre Creek tributaries
11	0.06	449	--	--	Las Flores Creek
12	1.17	2,668	--	--	Aliso Creek
13	0.09	360	--	--	San Onofre Creek south fork tributary
14	0.33	2,643	0.08	315	Pilgrim Creek
15	0.15	489	--	--	Las Pulgas lake tributary
16	0.15	2,967	--	--	San Mateo Creek tributaries
17	--	--	--	--	N/A
18	0.07	499	--	--	Aliso Creek tributaries; Las Pulgas creek tributary
19	0.12	1,036	--	--	San Onofre Creek south fork tributary
20	0.24	850	--	--	San Onofre Creek south fork tributary
21	0.18	410	0.18	537	San Onofre Creek south fork tributary
22	1.24	1,965	--	--	San Onofre Creek tributaries
23	0.21	704	--	--	Las Flores Creek tributaries
24	0.06	599	--	--	Las Flores Creek tributaries
Sum	**16.87**	**50,272**	**5.55**	**4,397**	

4 Conclusions and Recommendations

The project area and 100-ft buffer crosses and overlaps a substantial number of water bodies, which is not surprising as many of the roads run through canyons and valley bottoms. Most of the water bodies in the project area are jurisdictional waters, but are not wetlands. A total of 22.4 acres of jurisdictional waters of the U.S. are present within the project area and 100-ft buffer zone. Of this area, 16.87 are non-wetland channels and 5.55 are wetlands. The linear distances included in Table 1 reflect the sinuosity of most of the drainages in the study area; even small drainages exhibit relatively high linear length.

Because the project is specifically designed to repair problematic drainages, it is not feasible to avoid all of the aquatic features in the project area. However, implementation of the roads repair project would not disturb or impact the entire area of wetlands and waters listed above in Table 1, as these calculations

include the 100-ft survey buffer. It is more likely that edges or portions of the water bodies would be filled, stabilized, or diverted as part of the effort to improve drainage and reduce erosion.

Based on conceptual site plans of the proposed repair actions, approximately 0.1 acre of wetlands and 3 acres of non-wetland waters of the U.S are within the direct footprint of the various projects. These calculations are preliminary only, because final site plans, excavation, and grading would be developed by the construction contractor and implemented with some flexibility in the field. The linear distance of these areas cannot be accurately determined due to the three-dimensional nature of the proposed projects and the aquatic features under analysis.

The road repair projects would likely require small-scale excavation and/or fill to accommodate the proposed road upgrades. Sedimentation and erosion may occur due to clearing and soil disturbance during construction. In many cases, the jurisdictional waters are small drainage tributaries which are subject to existing erosion due to poor drainage. Improved stormwater conveyance afforded by the road project may stabilize and improve the condition of some drainages. The function of many wetlands and water bodies would not be permanently disrupted.

Wetlands and waters away from the road, but within the 100-ft buffer, may not be directly affected by the proposed action, but indirect impact may occur due to construction activity and runoff. The mapped locations of waters and wetlands should be used during project planning and development of a Storm Water Pollution Prevention Plan (SWPPP). The SWPPP should include best management practices to avoid and minimize sedimentation and erosion of downstream aquatic features and to avoid obstructions to the movement of aquatic species.

5 References

Reed, P. 1988. National List of Plant Species That Occur in Wetlands: 1988 National Summary. U.S. Fish and Wildlife Service in cooperation with the U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, U.S. Soil Conservation Service.

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USACE. 2006. Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region. Wetlands Regulatory Assistance Program.

USMC (U.S. Marine Corps). 2007. Integrated Natural Resources Management Plan for MCB Camp Pendleton. March.

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Attachment 1 – Supporting Photographs

Photo 1.
Road 8: Las Flores Creek

Photo 2.
Road 8: Las Flores Creek and adjacent wetland

Photo 3.
Road 9: Channel south of the road (Water of the U.S.).

Photo 4.
Road 9: Soil profile of wetland channel showing redoximorphic mottles and a depleted soil matrix. (Datasheet 9-w7)

Photo 5.
Road 10: Soil of wetland channel showing redoximorphic features. (Datasheet 10-w1)

Photo 6.
Road 10: Fishing Pond and tributary

Photo 7.
Road 14: Pilgrim Creek tributary.

Photo 8.
Road 8: Hydric soils at Road 14. (Datasheet 14-w2)

Photo 9.
Road 21: Riprap repair of culvert under road.

Photo 10.
Road 21: Meadow soil pit showing high water table.

Photo 11.
Road 21: Hydric soil from the meadow. (Datasheet 21-w23)

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Attachment 2 – Wetland Data Forms

See attached.

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WETLAND DETERMINATION FORM - Arid West Region

Project/Site:	Access Road 1 San Onofre Channel	City/County:	San Diego	Sampling Date:	12-15-06
Applicant/Owner:	MCB Camp Pendleton	State:	CA	Sampling Point:	1-w1
Investigator(s):	AR, MD	Section, Township, Range:	San Bernardino, T9S, R6W, sec 17		
Landform (hillslope, terrace, etc.):	Floodplain with old braided channels	Local relief (concave, convex, none):	Concave	Slope (%):	5
Subregion (LRR):	LRR-C	Lat: 33º 23' 33.5"	Long: 117º31' 49.8"	Datum:	NAD83
Soil Map Unit Name:	Visalia sandy loam; 0-2 % slopes			NWI classification:	

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks)

Are Vegetation ____, Soil ____, or Hydrology ____ significanly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ significanly disturbed? (If needed, explain any answers in Remarks).

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area within a wetland?**	Yes ____ No X
Hydric Soil Present?	Yes ____	No X		
Wetland Hydrology Presnt?	Yes X	No ____		

Remarks:

VEGETATION

Tree Stratum (Use scientific names) woody plants >3" dbh	Absolute % Cover	Dominant Species?	Indicator Status
Salix lasiolepis	25	Y	FACW
2.			
3.			
4.			
Total Cover:	25		
Sapling/Shrub Stratum (woody plants <3"dbh)			
Baccharis salicifolia	70	Y	FACW
Baccharis pilularis	25	n	UPL
3.			
4.			
5.			
Total Cover:	95		
Herb Stratum (non-woody plantss, regardless of size)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
Total Cover:			
Woody Vine Stratum (regardless of size)			
1.			
2.			
Total Cover:			

% Bare gourd in Herb Stratum 0 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That are OBL, FACW, or FAC 1.00 (A/B) (must be >0.5)

Prevalence index worksheet (test when Hydro and Soils indicate wetlands)

Total % Cover (absolute) of:		Multiply by:	
OBL species		x 1 =	0
FACW species	95	x 2 =	190
FAC species		x 3 =	0
FACU species		x 4 =	0
UPL species	25	x 5 =	125
Coumn Totals:	120 (A)		315 (B)

Prevalence Index = B/A = 2.625 (must be ≤3.0)

Hydrophytic vegetation indicators

Y Dominance test is >50%

Y Prevalence index is ≤ 3.0[1]

____ Morphological adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soils and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes X** **No** ____

Remarks: Duff and leaf litter over gravelly substrate in stream channel. Surveyed at edge of channel.

SOIL

Sampling point: 1-w1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-3	10 YR 3/2					g	gravel to cobbles
3-8	10 YR 2/2					sl	
8-12+	10 YR 2/2					sl	secondary layer of cobbles within loam

[1]Type: C=Concretion, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR C)
- ___ Depleted Below Dark Surface (A11)
- ___ Thin Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Material (F1)
- ___ Loamy Gleyed Matrix (F3)
- ___ Depleted Matrix (F6)
- ___ Redox Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pool (F9)

Indicators for Problematic Hydric Soils:[3]

- ___ 1 cm Muck (A9) (LRR C)
- ___ 2 cm Muck (A 10) (LRR B)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

___ Listed on National/Local Hydric Soils List

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present

Restrictive Layer (if present):
Type:
Depth (inches):

Hydric Soil Present? **Yes** ___ **No** **X**

Remarks: Dry at al depths. No indicators of hyric conditons. Probably subject to flowing water when stream flows, but little soil development to retain water and change to anoxia .outside of the flowing season.

HYDROLOGY

Wetland Hydrology Indicators:

Primary indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (Nonriverine)
- ___ Sediment Deposits (B2) (Nonriverine)
- ___ Drift Deposits (B3) (Nonriverine)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soil (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- x Water Marks (B1) (Riverine)
- x Sediment Deposits (B2) (Riverine)
- x Drift Deposits (B3) (Riverine)
- x Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No x	Depth (inches): ___
Water Table Present?	Yes ___	No x	Depth (inches): ___
Saturation Present? (includes capillary fringe)	Yes ___	No x	Depth (inches): ___ (12 inch determination)

Wetland Hydrology Present? **Yes** ___ **No** **X**

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks: Non-wetland, Water of the U.S. (San Onofre Creek)

Texture and Rock Fragment Content

Texture

cos - coarse sand
s - sand
fs - fine sand
vfs - very fine sand
lcos - loamy coarse sand
ls - loamy sand
lfs - loamy fine sand
lvfs - loamy very fine sand
cosl - coarse sandy loam
sl - sandy loam
fsl - fine sandy loam
vfsl - very fine sandy loam
l - loam
sil - silt loam
si - silt
scl - sandy clay loam
cl - clay loam
sicl - silty clay loam
sc - sandy clay
sic - silty clay
c - clay

Rock Fragments

gr - gravelly
vgr - very gravelly
xgr - extremely gravelly
cb - cobbly
vcb - very cobbly
xcb - extremely cobbly
st - stony
vst - very stony
xst - extremely stony

Redoximorphic Feature Morphology

Abundance

f - few
c - common
m - many

Size

1 - fine (<2mm)
2 - medium 2–5mm)
3 - coarse (5–20mm)
4 - very coarse (20–76mm)
5 - extremely coarse (>76mm)

Type

Fe-x - iron concentration (soft mass)
Fe-nc - iron nodule or concretion
Mn-x - manganese concentration (soft mass)
Mn-nc - manganese nodule or concretion
d - depletion

Contrast

f - faint
d - distinct
p - prominent

WETLAND DETERMINATION FORM - Arid West Region

Project/Site:	Access Roads-Road 4 Talega Creek Channel	City/County:	San Diego	Sampling Date:	2-19-07
Applicant/Owner:	MCB Camp Pendleton	State:	CA	Sampling Point:	4W-1
Investigator(s):	Mike Dungan, Andrew Raaf, Robin Kinmont	Section, Township, Range:	San Bernardino, T8S, R7W, sec25		
Landform (hillslope, terrace, etc.):	Creek channel	Local relief (concave, convex, none):	Concave	Slope (%):	<5
Subregion (LRR):	LRR-C	Lat: 33° 27' 4.755"	Long: -117° 33' 56.628"	Datum:	NAD83
Soil Map Unit Name:	Soboba cobbly loamy sand, 0-15% slopes			NWI classification:	

Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ____ (If no, explain in Remarks)

Are Vegetation ____, Soil ____, or Hydrology ____ significanly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ significanly disturbed? (If needed, explain any answers in Remarks).

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area within a wetland?**	Yes ____ No X
Hydric Soil Present?	Yes ____	No X		
Wetland Hydrology Presnt?	Yes X	No ____		

Remarks: Creek channel shows scouring and evidence of recent and frequent flow. Soil does not indicate prolonged saturation or wetland function. Site is considered a non-wetland, but a jurisdictional water body (Water of the U.S.)

VEGETATION

Tree Stratum (Use scientific names) woody plan	Absolute % Cover	Dominant Species?	Indicator Status
Platanus racemosa	10	Y	FACW
2.			
3.			
4.			
Total Cover:	10		
Sapling/Shrub Stratum (woody plants <3"dbh)			
Baccharis salicifolia	50	Y	FACW
2.			
3.			
4.			
5.			
Total Cover:	50		
Herb Stratum (non-woody plantss, regardless of size)			
Bromus diandrus	20	Y	UPL
Weedy annual grasses and forbs	5	N	-
3.			
4.			
5.			
6.			
7.			
8.			
Total Cover:	30		
Woody Vine Stratum (regardless of size)			
1.			
2.			
Total Cover:			

% Bare gourd in Herb Stratum 70 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That are OBL, FACW, or FAC 0.67 (A/B) (must be >0.5)

Prevalence index worksheet (test when Hydro and Soils indicate wetlands)

Total % Cover (absolute) of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	10	x 2 =	20
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	20	x 5 =	100
Coumn Totals:	30 (A)		120 (B)

Prevalence Index = B/A = 4 (must be ≤3.0)

Hydrophytic vegetation indicators

Y Dominance test is >50%

N Prevalence index is ≤ 3.0[1]

N Morphological adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

N Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soils and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes** X **No** ____

Remarks: Plant community is more dense along east bank and more sparse in the center of the creek channel.

SOIL

Sampling point: 4W-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-1/2	10 YR 4/2					sic	
1/2-12	10 ER 5/2					gr, s	

[1]Type: C=Concretion, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR C)
- ___ Depleted Below Dark Surface (A11)
- ___ Thin Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Material (F1)
- ___ Loamy Gleyed Matrix (F3)
- ___ Depleted Matrix (F6)
- ___ Redox Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pool (F9)

Indicators for Problematic Hydric Soils:[3]

- ___ 1 cm Muck (A9) (LRR C)
- ___ 2 cm Muck (A 10) (LRR B)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

___ Listed on National/Local Hydric Soils List

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present

Restrictive Layer (if present):
Type:
Depth (inches):

Hydric Soil Present? **Yes** ___ **No** **X**

Remarks: No redox indicators

HYDROLOGY

Wetland Hydrology Indicators:

Primary indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (Nonriverine)
- ___ Sediment Deposits (B2) (Nonriverine)
- ___ Drift Deposits (B3) (Nonriverine)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soil (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (Riverine)
- x Sediment Deposits (B2) (Riverine)
- x Drift Deposits (B3) (Riverine)
- x Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No x	Depth (inches): ___	
Water Table Present?	Yes ___	No x	Depth (inches): ___	
Saturation Present? (includes capillary fringe)	Yes ___	No x	Depth (inches): ___ (12 inch determination)	

Wetland Hydrology Present? **Yes** **X** **No** ___

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks: Stream channel shows evidence of recent and frequent flow. Bulldozed gravel bars along banks support upland vegetation. Stream channel intertwines with gravel bars throughout

Texture and Rock Fragment Content

Texture

- cos - coarse sand
- s - sand
- fs - fine sand
- vfs - very fine sand
- lcos - loamy coarse sand
- ls - loamy sand
- lfs - loamy fine sand
- lvfs - loamy very fine sand
- cosl - coarse sandy loam
- sl - sandy loam
- fsl - fine sandy loam
- vfsl - very fine sandy loam
- l - loam
- sil - silt loam
- si - silt
- scl - sandy clay loam
- cl - clay loam
- sicl - silty clay loam
- sc - sandy clay
- sic - silty clay
- c - clay

Rock Fragments

- gr - gravelly
- vgr - very gravelly
- xgr - extremely gravelly
- cb - cobbly
- vcb - very cobbly
- xcb - extremely cobbly
- st - stony
- vst - very stony
- xst - extremely stony

Redoximorphic Feature Morphology

Abundance

- f - few
- c - common
- m - many

Size

- 1 - fine (<2mm)
- 2 - medium 2–5mm)
- 3 - coarse (5–20mm)
- 4 - very coarse (20–76mm)
- 5 - extremely coarse (>76mm)

Type

- Fe-x - iron concentration (soft mass)
- Fe-nc - iron nodule or concretion
- Mn-x - manganese concentration (soft mass)
- Mn-nc - manganese nodule or concretion
- d - depletion

Contrast

- f - faint
- d - distinct
- p - prominent

WETLAND DETERMINATION FORM - Arid West Region

Project/Site:	Access Roads-Road 4 Talega Creek Upland	City/County:	San Diego	Sampling Date:	2-19-07
Applicant/Owner:	MCB Camp Pendleton	State:	CA	Sampling Point:	4-W2
Investigator(s):	Mike Dungan, Andrew Raaf, Robin Kinmont	Section, Township, Range:	San Bernardino, T8S, R7W, sec25		
Landform (hillslope, terrace, etc.):	Creek channel	Local relief (concave, convex, none):	Flat	Slope (%):	<5
Subregion (LRR):	LRR-C	Lat: 33° 27' 3.709"	Long: -117° 33' 56.191"	Datum:	NAD83
Soil Map Unit Name:	Capistrano sandy loam, 9-15% slopes			NWI classification:	

Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ____ (If no, explain in Remarks)

Are Vegetation ____, Soil ____, or Hydrology ____ significanly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ significanly disturbed? (If needed, explain any answers in Remarks).

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	**Is the Sampled Area within a wetland?**	Yes ____ No X
Hydric Soil Present?	Yes ____	No X		
Wetland Hydrology Presnt?	Yes ____	No X		

Remarks: Upland terrace above creek bank shows no wetland indicators.

VEGETATION

Tree Stratum (Use scientific names) woody plan	Absolute % Cover	Dominant Species?	Indicator Status
Platanus racemosa	10	Y	FACW
2.			
3.			
4.			
Total Cover:	10		
Sapling/Shrub Stratum (woody plants <3"dbh)			
1.			
2.			
3.			
4.			
5.			
Total Cover:			
Herb Stratum (non-woody plantss, regardless of size)			
Bromus diandrus	20	Y	UPL
Bromus madritensis/rubens	20	Y	UPL
Brassica nigra	20	Y	UPL
Erodium cicutarium	10	N	UPL
Salsola sp.	10	N	UPL
6.			
7.			
8.			
Total Cover:	85		
Woody Vine Stratum (regardless of size)			
1.			
2.			
Total Cover:			

% Bare gourd in Herb Stratum 15 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That are OBL, FACW, or FAC 0.25 (A/B) (must be >0.5)

Prevalence index worksheet (test when Hydro and Soils indicate wetlands)

Total % Cover (absolute) of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	10	x 2 =	20
FAC species		x 3 =	0
FACU species	0	x 4 =	0
UPL species	80	x 5 =	400
Coumn Totals:	90 (A)		420 (B)

Prevalence Index = B/A = 4.67 (must be ≤3.0)

Hydrophytic vegetation indicators

N Dominance test is >50%

N Prevalence index is ≤ 3.0[1]

N Morphological adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

N Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soils and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes** ____ **No** **X**

Remarks: Semi-distrubed grassland. Platanus racemosa present in old floodplain, now does not exhibit drainage hydrology due to road terrace and meandering of Talega Creek channel.

SOIL

Sampling point: 4-W2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-4	10 YR 3/2					sl	
4-12	10 YR 4/2					gr, s	Pockets of organic material and sand
12-	10 YR 5/3					gr, s	

[1]Type: C=Concretion, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR C)
- ___ Depleted Below Dark Surface (A11)
- ___ Thin Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Material (F1)
- ___ Loamy Gleyed Matrix (F3)
- ___ Depleted Matrix (F6)
- ___ Redox Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pool (F9)

Indicators for Problematic Hydric Soils:[3]

- ___ 1 cm Muck (A9) (LRR C)
- ___ 2 cm Muck (A 10) (LRR B)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

___ Listed on National/Local Hydric Soils List

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present

Restrictive Layer (if present):
Type:
Depth (inches):

Hydric Soil Present? **Yes** ___ **No** **X**

Remarks: Gravel and sand at 12" is similar to soil in the creek channel (site 4-w1). A few organic matter nodules, but no significant redox features.

HYDROLOGY

Wetland Hydrology Indicators:

Primary indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (Nonriverine)
- ___ Sediment Deposits (B2) (Nonriverine)
- ___ Drift Deposits (B3) (Nonriverine)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soil (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (Riverine)
- ___ Sediment Deposits (B2) (Riverine)
- ___ Drift Deposits (B3) (Riverine)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No x	Depth (inches): ___	
Water Table Present?	Yes ___	No x	Depth (inches): ___	
Saturation Present? (includes capillary fringe)	Yes ___	No x	Depth (inches): ___ (12 inch determination)	

Wetland Hydrology Present? **Yes** ___ **No** **X**

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks: No hydrologic indicators.

Texture and Rock Fragment Content

Texture

- cos - coarse sand
- s - sand
- fs - fine sand
- vfs - very fine sand
- lcos - loamy coarse sand
- ls - loamy sand
- lfs - loamy fine sand
- lvfs - loamy very fine sand
- cosl - coarse sandy loam
- sl - sandy loam
- fsl - fine sandy loam
- vfsl - very fine sandy loam
- l - loam
- sil - silt loam
- si - silt
- scl - sandy clay loam
- cl - clay loam
- sicl - silty clay loam
- sc - sandy clay
- sic - silty clay
- c - clay

Rock Fragments

- gr - gravelly
- vgr - very gravelly
- xgr - extremely gravelly
- cb - cobbly
- vcb - very cobbly
- xcb - extremely cobbly
- st - stony
- vst - very stony
- xst - extremely stony

Redoximorphic Feature Morphology

Abundance

- f - few
- c - common
- m - many

Size

- 1 - fine (<2mm)
- 2 - medium 2–5mm)
- 3 - coarse (5–20mm)
- 4 - very coarse (20–76mm)
- 5 - extremely coarse (>76mm)

Type

- Fe-x - iron concentration (soft mass)
- Fe-nc - iron nodule or concretion
- Mn-x - manganese concentration (soft mass)
- Mn-nc - manganese nodule or concretion
- d - depletion

Contrast

- f - faint
- d - distinct
- p - prominent

WETLAND DETERMINATION FORM - Arid West Region

Project/Site:	Access Roads-Road 4 sidebar	City/County:	San Diego	Sampling Date:	2-19-07
Applicant/Owner:	MCB Camp Pendleton	State:	CA	Sampling Point:	4-W3
Investigator(s):	Mike Dungan, Andrew Raaf, Robin Kinmont	Section, Township, Range:	San Bernardino, T8S, R7W, sec25		
Landform (hillslope, terrace, etc.):	Road ditch	Local relief (concave, convex, none):	Concave	Slope (%):	<5
Subregion (LRR):	LRR-C	Lat: 33° 27' 5.265"	Long: -117° 33' 32.924"	Datum:	NAD83
Soil Map Unit Name:	Capistrano sandy loam, 9-15% slopes			NWI classification:	

Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ____ (If no, explain in Remarks)

Are Vegetation ____, Soil ____, or Hydrology ____ significanly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ significanly disturbed? (If needed, explain any answers in Remarks).

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area within a wetland?**	Yes ____ No X
Hydric Soil Present?	Yes ____	No X		
Wetland Hydrology Presnt?	Yes X	No ____		

Remarks: Vegetation and hydrology indicate moist conditions and collection of drainage waters, but the soil is well drained and does not indicate prolonged saturation that would occur in a wetland

VEGETATION

Tree Stratum (Use scientific names) woody plan	Absolute % Cover	Dominant Species?	Indicator Status
Platanus racemosa	20	Y	FACW
2.			
3.			
4.			
Total Cover:	20		
Sapling/Shrub Stratum (woody plants <3"dbh)			
1.			
2.			
3.			
4.			
5.			
Total Cover:	0		
Herb Stratum (non-woody plantss, regardless of size)			
Conium maculatum	20	Y	FAC
Artemisia douglasiana	15	Y	FAC
Xanthium spinosum	10	Y	FAC
Misc low-cover species (<5% each)	50	-	-
5.			
6.			
7.			
8.			
Total Cover:	95		
Woody Vine Stratum (regardless of size)			
1.			
2.			
Total Cover:			

% Bare gourd in Herb Stratum 5 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That are OBL, FACW, or FAC 1.00 (A/B) (must be >0.5)

Prevalence index worksheet (test when Hydro and Soils indicate wetlands)

Total % Cover (absolute) of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	20	x 2 =	40
FAC species	55	x 3 =	165
FACU species		x 4 =	0
UPL species		x 5 =	0
Coumn Totals:	75 (A)		205 (B)

Prevalence Index = B/A = 2.73 (must be ≤3.0)

Hydrophytic vegetation indicators

Y Dominance test is >50%

Y Prevalence index is ≤ 3.0[1]

N Morphological adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

N Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soils and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes** X **No** ____

Remarks: Sand/gravel bars intertwined with creek channel have upland plant species. Sycame trunks have high spots around them with upland shrubs. These high areas are excluded from this datapoint. The datapoint represents the low areas in the creek channel and drainage ditches along the roadside.

SOIL

Sampling point: 4-W3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-2	2.5 YR 4/4					fsl	pockets of organic matter
2-10	2.5 YR 4/4		5 YR 5/8	Fe-nc	1, f,p	sil	clay nodules, some redox features
10-14	5 Y 3/2					c	live roots

[1]Type: C=Concretion, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR C)
- ___ Depleted Below Dark Surface (A11)
- ___ Thin Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Material (F1)
- ___ Loamy Gleyed Matrix (F3)
- ___ Depleted Matrix (F6)
- ___ Redox Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pool (F9)

Indicators for Problematic Hydric Soils:[3]

- ___ 1 cm Muck (A9) (LRR C)
- ___ 2 cm Muck (A 10) (LRR B)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

___ Listed on National/Local Hydric Soils List

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present

Restrictive Layer (if present):
Type:
Depth (inches):

Hydric Soil Present? **Yes** ___ **No** **X**

Remarks: Redox features are prominent but few. Matrix value and chroma do not indicate depletion.

HYDROLOGY

Wetland Hydrology Indicators:

Primary indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (Nonriverine)
- ___ Sediment Deposits (B2) (Nonriverine)
- ___ Drift Deposits (B3) (Nonriverine)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- x Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soil (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (Riverine)
- x Sediment Deposits (B2) (Riverine)
- x Drift Deposits (B3) (Riverine)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No x	Depth (inches): ___		
Water Table Present?	Yes ___	No x	Depth (inches): ___		
Saturation Present? (includes capillary fringe)	Yes ___	No x	Depth (inches): ___ (12 inch determination)	**Wetland Hydrology Present?**	**Yes** **X** **No** ___

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks: Some moss and sediment deposits. Live roots in soil column show oxidation.

Texture and Rock Fragment Content

Texture

cos - coarse sand
s - sand
fs - fine sand
vfs - very fine sand
lcos - loamy coarse sand
ls - loamy sand
lfs - loamy fine sand
lvfs - loamy very fine sand
cosl - coarse sandy loam
sl - sandy loam
fsl - fine sandy loam
vfsl - very fine sandy loam
l - loam
sil - silt loam
si - silt
scl - sandy clay loam
cl - clay loam
sicl - silty clay loam
sc - sandy clay
sic - silty clay
c - clay

Rock Fragments

gr - gravelly
vgr - very gravelly
xgr - extremely gravelly
cb - cobbly
vcb - very cobbly
xcb - extremely cobbly
st - stony
vst - very stony
xst - extremely stony

Redoximorphic Feature Morphology

Abundance

f - few
c - common
m - many

Size

1 - fine (<2mm)
2 - medium 2–5mm)
3 - coarse (5–20mm)
4 - very coarse (20–76mm)
5 - extremely coarse (>76mm)

Type

Fe-x - iron concentration (soft mass)
Fe-nc - iron nodule or concretion
Mn-x - manganese concentration (soft mass)
Mn-nc - manganese nodule or concretion
d - depletion

Contrast

f - faint
d - distinct
p - prominent

WETLAND DETERMINATION FORM - Arid West Region

Project/Site:	Access Roads-Road 4 sidebar upland	City/County:	San Diego	Sampling Date:	2-19-07
Applicant/Owner:	MCB Camp Pendleton	State:	CA	Sampling Point:	4-W4
Investigator(s):	Mike Dungan, Andrew Raaf, Robin Kinmont	Section, Township, Range:	San Bernardino, T8S, R7W, sec25		
Landform (hillslope, terrace, etc.):	Roadside upland	Local relief (concave, convex, none):	Concave	Slope (%):	<5
Subregion (LRR):	LRR-C	Lat: 33° 27' 4.933"	Long: -117° 33' 31.863"	Datum:	NAD83
Soil Map Unit Name:	Capistrano sandy loam, 9-15% slopes			NWI classification:	

Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ____ (If no, explain in Remarks)

Are Vegetation ____, Soil ____, or Hydrology ____ significanly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ significanly disturbed? (If needed, explain any answers in Remarks).

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	**Is the Sampled Area within a wetland?**	Yes ____ No X
Hydric Soil Present?	Yes ____	No X		
Wetland Hydrology Presnt?	Yes ____	No X		

Remarks:

VEGETATION

Tree Stratum (Use scientific names) woody plan	Absolute % Cover	Dominant Species?	Indicator Status
Quercus agrifolia	20	Y	UPL
Heteromeles arbutifolia	5	Y	UPL
3.			
4.			
Total Cover:	25		
Sapling/Shrub Stratum (woody plants <3"dbh)			
Baccharis pilularis	10	Y	UPL
Heteromeles arbutifolia	5	Y	UPL
3.			
4.			
5.			
Total Cover:	15		
Herb Stratum (non-woody plantss, regardless of size)			
Artemisia douglasiana	15	Y	FAC
Dentaria californica	10	Y	UPL
Stellaria media	10	Y	FACU
Centaurea melitensis	10	Y	UPL
Misc annual grasses and weedy forbs (<5% each)	35	N	-
6.			
7.			
8.			
Total Cover:	80		
Woody Vine Stratum (regardless of size)			
1.			
2.			
Total Cover:			

% Bare gourd in Herb Stratum 20 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That are OBL, FACW, or FAC 0.17 (A/B) (must be >0.5)

Prevalence index worksheet (test when Hydro and Soils indicate wetlands)

Total % Cover (absolute) of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	15	x 3 =	45
FACU species	10	x 4 =	40
UPL species	50	x 5 =	250
Coumn Totals:	75 (A)		335 (B)

Prevalence Index = B/A = 4.47 (must be ≤3.0)

Hydrophytic vegetation indicators

N Dominance test is >50%

N Prevalence index is ≤ 3.0[1]

N Morphological adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

N Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soils and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes** ____ **No** **X**

Remarks: Oak woodland habitat along road side along the upslope side of the roadway. Includes weedy roadside plants in the understory.

SOIL

Sampling point: 4-W4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-2	10 YR 3/4					cl	
2-8	10 YR 4/2					sl	
8-	10 YR 5/3					s	

[1]Type: C=Concretion, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR C)
- ___ Depleted Below Dark Surface (A11)
- ___ Thin Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Material (F1)
- ___ Loamy Gleyed Matrix (F3)
- ___ Depleted Matrix (F6)
- ___ Redox Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pool (F9)

Indicators for Problematic Hydric Soils:[3]

- ___ 1 cm Muck (A9) (LRR C)
- ___ 2 cm Muck (A 10) (LRR B)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

___ Listed on National/Local Hydric Soils List

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present

Restrictive Layer (if present):
Type:
Depth (inches):

Hydric Soil Present? **Yes** ___ **No** **X**

Remarks: Becoming sandier with depth. Well drained.

HYDROLOGY

Wetland Hydrology Indicators:

Primary indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (Nonriverine)
- ___ Sediment Deposits (B2) (Nonriverine)
- ___ Drift Deposits (B3) (Nonriverine)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soil (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (Riverine)
- ___ Sediment Deposits (B2) (Riverine)
- ___ Drift Deposits (B3) (Riverine)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No	x	Depth (inches):	
Water Table Present?	Yes ___	No	x	Depth (inches):	
Saturation Present? (includes capillary fringe)	Yes ___	No	x	Depth (inches): (12 inch determination)	

Wetland Hydrology Present? **Yes** ___ **No** **X**

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks: No strong hydrologic indicators. Perhaps some roadside pooling due to road runoff, but no natural wetland features.

Texture and Rock Fragment Content

Texture

- cos - coarse sand
- s - sand
- fs - fine sand
- vfs - very fine sand
- lcos - loamy coarse sand
- ls - loamy sand
- lfs - loamy fine sand
- lvfs - loamy very fine sand
- cosl - coarse sandy loam
- sl - sandy loam
- fsl - fine sandy loam
- vfsl - very fine sandy loam
- l - loam
- sil - silt loam
- si - silt
- scl - sandy clay loam
- cl - clay loam
- sicl - silty clay loam
- sc - sandy clay
- sic - silty clay
- c - clay

Rock Fragments

- gr - gravelly
- vgr - very gravelly
- xgr - extremely gravelly
- cb - cobbly
- vcb - very cobbly
- xcb - extremely cobbly
- st - stony
- vst - very stony
- xst - extremely stony

Redoximorphic Feature Morphology

Abundance

- f - few
- c - common
- m - many

Size

- 1 - fine (<2mm)
- 2 - medium 2–5mm)
- 3 - coarse (5–20mm)
- 4 - very coarse (20–76mm)
- 5 - extremely coarse (>76mm)

Type

- Fe-x - iron concentration (soft mass)
- Fe-nc - iron nodule or concretion
- Mn-x - manganese concentration (soft mass)
- Mn-nc - manganese nodule or concretion
- d - depletion

Contrast

- f - faint
- d - distinct
- p - prominent

WETLAND DETERMINATION FORM - Arid West Region

Project/Site:	Access Road 5 Drainage Tributary	City/County:	San Diego	Sampling Date:	3-22-07
Applicant/Owner:	MCB Camp Pendleton	State:	CA	Sampling Point:	5-w100
Investigator(s):	AR	Section, Township, Range:	San Bernardino, T10S, R5W, sec12		
Landform (hillslope, terrace, etc.):	Ravine	Local relief (concave, convex, none):	Concave	Slope (%):	0-5
Subregion (LRR):	LRR-C	Lat: 33° 19' 25.484"	Long: -117° 21' 6.859"	Datum:	NAD83
Soil Map Unit Name:	Visalia sandy loam, 5-9% slopes			NWI classification:	

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No ____ (If no, explain in Remarks)

Are Vegetation ____, Soil ____, or Hydrology ____ significanly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ significanly disturbed? (If needed, explain any answers in Remarks).

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area within a wetland?**	Yes ____ No X
Hydric Soil Present?	Yes ____	No X		
Wetland Hydrology Presnt?	Yes X	No ____		

Remarks:

VEGETATION

Tree Stratum (Use scientific names) woody plar	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:			
Sapling/Shrub Stratum (woody plants <3"dbh)			
Baccharis salicifolia	10	Y	FACW
2.			
3.			
4.			
5.			
Total Cover:	10		
Herb Stratum (non-woody plantss, regardless of size)			
Bromus spp.	30	Y	UPL
Artemisia douglasiana	20	Y	FAC
Brassica nigra	10	n	UPL
Medicago lupulina	10	n	FAC
Conium maculatum	10	n	FAC
6.			
7.			
8.			
Total Cover:	90		
Woody Vine Stratum (regardless of size)			
1.			
2.			
Total Cover:			

% Bare gourd in Herb Stratum 10 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That are OBL, FACW, or FAC 0.67 (A/B) (must be >0.5)

Prevalence index worksheet (test when Hydro and Soils indicate wetlands)

Total % Cover (absolute) of:			Multiply by:
OBL species		x 1 =	0
FACW species	10	x 2 =	20
FAC species	40	x 3 =	120
FACU species		x 4 =	0
UPL species	40	x 5 =	200
Coumn Totals:	90 (A)		340 (B)

Prevalence Index = B/A = 3.7777778 (must be ≤3.0)

Hydrophytic vegetation indicators

Y Dominance test is >50%

N Prevalence index is ≤ 3.0[1]

____ Morphological adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soils and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks:

SOIL

Sampling point: 5-w100

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-1	2.5 Y 4/4					L	
1-6	2.5 Y 4/2					S-gr	
6-14	2.4 Y 4.3					LS	

[1]Type: C=Concretion, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR C)
- ___ Depleted Below Dark Surface (A11)
- ___ Thin Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Material (F1)
- ___ Loamy Gleyed Matrix (F3)
- ___ Depleted Matrix (F6)
- ___ Redox Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pool (F9)

Indicators for Problematic Hydric Soils:[3]

- ___ 1 cm Muck (A9) (LRR C)
- ___ 2 cm Muck (A 10) (LRR B)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

___ Listed on National/Local Hydric Soils List

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present

Restrictive Layer (if present):
Type:
Depth (inches):

Hydric Soil Present? **Yes** ___ **No** x

Remarks: Soil is well-drained and not saturated

HYDROLOGY

Wetland Hydrology Indicators:

Primary indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (Nonriverine)
- ___ Sediment Deposits (B2) (Nonriverine)
- ___ Drift Deposits (B3) (Nonriverine)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- x Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soil (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- x Water Marks (B1) (Riverine)
- x Sediment Deposits (B2) (Riverine)
- ___ Drift Deposits (B3) (Riverine)
- x Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No x	Depth (inches): ___
Water Table Present?	Yes ___	No x	Depth (inches): ___
Saturation Present? (includes capillary fringe)	Yes ___	No x	Depth (inches): ___ (12 inch determination)

Wetland Hydrology Present? **Yes** x **No** ___

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks: Water of the US, but not wetlands. Evidence of perodic flow.

Texture and Rock Fragment Content

Texture

cos - coarse sand
s - sand
fs - fine sand
vfs - very fine sand
lcos - loamy coarse sand
ls - loamy sand
lfs - loamy fine sand
lvfs - loamy very fine sand
cosl - coarse sandy loam
sl - sandy loam
fsl - fine sandy loam
vfsl - very fine sandy loam
l - loam
sil - silt loam
si - silt
scl - sandy clay loam
cl - clay loam
sicl - silty clay loam
sc - sandy clay
sic - silty clay
c - clay

Rock Fragments

gr - gravelly
vgr - very gravelly
xgr - extremely gravelly
cb - cobbly
vcb - very cobbly
xcb - extremely cobbly
st - stony
vst - very stony
xst - extremely stony

Redoximorphic Feature Morphology

Abundance

f - few
c - common
m - many

Size

1 - fine (<2mm)
2 - medium 2–5mm)
3 - coarse (5–20mm)
4 - very coarse (20–76mm)
5 - extremely coarse (>76mm)

Type

Fe-x - iron concentration (soft mass)
Fe-nc - iron nodule or concretion
Mn-x - manganese concentration (soft mass)
Mn-nc - manganese nodule or concretion
d - depletion

Contrast

f - faint
d - distinct
p - prominent

WETLAND DETERMINATION FORM - Arid West Region

Project/Site:	Access Road 5, first terrace above drainage	City/County:	San Diego	Sampling Date:	3-22-07
Applicant/Owner:	MCB Camp Pendleton	State:	CA	Sampling Point:	5-w101
Investigator(s):	AR	Section, Township, Range:	San Bernardino, T10S, R5W, sec12		
Landform (hillslope, terrace, etc.):	floodplain/terrace within wider drainage channel	Local relief (concave, convex, none):	concave	Slope (%):	0-5
Subregion (LRR):	LRR-C	Lat:	33° 19' 26.842"	Long: -117° 21' 6.066"	Datum: NAD83
Soil Map Unit Name:	Visalia sandy loam, 5-9% slope			NWI classification:	

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks)

Are Vegetation ____, Soil ____, or Hydrology ____ significanly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ significanly disturbed? (If needed, explain any answers in Remarks).

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes		No	x
Hydric Soil Present?	Yes		No	x
Wetland Hydrology Presnt?	Yes		No	x

Is the Sampled Area within a wetland? Yes ____ No X

Remarks:

VEGETATION

Tree Stratum (Use scientific names) woody plants >3" dbh	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:			
Sapling/Shrub Stratum (woody plants <3"dbh)			
Baccharis salicifolia	20	Y	FACW
Baccharis pilularis	20	Y	UPL
3.			
4.			
5.			
Total Cover:	40		
Herb Stratum (non-woody plantss, regardless of size)			
Foeniculum vulgare	10	Y	FACU
Nassella spp.	10	Y	UPL
Brassica nigra	15	Y	UPL
Isocoma menzeisii	15	Y	UPL
5.			
6.			
7.			
8.			
Total Cover:	60		
Woody Vine Stratum (regardless of size)			
1.			
2.			
Total Cover:			

% Bare gourd in Herb Stratum 40 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That are OBL, FACW, or FAC 0.17 (A/B) (must be >0.5)

Prevalence index worksheet (test when Hydro and Soils indicate wetlands)

Total % Cover (absolute) of:			Multiply by:
OBL species		x 1 =	0
FACW species	20	x 2 =	40
FAC species		x 3 =	0
FACU species	10	x 4 =	40
UPL species	60	x 5 =	300
Coumn Totals:	90 (A)		380 (B)

Prevalence Index = B/A = 4.2222222 (must be ≤3.0)

Hydrophytic vegetation indicators

N Dominance test is >50%

N Prevalence index is ≤ 3.0[1]

____ Morphological adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soils and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes** ____ **No** **X**

Remarks:

SOIL

Sampling point: 5-w101

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-1	10 YR 4/2					SL	
1-2	2.5 YR 3/2					SC	
2-4	10 YR 4/3					SL	
4-10	10 YR 4/3					SC'	

[1]Type: C=Concretion, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR C)
- ___ Depleted Below Dark Surface (A11)
- ___ Thin Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Material (F1)
- ___ Loamy Gleyed Matrix (F3)
- ___ Depleted Matrix (F6)
- ___ Redox Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pool (F9)

Indicators for Problematic Hydric Soils:[3]

- ___ 1 cm Muck (A9) (LRR C)
- ___ 2 cm Muck (A 10) (LRR B)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

___ Listed on National/Local Hydric Soils List

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present

Restrictive Layer (if present):
Type:
Depth (inches):

Hydric Soil Present? **Yes** ___ **No** x

Remarks: Soil profile below 10" is very rocky; old road material, concrete and asphalt cobbles. Soil is dry throughout profile.

HYDROLOGY

Wetland Hydrology Indicators:

Primary indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (Nonriverine)
- ___ Sediment Deposits (B2) (Nonriverine)
- ___ Drift Deposits (B3) (Nonriverine)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soil (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (Riverine)
- x Sediment Deposits (B2) (Riverine)
- x Drift Deposits (B3) (Riverine)
- x Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): ___	
Water Table Present?	Yes ___	No X	Depth (inches): ___	
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches): ___ (12 inch determination)	

Wetland Hydrology Present? **Yes** ___ **No** x

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Texture and Rock Fragment Content

Texture

cos - coarse sand
s - sand
fs - fine sand
vfs - very fine sand
lcos - loamy coarse sand
ls - loamy sand
lfs - loamy fine sand
lvfs - loamy very fine sand
cosl - coarse sandy loam
sl - sandy loam
fsl - fine sandy loam
vfsl - very fine sandy loam
l - loam
sil - silt loam
si - silt
scl - sandy clay loam
cl - clay loam
sicl - silty clay loam
sc - sandy clay
sic - silty clay
c - clay

Rock Fragments

gr - gravelly
vgr - very gravelly
xgr - extremely gravelly
cb - cobbly
vcb - very cobbly
xcb - extremely cobbly
st - stony
vst - very stony
xst - extremely stony

Redoximorphic Feature Morphology

Abundance

f - few
c - common
m - many

Size

1 - fine (<2mm)
2 - medium 2–5mm)
3 - coarse (5–20mm)
4 - very coarse (20–76mm)
5 - extremely coarse (>76mm)

Type

Fe-x - iron concentration (soft mass)
Fe-nc - iron nodule or concretion
Mn-x - manganese concentration (soft mass)
Mn-nc - manganese nodule or concretion
d - depletion

Contrast

f - faint
d - distinct
p - prominent

WETLAND DETERMINATION FORM - Arid West Region

Project/Site:	Access Road 8 Mulefat upland/riparian	City/County:	San Diego	Sampling Date:	4-26-07
Applicant/Owner:	MCB Camp Pendleton	State:	CA	Sampling Point:	8-w1
Investigator(s):	AR, MD	Section, Township, Range:	San Bernardino, T10S, R5W, sec19		
Landform (hillslope, terrace, etc.):	floodplain	Local relief (concave, convex, none):	none	Slope (%):	0
Subregion (LRR):	LRR-C	Lat: 33° 17' 36.847"	Long: -117° 27' 12.089"	Datum:	NAD83
Soil Map Unit Name:	Salinas clay, 0 to 2 percent slopes			NWI classification:	

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X ____ (If no, explain in Remarks)

Are Vegetation ____, Soil ____, or Hydrology ____ significanly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ significanly disturbed? (If needed, explain any answers in Remarks).

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area within a wetland?**	Yes ____ No X
Hydric Soil Present?	Yes ____	No X		
Wetland Hydrology Presnt?	Yes ____	No X		

Remarks: Floodplain, high area along roadside.

VEGETATION

Tree Stratum (Use scientific names) woody plants >3" dbh	Absolute % Cover	Dominant Species?	Indicator Status
Salix spp.	10	Y	FACW
2.			
3.			
4.			
Total Cover:	10		
Sapling/Shrub Stratum (woody plants <3"dbh)			
Baccharis salicifolia	60	Y	FACW
Baccharis pilularis	20	Y	UPL
3.			
4.			
5.			
Total Cover:	80		
Herb Stratum (non-woody plantss, regardless of size)			
Conium maculatum	30	Y	FAC
Leymus triticoides	10	N	FAC
Hirschfeldia incana	10	N	UPL
4.			
5.			
6.			
7.			
8.			
Total Cover:	60		
Woody Vine Stratum (regardless of size)			
1.			
2.			
Total Cover:			

% Bare gourd in Herb Stratum 40 % Cover of Biotic Crust ____

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That are OBL, FACW, or FAC 0.75 (A/B) (must be >0.5)

Prevalence index worksheet (test when Hydro and Soils indicate wetlands)

Total % Cover (absolute) of:			Multiply by:
OBL species	0	x 1 =	0
FACW species	70	x 2 =	140
FAC species	40	x 3 =	120
FACU species		x 4 =	0
UPL species	30	x 5 =	150
Coumn Totals:	140 (A)		410 (B)

Prevalence Index = B/A = 2.9285714 (must be ≤3.0)

Hydrophytic vegetation indicators

Y Dominance test is >50%

Y Prevalence index is ≤ 3.0[1]

____ Morphological adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soils and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks:

SOIL

Sampling point: 8-w1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-12	10 YR 3/2					fsl	Very dry
12+	10 YR 2/2					vgr	fine loam in gravel spaces

[1]Type: C=Concretion, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR C)
- ___ Depleted Below Dark Surface (A11)
- ___ Thin Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Material (F1)
- ___ Loamy Gleyed Matrix (F3)
- ___ Depleted Matrix (F6)
- ___ Redox Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pool (F9)

Indicators for Problematic Hydric Soils:[3]

- ___ 1 cm Muck (A9) (LRR C)
- ___ 2 cm Muck (A 10) (LRR B)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

___ Listed on National/Local Hydric Soils List

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present

Restrictive Layer (if present):
Type:
Depth (inches):

Hydric Soil Present? Yes ___ No X

Remarks: Dry at all depths

HYDROLOGY

Wetland Hydrology Indicators:

Primary indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (Nonriverine)
- ___ Sediment Deposits (B2) (Nonriverine)
- ___ Drift Deposits (B3) (Nonriverine)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soil (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (Riverine)
- ___ Sediment Deposits (B2) (Riverine)
- ___ Drift Deposits (B3) (Riverine)
- x Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No x	Depth (inches): ___	
Water Table Present?	Yes ___	No x	Depth (inches): ___	
Saturation Present? (includes capillary fringe)	Yes ___	No x	Depth (inches): ___ (12 inch determination)	

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks: Old drainage patterns possible, but not dominant or strongly evident.

Texture and Rock Fragment Content

Texture

- cos - coarse sand
- s - sand
- fs - fine sand
- vfs - very fine sand
- lcos - loamy coarse sand
- ls - loamy sand
- lfs - loamy fine sand
- lvfs - loamy very fine sand
- cosl - coarse sandy loam
- sl - sandy loam
- fsl - fine sandy loam
- vfsl - very fine sandy loam
- l - loam
- sil - silt loam
- si - silt
- scl - sandy clay loam
- cl - clay loam
- sicl - silty clay loam
- sc - sandy clay
- sic - silty clay
- c - clay

Rock Fragments

- gr - gravelly
- vgr - very gravelly
- xgr - extremely gravelly
- cb - cobbly
- vcb - very cobbly
- xcb - extremely cobbly
- st - stony
- vst - very stony
- xst - extremely stony

Redoximorphic Feature Morphology

Abundance

- f - few
- c - common
- m - many

Size

- 1 - fine (<2mm)
- 2 - medium 2–5mm)
- 3 - coarse (5–20mm)
- 4 - very coarse (20–76mm)
- 5 - extremely coarse (>76mm)

Type

- Fe-x - iron concentration (soft mass)
- Fe-nc - iron nodule or concretion
- Mn-x - manganese concentration (soft mass)
- Mn-nc - manganese nodule or concretion
- d - depletion

Contrast

- f - faint
- d - distinct
- p - prominent

WETLAND DETERMINATION FORM - Arid West Region

Project/Site:	Access Roads-Road 9 Burned drainage and culvert	City/County:	San Diego	Sampling Date:	2-20-07
Applicant/Owner:	MCB Camp Pendleton	State:	CA	Sampling Point:	9-W7
Investigator(s):	Mike Dungan, Andrew Raaf, Melissa Tu	Section, Township, Range:	San Bernardino, T9S, R5W, sec26		
Landform (hillslope, terrace, etc.):	Drainage crease in burned area	Local relief (concave, convex, none):	Concave	Slope (%):	<5
Subregion (LRR):	LRR-C	Lat: 33° 21' 40.599"	Long: -117° 22' 8.077"	Datum:	NAD83
Soil Map Unit Name:	Salinas clay loam, 2-9% slopes			NWI classification:	

Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ____ (If no, explain in Remarks)

Are Vegetation ____, Soil ____, or Hydrology ____ significanly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ significanly disturbed? (If needed, explain any answers in Remarks).

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area within a wetland?** Yes X No ____
Hydric Soil Present?	Yes X	No ____	
Wetland Hydrology Presnt?	Yes X	No ____	

Remarks: Drainage trough is a wetland. Wetland boundary defined by vegetation community and defined channel/microtopography. Main/central channel is a jurisdictional water of the U.S.

VEGETATION

Tree Stratum (Use scientific names) woody plan	Absolute % Cover	Dominant Species?	Indicator Status
Salix spp.	10	Y	FACW
2.			
3.			
4.			
Total Cover:	10		
Sapling/Shrub Stratum (woody plants <3"dbh)			
Baccharis salicifolia	30	Y	FACW
Salix spp.	10	Y	FACW
3.			
4.			
5.			
Total Cover:	40		
Herb Stratum (non-woody plantss, regardless of size)			
Conium maculatum	45	Y	FAC
Artemisia douglasiana	15	Y	FAC
Cortaderia spp.	10	N	UPL
Urtica dioica holocericea	10	N	FACW
6.			
7.			
8.			
Total Cover:	80		
Woody Vine Stratum (regardless of size)			
1.			
2.			
Total Cover:			

% Bare gourd in Herb Stratum 20 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That are OBL, FACW, or FAC 1.00 (A/B) (must be >0.5)

Prevalence index worksheet (test when Hydro and Soils indicate wetlands)

Total % Cover (absolute) of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	60	x 2 =	120
FAC species	60	x 3 =	180
FACU species		x 4 =	0
UPL species	10	x 5 =	50
Coumn Totals:	130 (A)		350 (B)

Prevalence Index = B/A = 2.69 (must be ≤3.0)

Hydrophytic vegetation indicators

Y Dominance test is >50%

Y Prevalence index is ≤ 3.0[1]

N Morphological adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

N Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soils and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes** X **No** ____

Remarks: Recently burned drainage bottom. Sycamore upstream. Relatively flat.

SOIL

Sampling point: 9-W7

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-1/2	10 YR 2/1					sl	
1/2-3	10 YR 3/2					sl	
3-6	5 Y 4/2					sic	
6-9	10 YR 3/2		5 YR 4/6	Fe-nc	m,3,p	sl	30% mottles at later interface
9-12	10 YR 3/2		5 YR 4/6	Fe-nc	m,3,p	sl/gr	30% mottles at later interface

[1]Type: C=Concretion, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR C)
- ___ Depleted Below Dark Surface (A11)
- ___ Thin Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Material (F1)
- ___ Loamy Gleyed Matrix (F3)
- x Depleted Matrix (F6)
- ___ Redox Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pool (F9)

Indicators for Problematic Hydric Soils:[3]

- ___ 1 cm Muck (A9) (LRR C)
- ___ 2 cm Muck (A 10) (LRR B)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

___ Listed on National/Local Hydric Soils List

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present

Restrictive Layer (if present):
Type:
Depth (inches):

Hydric Soil Present? **Yes** X **No** ___

Remarks: Prominent mottles mostly between soil layers. Contrast and matrix value indicate depleted soil matrix.

HYDROLOGY

Wetland Hydrology Indicators:

Primary indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (Nonriverine)
- ___ Sediment Deposits (B2) (Nonriverine)
- ___ Drift Deposits (B3) (Nonriverine)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- x Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soil (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (Riverine)
- ___ Sediment Deposits (B2) (Riverine)
- ___ Drift Deposits (B3) (Riverine)
- x Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No	x	Depth (inches):	___
Water Table Present?	Yes ___	No	x	Depth (inches):	___
Saturation Present? (includes capillary fringe)	Yes ___	No	x	Depth (inches): (12 inch determination)	___

Wetland Hydrology Present? **Yes** x **No** ___

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks: Oxidation on rhizospheres, eroded channel in the low crease in the topography. Sediment and drift deposits may have been affected by recent fire.

Texture and Rock Fragment Content

Texture

- cos - coarse sand
- s - sand
- fs - fine sand
- vfs - very fine sand
- lcos - loamy coarse sand
- ls - loamy sand
- lfs - loamy fine sand
- lvfs - loamy very fine sand
- cosl - coarse sandy loam
- sl - sandy loam
- fsl - fine sandy loam
- vfsl - very fine sandy loam
- l - loam
- sil - silt loam
- si - silt
- scl - sandy clay loam
- cl - clay loam
- sicl - silty clay loam
- sc - sandy clay
- sic - silty clay
- c - clay

Rock Fragments

- gr - gravelly
- vgr - very gravelly
- xgr - extremely gravelly
- cb - cobbly
- vcb - very cobbly
- xcb - extremely cobbly
- st - stony
- vst - very stony
- xst - extremely stony

Redoximorphic Feature Morphology

Abundance

- f - few
- c - common
- m - many

Size

- 1 - fine (<2mm)
- 2 - medium 2–5mm)
- 3 - coarse (5–20mm)
- 4 - very coarse (20–76mm)
- 5 - extremely coarse (>76mm)

Type

- Fe-x - iron concentration (soft mass)
- Fe-nc - iron nodule or concretion
- Mn-x - manganese concentration (soft mass)
- Mn-nc - manganese nodule or concretion
- d - depletion

Contrast

- f - faint
- d - distinct
- p - prominent

WETLAND DETERMINATION FORM - Arid West Region

Project/Site:	Access Roads-Road 9 burned drainage upland	City/County:	San Diego	Sampling Date:	2-20-07
Applicant/Owner:	MCB Camp Pendleton	State:	CA	Sampling Point:	9-w8
Investigator(s):	Mike Dungan, Andrew Raaf, Melissa Tu	Section, Township, Range:	San Bernardino, T9S, R5W, sec26		
Landform (hillslope, terrace, etc.):	Valley adjacent to drainage	Local relief (concave, convex, none):	Flat	Slope (%):	5
Subregion (LRR):	LRR-C	Lat: 33° 21' 40.915"	Long: -117° 22' 7.877"	Datum:	NAD83
Soil Map Unit Name:	Salinas clay loam, 2-9% slopes			NWI classification:	

Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ____ (If no, explain in Remarks)

Are Vegetation ____, Soil ____, or Hydrology ____ significanly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ significanly disturbed? (If needed, explain any answers in Remarks).

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	**Is the Sampled Area within a wetland?**	Yes ____ No X
Hydric Soil Present?	Yes ____	No X		
Wetland Hydrology Presnt?	Yes ____	No X		

Remarks: Upland adjacent to the drainage channel is not a wetland

VEGETATION

Tree Stratum (Use scientific names) woody plan	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	0		
Sapling/Shrub Stratum (woody plants <3"dbh)			
1.			
2.			
3.			
4.			
5.			
Total Cover:	0		
Herb Stratum (non-woody plantss, regardless of size)			
Artemisia douglasiana	20	Y	FAC
Foeniculum vulgare	10	Y	FACU
Conicum maculatum	10	Y	FAC
Medicago polymorpha	10	Y	FACU
5.			
6.			
7.			
8.			
Total Cover:	50		
Woody Vine Stratum (regardless of size)			
1.			
2.			
Total Cover:			

% Bare gourd in Herb Stratum 5 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That are OBL, FACW, or FAC 0.50 (A/B) (must be >0.5)

Prevalence index worksheet (test when Hydro and Soils indicate wetlands)

Total % Cover (absolute) of:		Multiply by:	
OBL species		x 1 =	0
FACW species		x 2 =	0
FAC species	30	x 3 =	90
FACU species	20	x 4 =	80
UPL species		x 5 =	0
Coumn Totals:	50 (A)		170 (B)

Prevalence Index = B/A = 3.40 (must be ≤3.0)

Hydrophytic vegetation indicators

Y Dominance test is >50%

Y Prevalence index is ≤ 3.0[1]

N Morphological adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

N Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soils and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes** ____ **No** **X**

Remarks:

SOIL

Sampling point: 9-w8

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-1	10 YR 2/2					l	
1-3	10 YR 3/3					l	
3-12	10 YR 3/2					l	Clay pockets

[1]Type: C=Concretion, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR C)
- ___ Depleted Below Dark Surface (A11)
- ___ Thin Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Material (F1)
- ___ Loamy Gleyed Matrix (F3)
- ___ Depleted Matrix (F6)
- ___ Redox Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pool (F9)

Indicators for Problematic Hydric Soils:[3]

- ___ 1 cm Muck (A9) (LRR C)
- ___ 2 cm Muck (A 10) (LRR B)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

___ Listed on National/Local Hydric Soils List

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present

Restrictive Layer (if present):
Type: ___
Depth (inches): ___

Hydric Soil Present? **Yes** ___ **No** X

Remarks: No redox features

HYDROLOGY

Wetland Hydrology Indicators:

Primary indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (Nonriverine)
- ___ Sediment Deposits (B2) (Nonriverine)
- ___ Drift Deposits (B3) (Nonriverine)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soil (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (Riverine)
- ___ Sediment Deposits (B2) (Riverine)
- ___ Drift Deposits (B3) (Riverine)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No	x	Depth (inches): ___	
Water Table Present?	Yes ___	No	x	Depth (inches): ___	
Saturation Present? (includes capillary fringe)	Yes ___	No	x	Depth (inches): ___ (12 inch determination)	

Wetland Hydrology Present? **Yes** ___ **No** X

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Texture and Rock Fragment Content

Texture

- cos - coarse sand
- s - sand
- fs - fine sand
- vfs - very fine sand
- lcos - loamy coarse sand
- ls - loamy sand
- lfs - loamy fine sand
- lvfs - loamy very fine sand
- cosl - coarse sandy loam
- sl - sandy loam
- fsl - fine sandy loam
- vfsl - very fine sandy loam
- l - loam
- sil - silt loam
- si - silt
- scl - sandy clay loam
- cl - clay loam
- sicl - silty clay loam
- sc - sandy clay
- sic - silty clay
- c - clay

Rock Fragments

- gr - gravelly
- vgr - very gravelly
- xgr - extremely gravelly
- cb - cobbly
- vcb - very cobbly
- xcb - extremely cobbly
- st - stony
- vst - very stony
- xst - extremely stony

Redoximorphic Feature Morphology

Abundance

- f - few
- c - common
- m - many

Size

- 1 - fine (<2mm)
- 2 - medium 2–5mm)
- 3 - coarse (5–20mm)
- 4 - very coarse (20–76mm)
- 5 - extremely coarse (>76mm)

Type

- Fe-x - iron concentration (soft mass)
- Fe-nc - iron nodule or concretion
- Mn-x - manganese concentration (soft mass)
- Mn-nc - manganese nodule or concretion
- d - depletion

Contrast

- f - faint
- d - distinct
- p - prominent

WETLAND DETERMINATION FORM - Arid West Region

Project/Site:	Access Road 10 wetland channel	City/County:	San Diego	Sampling Date:	9-18-07
Applicant/Owner:	MCB Camp Pendleton	State:	CA	Sampling Point:	10-w1
Investigator(s):	AR, MD	Section, Township, Range:	San Bernardino, T8S, R5W, sec32		
Landform (hillslope, terrace, etc.):	Channel	Local relief (concave, convex, none):	Concave	Slope (%):	3
Subregion (LRR):	LRR-C	Lat: 33° 26' 22.959"	Long: -117° 25' 35.769"	Datum:	NAD83
Soil Map Unit Name:	Fallbrook rocky sandy loam, 9 to 30 percent slope, eroded			NWI classification:	

Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ____ (If no, explain in Remarks)

Are Vegetation ____, Soil ____, or Hydrology ____ significanly disturbed? Are "Normal Circumstances" present? Yes x No ____

Are Vegetation ____, Soil ____, or Hydrology ____ significanly disturbed? (If needed, explain any answers in Remarks).

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes x	No ____	**Is the Sampled Area within a wetland?**	Yes x No ____
Hydric Soil Present?	Yes x	No ____		
Wetland Hydrology Presnt?	Yes x	No ____		

Remarks:

VEGETATION

Tree Stratum (Use scientific names) woody plar	Absolute % Cover	Dominant Species?	Indicator Status
1. Platanus racemosa	8	Y	FACW
2.			
3.			
4.			
Total Cover:	8		
Sapling/Shrub Stratum (woody plants <3"dbh)			
1.			
2.			
3.			
4.			
5.			
Total Cover:			
Herb Stratum (non-woody plantss, regardless of size)			
1. Juncus effusus	60	Y	OBL
2. Xanthium spinosum	12	N	FAC
3. Rumex conglomoratus	10	N	FACW
4. Juncus effusus	8	N	FACW
5. Polypogon monospeliensis	8	N	FACW
5. Oenothera elata	2	N	FACW
7.			
8.			
Total Cover:	100		
Woody Vine Stratum (regardless of size)			
1.			
2.			
Total Cover:			

% Bare gourd in Herb Stratum 0 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That are OBL, FACW, or FAC 1.00 (A/B) (must be >0.5)

Prevalence index worksheet (test when Hydro and Soils indicate wetlands)

Total % Cover (absolute) of:			Multiply by:
OBL species	60	x 1 =	60
FACW species	30	x 2 =	60
FAC species	12	x 3 =	36
FACU species		x 4 =	0
UPL species		x 5 =	0
Coumn Totals:	102 (A)		156 (B)

Prevalence Index = B/A = 1.5294118 (must be ≤3.0)

Hydrophytic vegetation indicators

Y Dominance test is >50%

Y Prevalence index is ≤ 3.0[1]

____ Morphological adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soils and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes X No** ____

Remarks: Road crosses through drainage. Ambrosia sp. and other weedy species near disturbed road crossing.

SOIL

Sampling point: 10-w1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Type[1]	Loc[2]	Texture	Remarks
0-4	10 YR 2/2		5 YR 5/8	C	M	C	Mottles, concretions

[1]Type: C=Concretion, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR C)
- ___ Depleted Below Dark Surface (A11)
- ___ Thin Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Material (F1)
- ___ Loamy Gleyed Matrix (F3)
- ___ Depleted Matrix (F6)
- X Redox Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pool (F9)

Indicators for Problematic Hydric Soils:[3]

- ___ 1 cm Muck (A9) (LRR C)
- ___ 2 cm Muck (A 10) (LRR B)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

___ Listed on National/Local Hydric Soils List

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present

Restrictive Layer (if present):
Type:
Depth (inches):

Hydric Soil Present? Yes x No ___

Remarks: Soil is very dense clay. Unable to dig past 4 inches. Orange mottles in upper stratum. Heavy clay impedes drainage. Soil with surface cracks. Matrix is dark with >5% prominent redox concentrations.

HYDROLOGY

Wetland Hydrology Indicators:

Primary indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (Nonriverine)
- ___ Sediment Deposits (B2) (Nonriverine)
- ___ Drift Deposits (B3) (Nonriverine)
- x Surface Soil Cracks (B6)
- x Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- x Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soil (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (Riverine)
- ___ Sediment Deposits (B2) (Riverine)
- x Drift Deposits (B3) (Riverine)
- x Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No x	Depth (inches): ___
Water Table Present?	Yes ___	No x	Depth (inches): ___
Saturation Present? (includes capillary fringe)	Yes ___	No x	Depth (inches): ___ (12 inch determination)

Wetland Hydrology Present? Yes x No ___

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Surface water present in 2003 aerial photo.

Remarks: Site was saturated with standing water during February 2007 site visit.

Texture and Rock Fragment Content

Texture

cos - coarse sand
s - sand
fs - fine sand
vfs - very fine sand
lcos - loamy coarse sand
ls - loamy sand
lfs - loamy fine sand
lvfs - loamy very fine sand
cosl - coarse sandy loam
sl - sandy loam
fsl - fine sandy loam
vfsl - very fine sandy loam
l - loam
sil - silt loam
si - silt
scl - sandy clay loam
cl - clay loam
sicl - silty clay loam
sc - sandy clay
sic - silty clay
c - clay

Rock Fragments

gr - gravelly
vgr - very gravelly
xgr - extremely gravelly
cb - cobbly
vcb - very cobbly
xcb - extremely cobbly
st - stony
vst - very stony
xst - extremely stony

Redoximorphic Feature Morphology

Abundance

f - few
c - common
m - many

Size

1 - fine (<2mm)
2 - medium 2–5mm)
3 - coarse (5–20mm)
4 - very coarse (20–76mm)
5 - extremely coarse (>76mm)

Type

Fe-x - iron concentration (soft mass)
Fe-nc - iron nodule or concretion
Mn-x - manganese concentration (soft mass)
Mn-nc - manganese nodule or concretion
d - depletion

Contrast

f - faint
d - distinct
p - prominent

WETLAND DETERMINATION FORM - Arid West Region

Project/Site:	Access Road 10 draiange upland	City/County:	San Diego	Sampling Date:	9-18-07
Applicant/Owner:	MCB Camp Pendleton	State:	CA	Sampling Point:	10-w2
Investigator(s):	AR, MD	Section, Township, Range:	San Bernardino, T8S, R5W, sec32		
Landform (hillslope, terrace, etc.):	Hillslope	Local relief (concave, convex, none):	Slope	Slope (%):	3
Subregion (LRR):	LRR-C	Lat:	33° 26' 23.036"	Long: -117° 25' 35.601"	Datum: NAD83
Soil Map Unit Name:	Fallbrook rocky sandy loam, 9 to 30 percent slope, eroded			NWI classification:	

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks)

Are Vegetation ____, Soil ____, or Hydrology ____ significanly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ significanly disturbed? (If needed, explain any answers in Remarks).

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes		No	X
Hydric Soil Present?	Yes		No	X
Wetland Hydrology Presnt?	Yes		No	X

Is the Sampled Area within a wetland? Yes ____ No X

Remarks: For comparison with datapoint 10-w1

VEGETATION

Tree Stratum (Use scientific names) woody plar	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:			
Sapling/Shrub Stratum (woody plants <3"dbh)			
1.			
2.			
3.			
4.			
5.			
Total Cover:			
Herb Stratum (non-woody plantss, regardless of size)			
1. Avena barbata	30	Y	UPL
2. Bromus diandrus	30	Y	UPL
3. Brassica nigra	15	N	UPL
4. Ambrosia psilostachya	5	N	FAC
5.			
6.			
7.			
8.			
Total Cover:	80		
Woody Vine Stratum (regardless of size)			
1.			
2.			
Total Cover:			

% Bare gourd in Herb Stratum 20 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That are OBL, FACW, or FAC 0.00 (A/B) (must be >0.5)

Prevalence index worksheet (test when Hydro and Soils indicate wetlands)

Total % Cover (absolute) of:			Multiply by:
OBL species		x 1 =	0
FACW species		x 2 =	0
FAC species	5	x 3 =	15
FACU species		x 4 =	0
UPL species	75	x 5 =	375
Coumn Totals:	80 (A)		390 (B)

Prevalence Index = B/A = 4.875 (must be $\leq$3.0)

Hydrophytic vegetation indicators

N Dominance test is >50%

N Prevalence index is $\leq$ 3.0[1]

____ Morphological adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soils and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes** ____ **No** **X**

Remarks: Boundary noted at transition between Juncus community and Avena barbata community.a

SOIL

Sampling point: 10-w2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-5	10 YR 3/3					CL	Dense roots
5-12	10 YR 2/2					CL	Soil aggregated in small nodules

[1]Type: C=Concretion, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR C)
- ___ Depleted Below Dark Surface (A11)
- ___ Thin Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Material (F1)
- ___ Loamy Gleyed Matrix (F3)
- ___ Depleted Matrix (F6)
- ___ Redox Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pool (F9)

Indicators for Problematic Hydric Soils:[3]

- ___ 1 cm Muck (A9) (LRR C)
- ___ 2 cm Muck (A 10) (LRR B)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

___ Listed on National/Local Hydric Soils List

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present

Restrictive Layer (if present):
Type:
Depth (inches):

Hydric Soil Present? Yes ___ No x

Remarks: No redox features noted. Soil dry at all depths.

HYDROLOGY

Wetland Hydrology Indicators:

Primary indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (Nonriverine)
- ___ Sediment Deposits (B2) (Nonriverine)
- ___ Drift Deposits (B3) (Nonriverine)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soil (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (Riverine)
- ___ Sediment Deposits (B2) (Riverine)
- ___ Drift Deposits (B3) (Riverine)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No x	Depth (inches): ___
Water Table Present?	Yes ___	No x	Depth (inches): ___
Saturation Present? (includes capillary fringe)	Yes ___	No x	Depth (inches): ___ (12 inch determination)

Wetland Hydrology Present? Yes ___ No x

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks: Drainage channel boundary coincides with Juncus/Avena boundary.

Texture and Rock Fragment Content

Texture

- cos - coarse sand
- s - sand
- fs - fine sand
- vfs - very fine sand
- lcos - loamy coarse sand
- ls - loamy sand
- lfs - loamy fine sand
- lvfs - loamy very fine sand
- cosl - coarse sandy loam
- sl - sandy loam
- fsl - fine sandy loam
- vfsl - very fine sandy loam
- l - loam
- sil - silt loam
- si - silt
- scl - sandy clay loam
- cl - clay loam
- sicl - silty clay loam
- sc - sandy clay
- sic - silty clay
- c - clay

Rock Fragments

- gr - gravelly
- vgr - very gravelly
- xgr - extremely gravelly
- cb - cobbly
- vcb - very cobbly
- xcb - extremely cobbly
- st - stony
- vst - very stony
- xst - extremely stony

Redoximorphic Feature Morphology

Abundance

- f - few
- c - common
- m - many

Size

- 1 - fine (<2mm)
- 2 - medium 2–5mm)
- 3 - coarse (5–20mm)
- 4 - very coarse (20–76mm)
- 5 - extremely coarse (>76mm)

Type

- Fe-x - iron concentration (soft mass)
- Fe-nc - iron nodule or concretion
- Mn-x - manganese concentration (soft mass)
- Mn-nc - manganese nodule or concretion
- d - depletion

Contrast

- f - faint
- d - distinct
- p - prominent

WETLAND DETERMINATION FORM - Arid West Region

Project/Site:	Access Road 10 Hillside seep	City/County:	San Diego	Sampling Date:	9-18-07
Applicant/Owner:	MCB Camp Pendleton	State:	CA	Sampling Point:	10-w3
Investigator(s):	AR, MD	Section, Township, Range:	San Bernardino, T8S, R5W, sec32		
Landform (hillslope, terrace, etc.):	Hillslope	Local relief (concave, convex, none):	concave	Slope (%):	5
Subregion (LRR):	LRR-C	Lat:	33° 26' 37.649"	Long: -117° 25' 28.700"	Datum: NAD83
Soil Map Unit Name:	Fallbrook rocky sandy loam, 9 to 30 percent slope, eroded			NWI classification:	

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks)

Are Vegetation ____, Soil ____, or Hydrology ____ significanly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ significanly disturbed? (If needed, explain any answers in Remarks).

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area within a wetland?**	Yes X No ____
Hydric Soil Present?	Yes X	No ____		
Wetland Hydrology Presnt?	Yes X	No ____		

Remarks:

VEGETATION

Tree Stratum (Use scientific names) woody plar	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:			
Sapling/Shrub Stratum (woody plants <3"dbh)			
1. Baccharis salicifolia	80	Y	FACW
2.			
3.			
4.			
5.			
Total Cover:	80		
Herb Stratum (non-woody plantss, regardless of size)			
1. Juncus effusus	25	Y	OBL
2. Oenothera elata	20	Y	FACW
3. Carex praegracilis	20	Y	FACW
4.			
5.			
6.			
7.			
8.			
Total Cover:	65		
Woody Vine Stratum (regardless of size)			
1.			
2.			
Total Cover:			

% Bare gourd in Herb Stratum 25 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That are OBL, FACW, or FAC 1.00 (A/B) (must be >0.5)

Prevalence index worksheet (test when Hydro and Soils indicate wetlands)

Total % Cover (absolute) of:		Multiply by:	
OBL species	25	x 1 =	25
FACW species	120	x 2 =	240
FAC species		x 3 =	0
FACU species		x 4 =	0
UPL species		x 5 =	0
Coumn Totals:	145 (A)		265 (B)

Prevalence Index = B/A = 1.8275862 (must be ≤3.0)

Hydrophytic vegetation indicators

Y Dominance test is >50%

Y Prevalence index is ≤ 3.0[1]

____ Morphological adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soils and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes X** **No** ____

Remarks: An isloated seep in the hillside, also adjacent and upslope of a drainage channel. Coffeeberry (Rhamnus tomentella) at border of seep, but not within sampled wetland community. Further outside is upland dominated by Avena barbata and Bromus diandrus.

SOIL

Sampling point: 10-w3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-1	5 YR 2.5/1					L	Dense roots
1-6	10 YR 2/1					Si	
6-12	10 YR 3/1		5 YR 5/8			Si	Orange concretions 5%

[1]Type: C=Concretion, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR C)
- ___ Depleted Below Dark Surface (A11)
- ___ Thin Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Material (F1)
- ___ Loamy Gleyed Matrix (F3)
- ___ Depleted Matrix (F6)
- X Redox Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pool (F9)

Indicators for Problematic Hydric Soils:[3]

- ___ 1 cm Muck (A9) (LRR C)
- ___ 2 cm Muck (A 10) (LRR B)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

___ Listed on National/Local Hydric Soils List

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present

Restrictive Layer (if present):
Type:
Depth (inches):

Hydric Soil Present? Yes X No ___

Remarks: Prominent redox concretions and nodules at and below 6 inch depth.

HYDROLOGY

Wetland Hydrology Indicators:

Primary indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (Nonriverine)
- ___ Sediment Deposits (B2) (Nonriverine)
- ___ Drift Deposits (B3) (Nonriverine)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soil (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (Riverine)
- ___ Sediment Deposits (B2) (Riverine)
- ___ Drift Deposits (B3) (Riverine)
- x Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- x FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No x	Depth (inches): ___
Water Table Present?	Yes ___	No x	Depth (inches): ___
Saturation Present? (includes capillary fringe)	Yes ___	No x	Depth (inches): ___ (12 inch determination)

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks: Site shows wetland parameters. Indicators may be stronger during the wet season. The site appears to be a hillside seep with a restrictive soil layer. Bou

Texture and Rock Fragment Content

Texture

- cos - coarse sand
- s - sand
- fs - fine sand
- vfs - very fine sand
- lcos - loamy coarse sand
- ls - loamy sand
- lfs - loamy fine sand
- lvfs - loamy very fine sand
- cosl - coarse sandy loam
- sl - sandy loam
- fsl - fine sandy loam
- vfsl - very fine sandy loam
- l - loam
- sil - silt loam
- si - silt
- scl - sandy clay loam
- cl - clay loam
- sicl - silty clay loam
- sc - sandy clay
- sic - silty clay
- c - clay

Rock Fragments

- gr - gravelly
- vgr - very gravelly
- xgr - extremely gravelly
- cb - cobbly
- vcb - very cobbly
- xcb - extremely cobbly
- st - stony
- vst - very stony
- xst - extremely stony

Redoximorphic Feature Morphology

Abundance

- f - few
- c - common
- m - many

Size

- 1 - fine (<2mm)
- 2 - medium 2–5mm)
- 3 - coarse (5–20mm)
- 4 - very coarse (20–76mm)
- 5 - extremely coarse (>76mm)

Type

- Fe-x - iron concentration (soft mass)
- Fe-nc - iron nodule or concretion
- Mn-x - manganese concentration (soft mass)
- Mn-nc - manganese nodule or concretion
- d - depletion

Contrast

- f - faint
- d - distinct
- p - prominent

WETLAND DETERMINATION FORM - Arid West Region

Project/Site:	Access Road 10 Pond drainage	City/County:	San Diego	Sampling Date:	9-18-07
Applicant/Owner:	MCB Camp Pendleton	State:	CA	Sampling Point:	10-w4
Investigator(s):	AR, MD	Section, Township, Range:	San Bernardino, T8S, R5W, sec33		
Landform (hillslope, terrace, etc.):	Ditch	Local relief (concave, convex, none):	Concave	Slope (%):	3
Subregion (LRR):	LRR-C	Lat: 33° 26' 37.594"	Long: -117° 24' 43.578"	Datum:	NAD83
Soil Map Unit Name:	Fallbrook rocky sandy loam, 9 to 30 percent slope, eroded			NWI classification:	

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks)

Are Vegetation X , Soil ____ , or Hydrology ____ significanly disturbed? Are "Normal Circumstances" present? Yes ____ No X

Are Vegetation ____ , Soil ____ , or Hydrology ____ significanly disturbed? (If needed, explain any answers in Remarks).

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area within a wetland?**	Yes X No ____
Hydric Soil Present?	Yes X	No ____		
Wetland Hydrology Presnt?	Yes X	No ____		

Remarks: Recently burned (1 - 2 years ago). Drainage leading under Road 10 and into the fishing pond near Case Springs.

VEGETATION

Tree Stratum (Use scientific names) woody plar	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:			
Sapling/Shrub Stratum (woody plants <3"dbh)			
1.			
2.			
3.			
4.			
5.			
Total Cover:			
Herb Stratum (non-woody plantss, regardless of size)			
1. Stachys rigida ssp. quercetorum	30	Y	FACW
2. Juncus effusus	30	Y	OBL
3. Oenothera elata	20	Y	FACW
4. Typha sp.	10	N	OBL
5.			
6.			
7.			
8.			
Total Cover:	90		
Woody Vine Stratum (regardless of size)			
1.			
2.			
Total Cover:			

% Bare gourd in Herb Stratum 10 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That are OBL, FACW, or FAC 1.00 (A/B) (must be >0.5)

Prevalence index worksheet (test when Hydro and Soils indicate wetlands)

Total % Cover (absolute) of:			Multiply by:
OBL species	30	x 1 =	30
FACW species	50	x 2 =	100
FAC species		x 3 =	0
FACU species		x 4 =	0
UPL species		x 5 =	0
Coumn Totals:	80 (A)		130 (B)

Prevalence Index = B/A = 1.625 (must be ≤3.0)

Hydrophytic vegetation indicators

Y Dominance test is >50%

Y Prevalence index is ≤ 3.0[1]

____ Morphological adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soils and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes X** **No** ____

Remarks: Recently burned.

SOIL

Sampling point: 10-w4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-1/2	10 YR 2/2					CL	Ashy content in upper layer
1/2-8	10 yr 3/2		5 YR 4/6	1	m	CL	Common mottles, ~50%

[1]Type: C=Concretion, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR C)
- ___ Depleted Below Dark Surface (A11)
- ___ Thin Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Material (F1)
- ___ Loamy Gleyed Matrix (F3)
- ___ Depleted Matrix (F6)
- x Redox Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pool (F9)

Indicators for Problematic Hydric Soils:[3]

- ___ 1 cm Muck (A9) (LRR C)
- ___ 2 cm Muck (A 10) (LRR B)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

___ Listed on National/Local Hydric Soils List

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present

Restrictive Layer (if present):
Type:
Depth (inches):

Hydric Soil Present? Yes x No ___

Remarks: Very dense, solid clay below 8 inches. Mottles are common and high contrast throughout matrix.

HYDROLOGY

Wetland Hydrology Indicators:

Primary indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (Nonriverine)
- ___ Sediment Deposits (B2) (Nonriverine)
- ___ Drift Deposits (B3) (Nonriverine)
- x Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- x Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soil (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- x Water Marks (B1) (Riverine)
- x Sediment Deposits (B2) (Riverine)
- x Drift Deposits (B3) (Riverine)
- x Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No x	Depth (inches): ___
Water Table Present?	Yes ___	No x	Depth (inches): ___
Saturation Present? (includes capillary fringe)	Yes ___	No x	Depth (inches): ___ (12 inch determination)

Wetland Hydrology Present? Yes x No ___

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks: Ditch collects and conveys water to fishing pond. The site shows indicators of frequent inundation with alternating dry periods.

Texture and Rock Fragment Content

Texture

cos - coarse sand
s - sand
fs - fine sand
vfs - very fine sand
lcos - loamy coarse sand
ls - loamy sand
lfs - loamy fine sand
lvfs - loamy very fine sand
cosl - coarse sandy loam
sl - sandy loam
fsl - fine sandy loam
vfsl - very fine sandy loam
l - loam
sil - silt loam
si - silt
scl - sandy clay loam
cl - clay loam
sicl - silty clay loam
sc - sandy clay
sic - silty clay
c - clay

Rock Fragments

gr - gravelly
vgr - very gravelly
xgr - extremely gravelly
cb - cobbly
vcb - very cobbly
xcb - extremely cobbly
st - stony
vst - very stony
xst - extremely stony

Redoximorphic Feature Morphology

Abundance

f - few
c - common
m - many

Size

1 - fine (<2mm)
2 - medium 2–5mm)
3 - coarse (5–20mm)
4 - very coarse (20–76mm)
5 - extremely coarse (>76mm)

Type

Fe-x - iron concentration (soft mass)
Fe-nc - iron nodule or concretion
Mn-x - manganese concentration (soft mass)
Mn-nc - manganese nodule or concretion
d - depletion

Contrast

f - faint
d - distinct
p - prominent

WETLAND DETERMINATION FORM - Arid West Region

Project/Site:	Access Road 10 Pond Upland	City/County:	San Diego	Sampling Date:	9-18-07
Applicant/Owner:	MCB Camp Pendleton	State:	CA	Sampling Point:	10-w5
Investigator(s):	AR, MD	Section, Township, Range:	San Bernardino, T8S, R5W, sec33		
Landform (hillslope, terrace, etc.):	Hillslope	Local relief (concave, convex, none):	None	Slope (%):	0-1
Subregion (LRR):	LRR-C	Lat: 33° 26' 37.759"	Long: -117° 24' 43.657"	Datum:	NAD83
Soil Map Unit Name:	Fallbrook rocky sandy loam, 9 to 30 percent slope, eroded			NWI classification:	

Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ____ (If no, explain in Remarks)

Are Vegetation X , Soil ____ , or Hydrology ____ significanly disturbed? Are "Normal Circumstances" present? Yes ____ No X

Are Vegetation ____ , Soil ____ , or Hydrology ____ significanly disturbed? (If needed, explain any answers in Remarks).

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes		No	x
Hydric Soil Present?	Yes		No	x
Wetland Hydrology Presnt?	Yes		No	x

Is the Sampled Area within a wetland? Yes ____ No x

Remarks: Recently burned (1 - 2 years ago).

VEGETATION

Tree Stratum (Use scientific names) woody plar	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:			
Sapling/Shrub Stratum (woody plants <3"dbh)			
1.			
2.			
3.			
4.			
5.			
Total Cover:			
Herb Stratum (non-woody plantss, regardless of size)			
1. Isocoma menziesii	8	Y	FAC
2. Nassella pulchra	8	Y	UPL
3. Brassica nigra	7	N	UPL
4.			
5.			
6.			
7.			
8.			
Total Cover:	25		
Woody Vine Stratum (regardless of size)			
1.			
2.			
Total Cover:			

% Bare gourd in Herb Stratum 75 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That are OBL, FACW, or FAC 0.50 (A/B) (must be >0.5)

Prevalence index worksheet (test when Hydro and Soils indicate wetlands)

Total % Cover (absolute) of:			Multiply by:
OBL species		x 1 =	0
FACW species		x 2 =	0
FAC species	8	x 3 =	24
FACU species		x 4 =	0
UPL species	15	x 5 =	75
Coumn Totals:	23 (A)		99 (B)

Prevalence Index = B/A = 4.3043478 (must be ≤3.0)

Hydrophytic vegetation indicators

N Dominance test is >50%

N Prevalence index is ≤ 3.0[1]

____ Morphological adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soils and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes** ____ **No** **X**

Remarks: Recently burned. Nassella pulchra and Isocoma menziesii resprouting.

SOIL

Sampling point: 10-w5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-15	10 YR 2/2					CL	Dry throughout

[1]Type: C=Concretion, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR C)
- ___ Depleted Below Dark Surface (A11)
- ___ Thin Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Material (F1)
- ___ Loamy Gleyed Matrix (F3)
- ___ Depleted Matrix (F6)
- ___ Redox Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pool (F9)

Indicators for Problematic Hydric Soils:[3]

- ___ 1 cm Muck (A9) (LRR C)
- ___ 2 cm Muck (A 10) (LRR B)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

___ Listed on National/Local Hydric Soils List

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present

Restrictive Layer (if present):
Type:
Depth (inches):

Hydric Soil Present? **Yes** ___ **No** **X**

Remarks: Soil with dark color, but no redox features.

HYDROLOGY

Wetland Hydrology Indicators:

Primary indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (Nonriverine)
- ___ Sediment Deposits (B2) (Nonriverine)
- ___ Drift Deposits (B3) (Nonriverine)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soil (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (Riverine)
- ___ Sediment Deposits (B2) (Riverine)
- ___ Drift Deposits (B3) (Riverine)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): ___
Water Table Present?	Yes ___	No X	Depth (inches): ___
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches): ___ (12 inch determination)

Wetland Hydrology Present? **Yes** ___ **No** **X**

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Texture and Rock Fragment Content

Texture

cos - coarse sand
s - sand
fs - fine sand
vfs - very fine sand
lcos - loamy coarse sand
ls - loamy sand
lfs - loamy fine sand
lvfs - loamy very fine sand
cosl - coarse sandy loam
sl - sandy loam
fsl - fine sandy loam
vfsl - very fine sandy loam
l - loam
sil - silt loam
si - silt
scl - sandy clay loam
cl - clay loam
sicl - silty clay loam
sc - sandy clay
sic - silty clay
c - clay

Rock Fragments

gr - gravelly
vgr - very gravelly
xgr - extremely gravelly
cb - cobbly
vcb - very cobbly
xcb - extremely cobbly
st - stony
vst - very stony
xst - extremely stony

Redoximorphic Feature Morphology

Abundance

f - few
c - common
m - many

Size

1 - fine (<2mm)
2 - medium 2–5mm)
3 - coarse (5–20mm)
4 - very coarse (20–76mm)
5 - extremely coarse (>76mm)

Type

Fe-x - iron concentration (soft mass)
Fe-nc - iron nodule or concretion
Mn-x - manganese concentration (soft mass)
Mn-nc - manganese nodule or concretion
d - depletion

Contrast

f - faint
d - distinct
p - prominent

WETLAND DETERMINATION FORM - Arid West Region

Project/Site:	Access Road 12 Aliso Canyon Oscar 2 area	City/County:	San Diego	Sampling Date:	3-9-07
Applicant/Owner:	MCB Camp Pendleton	State:	CA	Sampling Point:	12-w1
Investigator(s):	MD, RK	Section, Township, Range:	San Bernardino, T10S, R5W, sec29		
Landform (hillslope, terrace, etc.):	Floodplain with old braided channels	Local relief (concave, convex, none):	Concave	Slope (%):	5
Subregion (LRR):	LRR-C	Lat: 33° 16' 17.247"	Long: -117° 26' 6.253"	Datum:	NAD83
Soil Map Unit Name:	Salinas clay loam, 0-2% slopes			NWI classification:	

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks)

Are Vegetation ____, Soil ____, or Hydrology ____ significanly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ significanly disturbed? (If needed, explain any answers in Remarks).

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area within a wetland?**	Yes ____ No X
Hydric Soil Present?	Yes ____	No X		
Wetland Hydrology Presnt?	Yes ____	No X		

Remarks:

VEGETATION

Tree Stratum (Use scientific names) woody plants >3" dbh	Absolute % Cover	Dominant Species?	Indicator Status
Salix lasiolepis	20	Y	FACW
2.			
3.			
4.			
Total Cover:	20		
Sapling/Shrub Stratum (woody plants <3"dbh)			
Baccharis salicifolia	75	Y	FACW
Baccharis pilularis	25	n	UPL
3.			
4.			
5.			
Total Cover:	100		
Herb Stratum (non-woody plantss, regardless of size)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
Total Cover:			
Woody Vine Stratum (regardless of size)			
1.			
2.			
Total Cover:			

% Bare gourd in Herb Stratum 0 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That are OBL, FACW, or FAC 1.00 (A/B) (must be >0.5)

Prevalence index worksheet (test when Hydro and Soils indicate wetlands)

Total % Cover (absolute) of:			Multiply by:
OBL species		x 1 =	0
FACW species	95	x 2 =	190
FAC species		x 3 =	0
FACU species		x 4 =	0
UPL species	25	x 5 =	125
Coumn Totals:	120 (A)		315 (B)

Prevalence Index = B/A = 2.625 (must be ≤3.0)

Hydrophytic vegetation indicators

Y Dominance test is >50%

Y Prevalence index is ≤ 3.0[1]

____ Morphological adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soils and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes X** **No** ____

Remarks: Duff and leaf litter.

SOIL

Sampling point: 12-w1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-12	10 YR 3/2					SiL	Well-drained, sticky.

[1]Type: C=Concretion, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR C)
- ___ Depleted Below Dark Surface (A11)
- ___ Thin Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Material (F1)
- ___ Loamy Gleyed Matrix (F3)
- ___ Depleted Matrix (F6)
- ___ Redox Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pool (F9)

Indicators for Problematic Hydric Soils:[3]

- ___ 1 cm Muck (A9) (LRR C)
- ___ 2 cm Muck (A 10) (LRR B)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

___ Listed on National/Local Hydric Soils List

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present

Restrictive Layer (if present):
Type:
Depth (inches):

Hydric Soil Present? **Yes** ___ **No** **X**

Remarks: Moist but not saturated

HYDROLOGY

Wetland Hydrology Indicators:

Primary indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (Nonriverine)
- ___ Sediment Deposits (B2) (Nonriverine)
- ___ Drift Deposits (B3) (Nonriverine)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soil (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (Riverine)
- ___ Sediment Deposits (B2) (Riverine)
- ___ Drift Deposits (B3) (Riverine)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No	x	Depth (inches):	___
Water Table Present?	Yes ___	No	x	Depth (inches):	___
Saturation Present? (includes capillary fringe)	Yes ___	No	x	Depth (inches): (12 inch determination)	___

Wetland Hydrology Present? **Yes** ___ **No** **X**

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks: Non-wetland, non-water of the U.S.

Texture and Rock Fragment Content

Texture

- cos - coarse sand
- s - sand
- fs - fine sand
- vfs - very fine sand
- lcos - loamy coarse sand
- ls - loamy sand
- lfs - loamy fine sand
- lvfs - loamy very fine sand
- cosl - coarse sandy loam
- sl - sandy loam
- fsl - fine sandy loam
- vfsl - very fine sandy loam
- l - loam
- sil - silt loam
- si - silt
- scl - sandy clay loam
- cl - clay loam
- sicl - silty clay loam
- sc - sandy clay
- sic - silty clay
- c - clay

Rock Fragments

- gr - gravelly
- vgr - very gravelly
- xgr - extremely gravelly
- cb - cobbly
- vcb - very cobbly
- xcb - extremely cobbly
- st - stony
- vst - very stony
- xst - extremely stony

Redoximorphic Feature Morphology

Abundance

- f - few
- c - common
- m - many

Size

- 1 - fine (<2mm)
- 2 - medium 2–5mm)
- 3 - coarse (5–20mm)
- 4 - very coarse (20–76mm)
- 5 - extremely coarse (>76mm)

Type

- Fe-x - iron concentration (soft mass)
- Fe-nc - iron nodule or concretion
- Mn-x - manganese concentration (soft mass)
- Mn-nc - manganese nodule or concretion
- d - depletion

Contrast

- f - faint
- d - distinct
- p - prominent

WETLAND DETERMINATION FORM - Arid West Region

Project/Site:	Access Road 13, Culvert Upstream	City/County:	San Diego	Sampling Date:	2-27-07
Applicant/Owner:	MCB Camp Pendleton	State:	CA	Sampling Point:	13-w20
Investigator(s):	AR, MD	Section, Township, Range:	San Bernardino, T9S, R6W, sec24		
Landform (hillslope, terrace, etc.):	Ditch	Local relief (concave, convex, none):	Concave	Slope (%):	5-10
Subregion (LRR):	LRR-C	Lat: 33° 22' 44.740"	Long: -117° 27' 36.825"	Datum:	NAD83
Soil Map Unit Name:	Steep gullied land			NWI classification:	

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks)

Are Vegetation ____, Soil ____, or Hydrology ____ significanly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ significanly disturbed? (If needed, explain any answers in Remarks).

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area within a wetland?**	Yes ____ No X
Hydric Soil Present?	Yes ____	No X		
Wetland Hydrology Presnt?	Yes X	No ____		

Remarks:

VEGETATION

Tree Stratum (Use scientific names) woody plar	Absolute % Cover	Dominant Species?	Indicator Status
Platanus racemosa	10	Y	FACW
Salix lasiolepis	10	Y	FACW
3.			
4.			
Total Cover:	25		
Sapling/Shrub Stratum (woody plants <3"dbh)			
Baccharis salicifolia	50	Y	FACW
2.			
3.			
4.			
5.			
Total Cover:			
Herb Stratum (non-woody plantss, regardless of size)			
Conium maculatum	40	Y	FAC
Cyperus eragrostis	15	Y	FACW
Unknown #1	10	n	
Xanthium strumariaum	5	n	FAC
5.			
6.			
7.			
8.			
Total Cover:	80		
Woody Vine Stratum (regardless of size)			
1.			
2.			
Total Cover:			

% Bare gourd in Herb Stratum 20 % Cover of Biotic Crust <3

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That are OBL, FACW, or FAC 1.00 (A/B) (must be >0.5)

Prevalence index worksheet (test when Hydro and Soils indicate wetlands)

Total % Cover (absolute) of:			Multiply by:
OBL species		x 1 =	0
FACW species	35	x 2 =	70
FAC species	45	x 3 =	135
FACU species		x 4 =	0
UPL species		x 5 =	0
Coumn Totals:	80 (A)		205 (B)

Prevalence Index = B/A = 2.5625 (must be ≤3.0)

Hydrophytic vegetation indicators

Y Dominance test is >50%

Y Prevalence index is ≤ 3.0[1]

____ Morphological adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soils and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks:

SOIL

Sampling point: 13-w20

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-1/2	10 YR 3/2					S	
1/2-6	10 YR 4/2					S	
6-7	2.5 Y 1/1					Si	high organic matter, nearly black
7-9	2.5 Y 2.5/1					SiC	high organic matter
9-12+	10 YR 4/2					S	

[1]Type: C=Concretion, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR C)
- ___ Depleted Below Dark Surface (A11)
- ___ Thin Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Material (F1)
- ___ Loamy Gleyed Matrix (F3)
- ___ Depleted Matrix (F6)
- ___ Redox Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pool (F9)

Indicators for Problematic Hydric Soils:[3]

- ___ 1 cm Muck (A9) (LRR C)
- ___ 2 cm Muck (A 10) (LRR B)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

___ Listed on National/Local Hydric Soils List

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present

Restrictive Layer (if present):
Type:
Depth (inches):

Hydric Soil Present? **Yes** ___ **No** X

Remarks: Surface layer of duff and organic matter. Fine sediment and organic matter at 7 inches is dark and has organic material, but is not mucky or peaty. Sandy and well drained below. Rain one hour before sample, and soil is moist but not highly wet or saturated.

HYDROLOGY

Wetland Hydrology Indicators:

Primary indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (Nonriverine)
- ___ Sediment Deposits (B2) (Nonriverine)
- ___ Drift Deposits (B3) (Nonriverine)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soil (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (Riverine)
- X Sediment Deposits (B2) (Riverine)
- X Drift Deposits (B3) (Riverine)
- X Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No x	Depth (inches): ___	
Water Table Present?	Yes ___	No x	Depth (inches): ___	
Saturation Present? (includes capillary fringe)	Yes ___	No x	Depth (inches): ___ (12 inch determination)	

Wetland Hydrology Present? **Yes** x **No** ___

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Texture and Rock Fragment Content

Texture

cos - coarse sand
s - sand
fs - fine sand
vfs - very fine sand
lcos - loamy coarse sand
ls - loamy sand
lfs - loamy fine sand
lvfs - loamy very fine sand
cosl - coarse sandy loam
sl - sandy loam
fsl - fine sandy loam
vfsl - very fine sandy loam
l - loam
sil - silt loam
si - silt
scl - sandy clay loam
cl - clay loam
sicl - silty clay loam
sc - sandy clay
sic - silty clay
c - clay

Rock Fragments

gr - gravelly
vgr - very gravelly
xgr - extremely gravelly
cb - cobbly
vcb - very cobbly
xcb - extremely cobbly
st - stony
vst - very stony
xst - extremely stony

Redoximorphic Feature Morphology

Abundance

f - few
c - common
m - many

Size

1 - fine (<2mm)
2 - medium 2–5mm)
3 - coarse (5–20mm)
4 - very coarse (20–76mm)
5 - extremely coarse (>76mm)

Type

Fe-x - iron concentration (soft mass)
Fe-nc - iron nodule or concretion
Mn-x - manganese concentration (soft mass)
Mn-nc - manganese nodule or concretion
d - depletion

Contrast

f - faint
d - distinct
p - prominent

WETLAND DETERMINATION FORM - Arid West Region

Project/Site:	Access Road 14 depression/basin	City/County:	San Diego	Sampling Date:	4-26-07
Applicant/Owner:	MCB Camp Pendleton	State:	CA	Sampling Point:	14-w1
Investigator(s):	AR, MD	Section, Township, Range:	San Bernardino, T10S, R4W, sec11		
Landform (hillslope, terrace, etc.):	Hillslope	Local relief (concave, convex, none):	Slope/concave	Slope (%):	5
Subregion (LRR):	LRR-C	Lat: 33° 18' 48.758"	Long: -117° 16' 33.665"	Datum:	NAD83
Soil Map Unit Name:	Fallbrook sandy loam, 5 to 9 percent slopes			NWI classification:	

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks)

Are Vegetation ____, Soil ____, or Hydrology ____ significanly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ significanly disturbed? (If needed, explain any answers in Remarks).

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes		No	x
Hydric Soil Present?	Yes		No	x
Wetland Hydrology Presnt?	Yes		No	x

Is the Sampled Area within a wetland? Yes ____ No x

Remarks: Small depression at roadside. WUS channel goes through the basin. Moist, but not wet. Area analyzed for potential wetland status.

VEGETATION

Tree Stratum (Use scientific names) woody plants >3" dbh	Absolute % Cover	Dominant Species?	Indicator Status
Quercus agrifolia	40	Y	UPL
2.			
3.			
4.			
Total Cover:	40		
Sapling/Shrub Stratum (woody plants <3"dbh)			
Artemisia douglasiana	30	Y	FAC
Quercus agrifolia	20	Y	UPL
Baccharis pilularis	10	N	UPL
Malosma laurelina	5	N	UPL
5.			
Total Cover:	65		
Herb Stratum (non-woody plantss, regardless of size)			
Juncus xiphioides	80	Y	OBL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
Total Cover:	80		
Woody Vine Stratum (regardless of size)			
1.			
2.			
Total Cover:			

% Bare gourd in Herb Stratum 20 % Cover of Biotic Crust ____

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That are OBL, FACW, or FAC 0.50 (A/B) (must be >0.5)

Prevalence index worksheet (test when Hydro and Soils indicate wetlands)

Total % Cover (absolute) of:			Multiply by:
OBL species	80	x 1 =	80
FACW species		x 2 =	0
FAC species	30	x 3 =	90
FACU species		x 4 =	0
UPL species	60	x 5 =	300
Coumn Totals:	170 (A)		470 (B)

Prevalence Index = B/A = 2.7647059 (must be ≤3.0)

Hydrophytic vegetation indicators

N Dominance test is >50%

Y Prevalence index is ≤ 3.0[1]

____ Morphological adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soils and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes** ____ **No** **x**

Remarks:

SOIL

Sampling point: 14-w1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 3/3		5 YR 4/6	mottle	C2d	LS	Color variable in the sandy matrix
7-12	10 YR 4/3					ALS	No mottles, dry throughout

[1]Type: C=Concretion, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR C)
- ___ Depleted Below Dark Surface (A11)
- ___ Thin Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Material (F1)
- ___ Loamy Gleyed Matrix (F3)
- ___ Depleted Matrix (F6)
- ___ Redox Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pool (F9)

Indicators for Problematic Hydric Soils:[3]

- ___ 1 cm Muck (A9) (LRR C)
- ___ 2 cm Muck (A 10) (LRR B)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

___ Listed on National/Local Hydric Soils List

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present

Restrictive Layer (if present):
Type:
Depth (inches):

Hydric Soil Present? **Yes** ___ **No** x

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (Nonriverine)
- ___ Sediment Deposits (B2) (Nonriverine)
- ___ Drift Deposits (B3) (Nonriverine)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soil (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (Riverine)
- ___ Sediment Deposits (B2) (Riverine)
- ___ Drift Deposits (B3) (Riverine)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No ___ Depth (inches): ___
Water Table Present? Yes ___ No ___ Depth (inches): ___
Saturation Present? Yes ___ No ___ Depth (inches): ___
(includes capillary fringe) (12 inch determination)

Wetland Hydrology Present? **Yes** ___ **No** x

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks: Lowland, but not recent drainage lines. WUS runds along the northern edge, but it's very narrow (<0.5m)

Texture and Rock Fragment Content

Texture

cos - coarse sand
s - sand
fs - fine sand
vfs - very fine sand
lcos - loamy coarse sand
ls - loamy sand
lfs - loamy fine sand
lvfs - loamy very fine sand
cosl - coarse sandy loam
sl - sandy loam
fsl - fine sandy loam
vfsl - very fine sandy loam
l - loam
sil - silt loam
si - silt
scl - sandy clay loam
cl - clay loam
sicl - silty clay loam
sc - sandy clay
sic - silty clay
c - clay

Rock Fragments

gr - gravelly
vgr - very gravelly
xgr - extremely gravelly
cb - cobbly
vcb - very cobbly
xcb - extremely cobbly
st - stony
vst - very stony
xst - extremely stony

Redoximorphic Feature Morphology

Abundance

f - few
c - common
m - many

Size

1 - fine (<2mm)
2 - medium 2–5mm)
3 - coarse (5–20mm)
4 - very coarse (20–76mm)
5 - extremely coarse (>76mm)

Type

Fe-x - iron concentration (soft mass)
Fe-nc - iron nodule or concretion
Mn-x - manganese concentration (soft mass)
Mn-nc - manganese nodule or concretion
d - depletion

Contrast

f - faint
d - distinct
p - prominent

WETLAND DETERMINATION FORM - Arid West Region

Project/Site:	Access Road 14 wet channel	City/County:	San Diego	Sampling Date:	4-26-07
Applicant/Owner:	MCB Camp Pendleton	State:	CA	Sampling Point:	14-w2
Investigator(s):	AR, MD	Section, Township, Range:	San Bernardino, T10S, R4W, sec11		
Landform (hillslope, terrace, etc.):	Channel	Local relief (concave, convex, none):	Concave	Slope (%):	5
Subregion (LRR):	LRR-C	Lat: 33° 18' 53.588"	Long: -117° 16' 35.586"	Datum:	NAD83
Soil Map Unit Name:	Bonsall sandy loam, 2 to 9 percent slopes			NWI classification:	

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks)

Are Vegetation ____, Soil ____, or Hydrology ____ significanly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ significanly disturbed? (If needed, explain any answers in Remarks).

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes x	No	**Is the Sampled Area within a wetland?**	Yes x No
Hydric Soil Present?	Yes x	No		
Wetland Hydrology Presnt?	Yes x	No		

Remarks:

VEGETATION

Tree Stratum (Use scientific names) woody plants >3" dbh	Absolute % Cover	Dominant Species?	Indicator Status
Quercus agrifolia	80	Y	UPL
2.			
3.			
4.			
Total Cover:	80		
Sapling/Shrub Stratum (woody plants <3"dbh)			
Salix spp.	20	Y	FACW
Toxicodendron diversilobum	10	Y	UPL
Malosma laurelina	5	N	UPL
4.			
5.			
Total Cover:	50		
Herb Stratum (non-woody plantss, regardless of size)			
Eleocharis macrostachya	50	Y	OBL
Anemopsis californica	10	N	OBL
Rorippa nasturtium-aquaticum	5	N	OBL
4.			
5.			
6.			
7.			
8.			
Total Cover:	70		
Woody Vine Stratum (regardless of size)			
1.			
2.			
Total Cover:			

% Bare gourd in Herb Stratum 30 % Cover of Biotic Crust ____

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That are OBL, FACW, or FAC 1.00 (A/B) (must be >0.5)

Prevalence index worksheet (test when Hydro and Soils indicate wetlands)

Total % Cover (absolute) of:			Multiply by:
OBL species	65	x 1 =	65
FACW species	20	x 2 =	40
FAC species		x 3 =	0
FACU species		x 4 =	0
UPL species	15	x 5 =	75
Coumn Totals:	100 (A)		180 (B)

Prevalence Index = B/A = 1.8 (must be $\leq$3.0)

Hydrophytic vegetation indicators

Y Dominance test is >50%

Y Prevalence index is $\leq$ 3.0[1]

____ Morphological adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soils and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks:

SOIL

Sampling point: 14-w2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Type[1]	Loc[2]	Texture	Remarks
0-1	10YR 3/2					cl	High organinc matter in clumps
1-5	2.5 Y 2/2					scl	
6-12	10 YR 3/1		2.5 YR 4/8	c	m	cl	A few small redox grains, fine texture

[1]Type: C=Concretion, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR C)
- ___ Depleted Below Dark Surface (A11)
- ___ Thin Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Material (F1)
- ___ Loamy Gleyed Matrix (F3)
- ___ Depleted Matrix (F6)
- x Redox Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pool (F9)

Indicators for Problematic Hydric Soils:[3]

- ___ 1 cm Muck (A9) (LRR C)
- ___ 2 cm Muck (A 10) (LRR B)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

___ Listed on National/Local Hydric Soils List

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present

Restrictive Layer (if present):
Type:
Depth (inches):

Hydric Soil Present? Yes x No ___

Remarks: Organic matter nodules in upper layer nearly black (10 YR 2/1). Redox grains in lower stratum variable in color, but generally reddish. Clay texture at depth retards percolation.

HYDROLOGY

Wetland Hydrology Indicators:

Primary indicators (any one indicator is sufficient)

- x Surface Water (A1)
- x High Water Table (A2)
- x Saturation (A3)
- x Water Marks (B1) (Nonriverine)
- x Sediment Deposits (B2) (Nonriverine)
- ___ Drift Deposits (B3) (Nonriverine)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- x Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soil (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- x Water Marks (B1) (Riverine)
- ___ Sediment Deposits (B2) (Riverine)
- ___ Drift Deposits (B3) (Riverine)
- x Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes X	No ___	Depth (inches): ___	
Water Table Present?	Yes X	No ___	Depth (inches): 6	
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches): 4 (12 inch determination)	

Wetland Hydrology Present? Yes x No ___

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Texture and Rock Fragment Content

Texture

- cos - coarse sand
- s - sand
- fs - fine sand
- vfs - very fine sand
- lcos - loamy coarse sand
- ls - loamy sand
- lfs - loamy fine sand
- lvfs - loamy very fine sand
- cosl - coarse sandy loam
- sl - sandy loam
- fsl - fine sandy loam
- vfsl - very fine sandy loam
- l - loam
- sil - silt loam
- si - silt
- scl - sandy clay loam
- cl - clay loam
- sicl - silty clay loam
- sc - sandy clay
- sic - silty clay
- c - clay

Rock Fragments

- gr - gravelly
- vgr - very gravelly
- xgr - extremely gravelly
- cb - cobbly
- vcb - very cobbly
- xcb - extremely cobbly
- st - stony
- vst - very stony
- xst - extremely stony

Redoximorphic Feature Morphology

Abundance

- f - few
- c - common
- m - many

Size

- 1 - fine (<2mm)
- 2 - medium 2–5mm)
- 3 - coarse (5–20mm)
- 4 - very coarse (20–76mm)
- 5 - extremely coarse (>76mm)

Type

- Fe-x - iron concentration (soft mass)
- Fe-nc - iron nodule or concretion
- Mn-x - manganese concentration (soft mass)
- Mn-nc - manganese nodule or concretion
- d - depletion

Contrast

- f - faint
- d - distinct
- p - prominent

WETLAND DETERMINATION FORM - Arid West Region

Project/Site:	Access Road 14 channel bank	City/County:	San Diego	Sampling Date:	4-26-07
Applicant/Owner:	MCB Camp Pendleton	State:	CA	Sampling Point:	14-w3
Investigator(s):	AR, MD	Section, Township, Range:	San Bernardino, T10S, R4W, sec11		
Landform (hillslope, terrace, etc.):	Channel bank/terrace	Local relief (concave, convex, none):	Slope	Slope (%):	10-20
Subregion (LRR):	LRR-C	Lat: 33° 18' 53.827"	Long: -117° 16' 35.515"	Datum:	NAD83
Soil Map Unit Name:	Bonsall sandy loam, 2 to 9 percent slopes			NWI classification:	

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks)

Are Vegetation ____, Soil ____, or Hydrology ____ significanly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ significanly disturbed? (If needed, explain any answers in Remarks).

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes		No	X
Hydric Soil Present?	Yes		No	X
Wetland Hydrology Presnt?	Yes		No	X

Is the Sampled Area within a wetland? Yes ____ No X

Remarks: Bank along channel (point 14wt2)

VEGETATION

Tree Stratum (Use scientific names) woody plants >3" dbh	Absolute % Cover	Dominant Species?	Indicator Status
Quercus agrifolia	95	Y	UPL
2.			
3.			
4.			
Total Cover:	95		
Sapling/Shrub Stratum (woody plants <3"dbh)			
Quercus agrifolia	20	Y	UPL
Rhus integrifolia	10	Y	UPL
Malosma laurelina	10	Y	UPL
4.			
5.			
Total Cover:	50		
Herb Stratum (non-woody plantss, regardless of size)			
Carex sp.	40	Y	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
Total Cover:	45		
Woody Vine Stratum (regardless of size)			
1.			
2.			
Total Cover:			

% Bare gourd in Herb Stratum 55 % Cover of Biotic Crust ____

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That are OBL, FACW, or FAC 0.20 (A/B) (must be >0.5)

Prevalence index worksheet (test when Hydro and Soils indicate wetlands)

Total % Cover (absolute) of:			Multiply by:
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	40	x 3 =	120
FACU species		x 4 =	0
UPL species	135	x 5 =	675
Coumn Totals:	175	(A)	795 (B)

Prevalence Index = B/A = 4.5428571 (must be ≤3.0)

Hydrophytic vegetation indicators

N Dominance test is >50%

N Prevalence index is ≤ 3.0[1]

____ Morphological adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soils and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes** ____ **No** **X**

Remarks:

SOIL

Sampling point: 14-w3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-3	10 YR 3/3					l	duff, dense roots
3-10	7.5 YR 3/4					fsl	Large woody roots

[1]Type: C=Concretion, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR C)
- ___ Depleted Below Dark Surface (A11)
- ___ Thin Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Material (F1)
- ___ Loamy Gleyed Matrix (F3)
- ___ Depleted Matrix (F6)
- x Redox Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pool (F9)

Indicators for Problematic Hydric Soils:[3]

- ___ 1 cm Muck (A9) (LRR C)
- ___ 2 cm Muck (A 10) (LRR B)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

___ Listed on National/Local Hydric Soils List

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present

Restrictive Layer (if present):
Type:
Depth (inches):

Hydric Soil Present? Yes ___ No X

Remarks: Dry at all depths

HYDROLOGY

Wetland Hydrology Indicators:

Primary indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (Nonriverine)
- ___ Sediment Deposits (B2) (Nonriverine)
- ___ Drift Deposits (B3) (Nonriverine)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soil (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (Riverine)
- ___ Sediment Deposits (B2) (Riverine)
- ___ Drift Deposits (B3) (Riverine)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No x	Depth (inches): ___	
Water Table Present?	Yes ___	No x	Depth (inches): ___	
Saturation Present? (includes capillary fringe)	Yes ___	No x	Depth (inches): ___ (12 inch determination)	

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Texture and Rock Fragment Content

Texture

cos - coarse sand
s - sand
fs - fine sand
vfs - very fine sand
lcos - loamy coarse sand
ls - loamy sand
lfs - loamy fine sand
lvfs - loamy very fine sand
cosl - coarse sandy loam
sl - sandy loam
fsl - fine sandy loam
vfsl - very fine sandy loam
l - loam
sil - silt loam
si - silt
scl - sandy clay loam
cl - clay loam
sicl - silty clay loam
sc - sandy clay
sic - silty clay
c - clay

Rock Fragments

gr - gravelly
vgr - very gravelly
xgr - extremely gravelly
cb - cobbly
vcb - very cobbly
xcb - extremely cobbly
st - stony
vst - very stony
xst - extremely stony

Redoximorphic Feature Morphology

Abundance

f - few
c - common
m - many

Size

1 - fine (<2mm)
2 - medium 2–5mm)
3 - coarse (5–20mm)
4 - very coarse (20–76mm)
5 - extremely coarse (>76mm)

Type

Fe-x - iron concentration (soft mass)
Fe-nc - iron nodule or concretion
Mn-x - manganese concentration (soft mass)
Mn-nc - manganese nodule or concretion
d - depletion

Contrast

f - faint
d - distinct
p - prominent

WETLAND DETERMINATION FORM - Arid West Region

Project/Site:	Access Road 15 Papa 3 area	City/County:	San Diego	Sampling Date:	3-7-07
Applicant/Owner:	MCB Camp Pendleton	State:	CA	Sampling Point:	15-w1
Investigator(s):	MD, RK, MT	Section, Township, Range:	San Bernardino, T9S, R5W, sec30		
Landform (hillslope, terrace, etc.):	Valley bottom/shallow swale	Local relief (concave, convex, none):	concave	Slope (%):	<5
Subregion (LRR):	LRR-C	Lat: 33° 21' 32.333"	Long: -117° 27' 7.923"	Datum:	NAD83
Soil Map Unit Name:	Steep gullied land			NWI classification:	

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks)

Are Vegetation ____, Soil ____, or Hydrology ____ significanly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ significanly disturbed? (If needed, explain any answers in Remarks).

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes x	No	**Is the Sampled Area within a wetland?**	Yes ____ No X
Hydric Soil Present?	Yes	No x		
Wetland Hydrology Presnt?	Yes	No x		

Remarks:

VEGETATION

Tree Stratum (Use scientific names) woody plants >3" dbh	Absolute % Cover	Dominant Species?	Indicator Status
Salix lasiolepis	60	Y	FACW
Sambucus mexicana	10	n	FAC
3.			
4.			
Total Cover:	70		
Sapling/Shrub Stratum (woody plants <3"dbh)			
Baccharis salicifolia	40	Y	FACW
Sambucus mexicana	10	Y	FAC
3.			
4.			
5.			
Total Cover:	50		
Herb Stratum (non-woody plantss, regardless of size)			
Silybum marianum	40	Y	UPL
Artemisia douglasiana	5	n	FAC
Herschfeldia incana	25	Y	UPL
4.			
5.			
6.			
7.			
8.			
Total Cover:	70		
Woody Vine Stratum (regardless of size)			
1.			
2.			
Total Cover:			

% Bare gourd in Herb Stratum 30 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That are OBL, FACW, or FAC 0.60 (A/B) (must be >0.5)

Prevalence index worksheet (test when Hydro and Soils indicate wetlands)

Total % Cover (absolute) of:			Multiply by:
OBL species		x 1 =	0
FACW species	100	x 2 =	200
FAC species	25	x 3 =	75
FACU species		x 4 =	0
UPL species	65	x 5 =	325
Coumn Totals:	190 (A)		600 (B)

Prevalence Index = B/A = 3.1578947 (must be ≤3.0)

Hydrophytic vegetation indicators

Y Dominance test is >50%

N Prevalence index is ≤ 3.0[1]

____ Morphological adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soils and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes X** **No** ____

Remarks:

SOIL

Sampling point: 15-w1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-4	10 YR 3/2					LS	
4-12	10 YR 3/2					SL	pockets of clay
12-16	10 YR 4/2					LS	

[1]Type: C=Concretion, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR C)
- ___ Depleted Below Dark Surface (A11)
- ___ Thin Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Material (F1)
- ___ Loamy Gleyed Matrix (F3)
- ___ Depleted Matrix (F6)
- ___ Redox Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pool (F9)

Indicators for Problematic Hydric Soils:[3]

- ___ 1 cm Muck (A9) (LRR C)
- ___ 2 cm Muck (A 10) (LRR B)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

___ Listed on National/Local Hydric Soils List

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present

Restrictive Layer (if present):
Type:
Depth (inches):

Hydric Soil Present? Yes ___ No X

Remarks: Deep, well-drained soil.

HYDROLOGY

Wetland Hydrology Indicators:

Primary indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (Nonriverine)
- ___ Sediment Deposits (B2) (Nonriverine)
- ___ Drift Deposits (B3) (Nonriverine)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soil (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (Riverine)
- ___ Sediment Deposits (B2) (Riverine)
- ___ Drift Deposits (B3) (Riverine)
- x Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No x	Depth (inches): ___		
Water Table Present?	Yes ___	No x	Depth (inches): ___		
Saturation Present? (includes capillary fringe)	Yes ___	No x	Depth (inches): ___ (12 inch determination)	**Wetland Hydrology Present?**	Yes ___ No x

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks: Valley bottom, floodplain with riparian vegetation, but not a wetland or water of the US.

Texture and Rock Fragment Content

Texture

cos - coarse sand
s - sand
fs - fine sand
vfs - very fine sand
lcos - loamy coarse sand
ls - loamy sand
lfs - loamy fine sand
lvfs - loamy very fine sand
cosl - coarse sandy loam
sl - sandy loam
fsl - fine sandy loam
vfsl - very fine sandy loam
l - loam
sil - silt loam
si - silt
scl - sandy clay loam
cl - clay loam
sicl - silty clay loam
sc - sandy clay
sic - silty clay
c - clay

Rock Fragments

gr - gravelly
vgr - very gravelly
xgr - extremely gravelly
cb - cobbly
vcb - very cobbly
xcb - extremely cobbly
st - stony
vst - very stony
xst - extremely stony

Redoximorphic Feature Morphology

Abundance

f - few
c - common
m - many

Size

1 - fine (<2mm)
2 - medium 2–5mm)
3 - coarse (5–20mm)
4 - very coarse (20–76mm)
5 - extremely coarse (>76mm)

Type

Fe-x - iron concentration (soft mass)
Fe-nc - iron nodule or concretion
Mn-x - manganese concentration (soft mass)
Mn-nc - manganese nodule or concretion
d - depletion

Contrast

f - faint
d - distinct
p - prominent

WETLAND DETERMINATION FORM - Arid West Region

Project/Site:	Access Roads-Road 18 at Roblar Road Ditch	City/County:	San Diego	Sampling Date:	2-20-07
Applicant/Owner:	MCB Camp Pendleton	State:	CA	Sampling Point:	18-W11
Investigator(s):	Mike Dungan, Andrew Raaf, Melissa Tu	Section, Township, Range:	San Bernardino, T9S, R5W, sec36		
Landform (hillslope, terrace, etc.):	Drainage and road ditch	Local relief (concave, convex, none):	Concave	Slope (%):	10
Subregion (LRR):	LRR-C	Lat: 33° 21' 2.433"	Long: -117° 21' 48.071"	Datum:	NAD83
Soil Map Unit Name:	Las Flores loamy fine sand, 2 to 9% slopes			NWI classification:	

Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ____ (If no, explain in Remarks)

Are Vegetation ____, Soil ____, or Hydrology ____ significanly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ significanly disturbed? (If needed, explain any answers in Remarks).

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area within a wetland?** Yes ____ No x
Hydric Soil Present?	Yes ____	No X	
Wetland Hydrology Presnt?	Yes ____	No X	

Remarks: The sample point is a low area with collects stormwater, but is not a wetland and does not exhibit strong hydolology for jurisidictional status. Further downstream, a defined channel (Water of the U.S.) becomes evident.

VEGETATION

Tree Stratum (Use scientific names) woody plan	Absolute % Cover	Dominant Species?	Indicator Status
Salix lasiolepis	30	Y	FACW
2.			
3.			
4.			
Total Cover:	30		
Sapling/Shrub Stratum (woody plants <3"dbh)			
Baccharis pilularis	40	Y	UPL
Baccharis salicifolia	25	Y	FACW
3.			
4.			
5.			
Total Cover:	65		
Herb Stratum (non-woody plantss, regardless of size)			
Eleocharis macrostachya	70	Y	OBL
Juncus spp.	10	N	FACW
3.			
4.			
5.			
6.			
7.			
8.			
Total Cover:	80		
Woody Vine Stratum (regardless of size)			
1.			
2.			
Total Cover:			

% Bare gourd in Herb Stratum 5 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That are OBL, FACW, or FAC 1.33 (A/B) (must be >0.5)

Prevalence index worksheet (test when Hydro and Soils indicate wetlands)

Total % Cover (absolute) of:		Multiply by:	
OBL species	70	x 1 =	70
FACW species	25	x 2 =	50
FAC species	0	x 3 =	0
FACU species		x 4 =	0
UPL species	40	x 5 =	200
Coumn Totals:	135 (A)		320 (B)

Prevalence Index = B/A = 2.37 (must be $\leq$3.0)

Hydrophytic vegetation indicators

Y Dominance test is >50%

Y Prevalence index is $\leq$ 3.0[1]

N Morphological adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

N Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soils and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes** X **No** ____

Remarks: Plant community in trough of channel is hydrophytic, although mature and healthy Baccharis pilularis is also present.

SOIL

Sampling point: 18-W11

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-3	2.5 Y 4/3					sl	
3-12	2.5 Y 3/2					sl	

[1]Type: C=Concretion, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR C)
- ___ Depleted Below Dark Surface (A11)
- ___ Thin Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Material (F1)
- ___ Loamy Gleyed Matrix (F3)
- ___ Depleted Matrix (F6)
- ___ Redox Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pool (F9)

Indicators for Problematic Hydric Soils:[3]

- ___ 1 cm Muck (A9) (LRR C)
- ___ 2 cm Muck (A 10) (LRR B)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

___ Listed on National/Local Hydric Soils List

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present

Restrictive Layer (if present):
Type:
Depth (inches):

Hydric Soil Present? **Yes** ___ **No** X

Remarks: No redox features

HYDROLOGY

Wetland Hydrology Indicators:

Primary indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (Nonriverine)
- ___ Sediment Deposits (B2) (Nonriverine)
- ___ Drift Deposits (B3) (Nonriverine)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soil (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (Riverine)
- ___ Sediment Deposits (B2) (Riverine)
- ___ Drift Deposits (B3) (Riverine)
- x Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No x	Depth (inches): ___		
Water Table Present?	Yes ___	No x	Depth (inches): ___		
Saturation Present? (includes capillary fringe)	Yes ___	No x	Depth (inches): ___ (12 inch determination)	**Wetland Hydrology Present?**	**Yes** ___ **No** X

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks: Part of a swale, or low draiange area, but no strong indicators of consistent wetland hydrology at the sample point.. Further downstream, a defined channe with sediment lines becomes apparent.

Texture and Rock Fragment Content

Texture

- cos - coarse sand
- s - sand
- fs - fine sand
- vfs - very fine sand
- lcos - loamy coarse sand
- ls - loamy sand
- lfs - loamy fine sand
- lvfs - loamy very fine sand
- cosl - coarse sandy loam
- sl - sandy loam
- fsl - fine sandy loam
- vfsl - very fine sandy loam
- l - loam
- sil - silt loam
- si - silt
- scl - sandy clay loam
- cl - clay loam
- sicl - silty clay loam
- sc - sandy clay
- sic - silty clay
- c - clay

Rock Fragments

- gr - gravelly
- vgr - very gravelly
- xgr - extremely gravelly
- cb - cobbly
- vcb - very cobbly
- xcb - extremely cobbly
- st - stony
- vst - very stony
- xst - extremely stony

Redoximorphic Feature Morphology

Abundance

- f - few
- c - common
- m - many

Size

- 1 - fine (<2mm)
- 2 - medium 2–5mm)
- 3 - coarse (5–20mm)
- 4 - very coarse (20–76mm)
- 5 - extremely coarse (>76mm)

Type

- Fe-x - iron concentration (soft mass)
- Fe-nc - iron nodule or concretion
- Mn-x - manganese concentration (soft mass)
- Mn-nc - manganese nodule or concretion
- d - depletion

Contrast

- f - faint
- d - distinct
- p - prominent

WETLAND DETERMINATION FORM - Arid West Region

Project/Site:	Access Road 18 Drainage	City/County:	San Diego	Sampling Date:	3-22-07
Applicant/Owner:	MCB Camp Pendleton	State:	CA	Sampling Point:	18-w102
Investigator(s):	AR	Section, Township, Range:	San Bernardino, T9S, R5W, sec24		
Landform (hillslope, terrace, etc.):	Burned drainage	Local relief (concave, convex, none):	Concave	Slope (%):	5
Subregion (LRR):	LRR-C	Lat: 33° 22' 47.774"	Long: -117° 21' 13.903"	Datum:	NAD83
Soil Map Unit Name:	Fallbrook sandy loam, 5-9% slopes			NWI classification:	

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks)

Are Vegetation ____, Soil ____, or Hydrology ____ significanly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ significanly disturbed? (If needed, explain any answers in Remarks).

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes		No	x
Hydric Soil Present?	Yes		No	x
Wetland Hydrology Presnt?	Yes		No	x

Is the Sampled Area within a wetland? Yes ____ No X

Remarks:

VEGETATION

Tree Stratum (Use scientific names) woody plants >3" dbh	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:			
Sapling/Shrub Stratum (woody plants <3"dbh)			
Baccharis salicifolia	5	Y	FACW
2.			
3.			
4.			
5.			
Total Cover:	7		
Herb Stratum (non-woody plantss, regardless of size)			
Erodium cicutarium	20	Y	UPL
Lasthenia californica (aka Lathenia chrysostoma).	20	Y	FACU
Foeniculum vulgare	10	n	FACU
Medicago lupulina	10	n	FAC
5.			
6.			
7.			
8.			
Total Cover:	70		
Woody Vine Stratum (regardless of size)			
1.			
2.			
Total Cover:			

% Bare gourd in Herb Stratum 30 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That are OBL, FACW, or FAC 0.50 (A/B) (must be >0.5)

Prevalence index worksheet (test when Hydro and Soils indicate wetlands)

Total % Cover (absolute) of:			Multiply by:
OBL species		x 1 =	0
FACW species	5	x 2 =	10
FAC species	10	x 3 =	30
FACU species	30	x 4 =	120
UPL species	20	x 5 =	100
Coumn Totals:	65 (A)		260 (B)

Prevalence Index = B/A = 4 (must be ≤3.0)

Hydrophytic vegetation indicators

N Dominance test is >50%

N Prevalence index is ≤ 3.0[1]

____ Morphological adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soils and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes** ____ **No** **X**

Remarks:

SOIL

Sampling point: 18-w102

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-1/2	5 Y 6/1					vgr	roadfill washed from above
1/2-2	5 Y 5/2					SL	
2-12+	2.5 Y 3/3					L	

[1]Type: C=Concretion, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR C)
- ___ Depleted Below Dark Surface (A11)
- ___ Thin Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Material (F1)
- ___ Loamy Gleyed Matrix (F3)
- ___ Depleted Matrix (F6)
- ___ Redox Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pool (F9)

Indicators for Problematic Hydric Soils:[3]

- ___ 1 cm Muck (A9) (LRR C)
- ___ 2 cm Muck (A 10) (LRR B)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

___ Listed on National/Local Hydric Soils List

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present

Restrictive Layer (if present):
Type:
Depth (inches):

Hydric Soil Present? **Yes** ___ **No** x

Remarks: Soil is dry throughout. Rocky with fragments from concrete and asphalt road bed.

HYDROLOGY

Wetland Hydrology Indicators:

Primary indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (Nonriverine)
- ___ Sediment Deposits (B2) (Nonriverine)
- ___ Drift Deposits (B3) (Nonriverine)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soil (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (Riverine)
- ___ Sediment Deposits (B2) (Riverine)
- x Drift Deposits (B3) (Riverine)
- x Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): ___		
Water Table Present?	Yes ___	No X	Depth (inches): ___		
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches): ___ (12 inch determination)	**Wetland Hydrology Present?**	**Yes** x **No** ___

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks: Appears isolated, a ditch excavated in uplands without substantial connectivity downstream. Not a wetland and non-jurisdictional.

Texture and Rock Fragment Content

Texture

cos - coarse sand
s - sand
fs - fine sand
vfs - very fine sand
lcos - loamy coarse sand
ls - loamy sand
lfs - loamy fine sand
lvfs - loamy very fine sand
cosl - coarse sandy loam
sl - sandy loam
fsl - fine sandy loam
vfsl - very fine sandy loam
l - loam
sil - silt loam
si - silt
scl - sandy clay loam
cl - clay loam
sicl - silty clay loam
sc - sandy clay
sic - silty clay
c - clay

Rock Fragments

gr - gravelly
vgr - very gravelly
xgr - extremely gravelly
cb - cobbly
vcb - very cobbly
xcb - extremely cobbly
st - stony
vst - very stony
xst - extremely stony

Redoximorphic Feature Morphology

Abundance

f - few
c - common
m - many

Size

1 - fine (<2mm)
2 - medium 2–5mm)
3 - coarse (5–20mm)
4 - very coarse (20–76mm)
5 - extremely coarse (>76mm)

Type

Fe-x - iron concentration (soft mass)
Fe-nc - iron nodule or concretion
Mn-x - manganese concentration (soft mass)
Mn-nc - manganese nodule or concretion
d - depletion

Contrast

f - faint
d - distinct
p - prominent

WETLAND DETERMINATION FORM - Arid West Region

Project/Site:	Access Road 20, Creek Tributary	City/County:	San Diego	Sampling Date:	2-26-07
Applicant/Owner:	MCB Camp Pendleton	State:	CA	Sampling Point:	20-w21
Investigator(s):	AR, MD	Section, Township, Range:	San Bernardino, T9S, R5W, sec19		
Landform (hillslope, terrace, etc.):	Drainage channel	Local relief (concave, convex, none):	Concave	Slope (%):	5
Subregion (LRR):	LRR-C	Lat: 33° 22' 51.604"	Long: -117° 26' 58.296"	Datum:	NAD83
Soil Map Unit Name:	Altamont clay, 9-15% slopes			NWI classification:	

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks)

Are Vegetation ____, Soil ____, or Hydrology ____ significanly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ significanly disturbed? (If needed, explain any answers in Remarks).

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area within a wetland?**	Yes ____ No X
Hydric Soil Present?	Yes ____	No X		
Wetland Hydrology Presnt?	Yes X	No ____		

Remarks:

VEGETATION

Tree Stratum (Use scientific names) woody plar	Absolute % Cover	Dominant Species?	Indicator Status
Sambucus mexicana	20	Y	FAC
2.			
3.			
4.			
Total Cover:	20		
Sapling/Shrub Stratum (woody plants <3"dbh)			
Sambucus mexicana	15	Y	FAC
Baccharis salicifolia	10	Y	FACW
3.			
4.			
5.			
Total Cover:	25		
Herb Stratum (non-woody plantss, regardless of size)			
Artemisia douglasiana	20	Y	FAC
Cortaderia spp.	20	Y	UPL
Salvia spathacea	10	Y	UPL
Unknown #1	5	N	
5.			
6.			
7.			
8.			
Total Cover:	70		
Woody Vine Stratum (regardless of size)			
1.			
2.			
Total Cover:			

% Bare gourd in Herb Stratum 30 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That are OBL, FACW, or FAC 0.67 (A/B) (must be >0.5)

Prevalence index worksheet (test when Hydro and Soils indicate wetlands)

Total % Cover (absolute) of:			Multiply by:
OBL species		x 1 =	0
FACW species	10	x 2 =	20
FAC species	35	x 3 =	105
FACU species		x 4 =	0
UPL species	30	x 5 =	150
Coumn Totals:	75 (A)		275 (B)

Prevalence Index = B/A = 3.6666667 (must be ≤3.0)

Hydrophytic vegetation indicators

Y Dominance test is >50%

N Prevalence index is ≤ 3.0[1]

____ Morphological adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soils and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes X** **No** ____

Remarks: Longer-lived species (woodly plants and shrubs) are more indicative of hydophytic vegetation. The herbaceous layer shows some upland species.

SOIL

Sampling point: 20-w21

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-3	2.5 Y 3/2					L	
3-7	2.5 Y 4/2					S	
7-13	2.5 Y 3/2					LS	Cobbles and sandy patches

[1]Type: C=Concretion, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR C)
- ___ Depleted Below Dark Surface (A11)
- ___ Thin Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Material (F1)
- ___ Loamy Gleyed Matrix (F3)
- ___ Depleted Matrix (F6)
- ___ Redox Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pool (F9)

Indicators for Problematic Hydric Soils:[3]

- ___ 1 cm Muck (A9) (LRR C)
- ___ 2 cm Muck (A 10) (LRR B)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

___ Listed on National/Local Hydric Soils List

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present

Restrictive Layer (if present):
Type:
Depth (inches):

Hydric Soil Present? Yes ___ No X

Remarks: Rain a few hours before sampling and soil is not saturated.

HYDROLOGY

Wetland Hydrology Indicators:

Primary indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (Nonriverine)
- ___ Sediment Deposits (B2) (Nonriverine)
- ___ Drift Deposits (B3) (Nonriverine)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soil (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (Riverine)
- x Sediment Deposits (B2) (Riverine)
- x Drift Deposits (B3) (Riverine)
- x Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No x	Depth (inches): ___		
Water Table Present?	Yes ___	No x	Depth (inches): ___		
Saturation Present? (includes capillary fringe)	Yes ___	No x	Depth (inches): ___ (12 inch determination)	**Wetland Hydrology Present?**	Yes x No ___

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Texture and Rock Fragment Content

Texture

cos - coarse sand
s - sand
fs - fine sand
vfs - very fine sand
lcos - loamy coarse sand
ls - loamy sand
lfs - loamy fine sand
lvfs - loamy very fine sand
cosl - coarse sandy loam
sl - sandy loam
fsl - fine sandy loam
vfsl - very fine sandy loam
l - loam
sil - silt loam
si - silt
scl - sandy clay loam
cl - clay loam
sicl - silty clay loam
sc - sandy clay
sic - silty clay
c - clay

Rock Fragments

gr - gravelly
vgr - very gravelly
xgr - extremely gravelly
cb - cobbly
vcb - very cobbly
xcb - extremely cobbly
st - stony
vst - very stony
xst - extremely stony

Redoximorphic Feature Morphology

Abundance

f - few
c - common
m - many

Size

1 - fine (<2mm)
2 - medium 2–5mm)
3 - coarse (5–20mm)
4 - very coarse (20–76mm)
5 - extremely coarse (>76mm)

Type

Fe-x - iron concentration (soft mass)
Fe-nc - iron nodule or concretion
Mn-x - manganese concentration (soft mass)
Mn-nc - manganese nodule or concretion
d - depletion

Contrast

f - faint
d - distinct
p - prominent

WETLAND DETERMINATION FORM - Arid West Region

Project/Site:	Access Road 21 Creek Drainage	City/County:	San Diego	Sampling Date:	2-27-07
Applicant/Owner:	MCB Camp Pendleton	State:	CA	Sampling Point:	21-W22
Investigator(s):	AR, MD	Section, Township, Range:	San Bernardino, T9S, R6W, sec24		
Landform (hillslope, terrace, etc.):	Channel	Local relief (concave, convex, none):	Concave	Slope (%):	<5
Subregion (LRR):	LRR-C	Lat: 33° 22' 36.711"	Long: -117° 28' 12.297"	Datum:	NAD83
Soil Map Unit Name:	Steep gullied land			NWI classification:	

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks)

Are Vegetation ____, Soil ____, or Hydrology ____ significanly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ significanly disturbed? (If needed, explain any answers in Remarks).

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area within a wetland?**	Yes ____ No X
Hydric Soil Present?	Yes ____	No X		
Wetland Hydrology Presnt?	Yes X	No ____		

Remarks:

VEGETATION

Tree Stratum (Use scientific names) woody plar	Absolute % Cover	Dominant Species?	Indicator Status
Platanus racemosa	10	Y	FACW
Salix lasiolepis	10	Y	FACW
3.			
4.			
Total Cover:	20		
Sapling/Shrub Stratum (woody plants <3"dbh)			
Baccharis salicifolia	50	Y	FACW
Salix lasiolepis	20	Y	FACW
3.			
4.			
5.			
Total Cover:	75		
Herb Stratum (non-woody plantss, regardless of size)			
Eleocharis macrostachya	10	Y	OBL
Senecio flaccidus var. douglasii	10	Y	NI
3.			
4.			
5.			
6.			
7.			
8.			
Total Cover:	30		
Woody Vine Stratum (regardless of size)			
1.			
2.			
Total Cover:			

% Bare gourd in Herb Stratum 70 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That are OBL, FACW, or FAC 0.83 (A/B) (must be >0.5)

Prevalence index worksheet (test when Hydro and Soils indicate wetlands)

Total % Cover (absolute) of:			Multiply by:
OBL species	10	x 1 =	10
FACW species	90	x 2 =	180
FAC species		x 3 =	0
FACU species		x 4 =	0
UPL species		x 5 =	0
Coumn Totals:	100 (A)		190 (B)

Prevalence Index = B/A = 1.9 (must be ≤3.0)

Hydrophytic vegetation indicators

Y Dominance test is >50%

Y Prevalence index is ≤ 3.0[1]

____ Morphological adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soils and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks:

SOIL

Sampling point: 21-W22

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-4	10 YR 3/3					S	
4-5	10 YR 3/2					S	Darker OM nodules mixed 5%
5-16	10 YR 4/3					S vcb	Cobbles and sand

[1]Type: C=Concretion, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR C)
- ___ Depleted Below Dark Surface (A11)
- ___ Thin Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Material (F1)
- ___ Loamy Gleyed Matrix (F3)
- ___ Depleted Matrix (F6)
- ___ Redox Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pool (F9)

Indicators for Problematic Hydric Soils:[3]

- ___ 1 cm Muck (A9) (LRR C)
- ___ 2 cm Muck (A 10) (LRR B)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

___ Listed on National/Local Hydric Soils List

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present

Restrictive Layer (if present):
Type:
Depth (inches):

Hydric Soil Present? **Yes** ___ **No** **X**

Remarks: Soil is damp, but not saturated (Rained a few hours before sample).

HYDROLOGY

Wetland Hydrology Indicators:

Primary indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (Nonriverine)
- ___ Sediment Deposits (B2) (Nonriverine)
- ___ Drift Deposits (B3) (Nonriverine)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soil (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- X Water Marks (B1) (Riverine)
- X Sediment Deposits (B2) (Riverine)
- X Drift Deposits (B3) (Riverine)
- X Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): ___	
Water Table Present?	Yes ___	No X	Depth (inches): ___	
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches): ___ (12 inch determination)	

Wetland Hydrology Present? **Yes** **X** **No** ___

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Texture and Rock Fragment Content

Texture

- cos - coarse sand
- s - sand
- fs - fine sand
- vfs - very fine sand
- lcos - loamy coarse sand
- ls - loamy sand
- lfs - loamy fine sand
- lvfs - loamy very fine sand
- cosl - coarse sandy loam
- sl - sandy loam
- fsl - fine sandy loam
- vfsl - very fine sandy loam
- l - loam
- sil - silt loam
- si - silt
- scl - sandy clay loam
- cl - clay loam
- sicl - silty clay loam
- sc - sandy clay
- sic - silty clay
- c - clay

Rock Fragments

- gr - gravelly
- vgr - very gravelly
- xgr - extremely gravelly
- cb - cobbly
- vcb - very cobbly
- xcb - extremely cobbly
- st - stony
- vst - very stony
- xst - extremely stony

Redoximorphic Feature Morphology

Abundance

- f - few
- c - common
- m - many

Size

- 1 - fine (<2mm)
- 2 - medium 2–5mm)
- 3 - coarse (5–20mm)
- 4 - very coarse (20–76mm)
- 5 - extremely coarse (>76mm)

Type

- Fe-x - iron concentration (soft mass)
- Fe-nc - iron nodule or concretion
- Mn-x - manganese concentration (soft mass)
- Mn-nc - manganese nodule or concretion
- d - depletion

Contrast

- f - faint
- d - distinct
- p - prominent

WETLAND DETERMINATION FORM - Arid West Region

Project/Site:	Access Road 21 Swale	City/County:	San Diego	Sampling Date:	2-28-07
Applicant/Owner:	MCB Camp Pendleton	State:	CA	Sampling Point:	21-W23
Investigator(s):	AR, MD	Section, Township, Range:	San Bernardino, T9S, R6W, sec24		
Landform (hillslope, terrace, etc.):	Depression	Local relief (concave, convex, none):	Concave	Slope (%):	<5
Subregion (LRR):	LRR-C	Lat: 33° 22' 55.520"	Long: -117° 28' 9.797"	Datum:	NAD83
Soil Map Unit Name:	Las Flores loamy fine sand, 2-9% slopes			NWI classification:	

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks)

Are Vegetation ____, Soil ____, or Hydrology ____ significanly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ significanly disturbed? (If needed, explain any answers in Remarks).

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area within a wetland?**	Yes X No ____
Hydric Soil Present?	Yes X	No ____		
Wetland Hydrology Presnt?	Yes X	No ____		

Remarks:

VEGETATION

Tree Stratum (Use scientific names) woody plar	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:			
Sapling/Shrub Stratum (woody plants <3"dbh)			
Baccharis salicifolia	10	Y	FACW
3.			
4.			
5.			
Total Cover:	10		
Herb Stratum (non-woody plantss, regardless of size)			
Leymus triticoides	70	Y	FAC
Eleocharis macrostachya	15	n	FAC
Sidalcea malvaeflora	10	n	NI
Rumex spp.	8	n	FACW
5.			
6.			
7.			
8.			
Total Cover:	100		
Woody Vine Stratum (regardless of size)			
1.			
2.			
Total Cover:			

% Bare gourd in Herb Stratum 0 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That are OBL, FACW, or FAC 1.00 (A/B) (must be >0.5)

Prevalence index worksheet (test when Hydro and Soils indicate wetlands)

Total % Cover (absolute) of:			Multiply by:
OBL species		x 1 =	0
FACW species	18	x 2 =	36
FAC species	85	x 3 =	255
FACU species		x 4 =	0
UPL species		x 5 =	0
Coumn Totals:	103 (A)		291 (B)

Prevalence Index = B/A = 2.8252427 (must be ≤3.0)

Hydrophytic vegetation indicators

Y Dominance test is >50%

Y Prevalence index is ≤ 3.0[1]

____ Morphological adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soils and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks:

SOIL

Sampling point: 21-W23

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-2	10 YR 2/1					L	Many roots
2-11	10 YR 4/2					LS	
11-16+	2.5 YR 4/2		2.5 YR 5/6	D	M, 3fd	SL	Mottled

[1]Type: C=Concretion, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- x Histosol (A1)
- Histic Epipedon (A2)
- x Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5) (LRR C)
- Depleted Below Dark Surface (A11)
- Thin Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- Sandy Gleyed Matrix (S4)
- x Sandy Redox (S5)
- x Stripped Matrix (S6)
- Loamy Mucky Material (F1)
- Loamy Gleyed Matrix (F3)
- x Depleted Matrix (F6)
- Redox Dark Surface (F7)
- Redox Depressions (F8)
- Vernal Pool (F9)

Indicators for Problematic Hydric Soils:[3]

- 1 cm Muck (A9) (LRR C)
- 2 cm Muck (A 10) (LRR B)
- Reduced Vertic (F18)
- Red Parent Material (TF2)
- Other (Explain in Remarks)

Listed on National/Local Hydric Soils List

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present

Restrictive Layer (if present):
Type:
Depth (inches):

Hydric Soil Present? Yes X No

Remarks: Bright mottles in depleted/stripped matrix. Surface is saturated. Seveal of the soil indicators are approximated.

HYDROLOGY

Wetland Hydrology Indicators:

Primary indicators (any one indicator is sufficient)

- Surface Water (A1)
- High Water Table (A2)
- x Saturation (A3)
- Water Marks (B1) (Nonriverine)
- Sediment Deposits (B2) (Nonriverine)
- Drift Deposits (B3) (Nonriverine)
- Surface Soil Cracks (B6)
- Inundation Visible on Aerial Imagery (B7)
- Water-Stained Leaves (B9)
- Salt Crust (B11)
- Biotic Crust (B12)
- Aquatic Invertebrates (B13)
- Hydrogen Sulfide Odor (C1)
- Oxidized Rhizospheres along Living Roots (C3)
- Presence of Reduced Iron (C4)
- Recent Iron Reduction in Plowed Soil (C6)
- Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- Water Marks (B1) (Riverine)
- Sediment Deposits (B2) (Riverine)
- Drift Deposits (B3) (Riverine)
- Drainage Patterns (B10)
- Dry-Season Water Table (C2)
- Thin Muck Surface (C7)
- Crayfish Burrows (C8)
- Saturation Visible on Aerial Imagery (C9)
- Shallow Aquitard (D3)
- FAC-Neutral Test (D5)

Field Observations:

	Yes	No	Depth (inches)
Surface Water Present?		X	
Water Table Present?		X	
Saturation Present? (includes capillary fringe)	X		6 (12 inch determination)

Wetland Hydrology Present? Yes X No

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Swale along roadside at existing culvert outwash. Light rainfall early today and yesterday.

Remarks:

Texture and Rock Fragment Content

Texture

cos - coarse sand
s - sand
fs - fine sand
vfs - very fine sand
lcos - loamy coarse sand
ls - loamy sand
lfs - loamy fine sand
lvfs - loamy very fine sand
cosl - coarse sandy loam
sl - sandy loam
fsl - fine sandy loam
vfsl - very fine sandy loam
l - loam
sil - silt loam
si - silt
scl - sandy clay loam
cl - clay loam
sicl - silty clay loam
sc - sandy clay
sic - silty clay
c - clay

Rock Fragments

gr - gravelly
vgr - very gravelly
xgr - extremely gravelly
cb - cobbly
vcb - very cobbly
xcb - extremely cobbly
st - stony
vst - very stony
xst - extremely stony

Redoximorphic Feature Morphology

Abundance

f - few
c - common
m - many

Size

1 - fine (<2mm)
2 - medium 2–5mm)
3 - coarse (5–20mm)
4 - very coarse (20–76mm)
5 - extremely coarse (>76mm)

Type

Fe-x - iron concentration (soft mass)
Fe-nc - iron nodule or concretion
Mn-x - manganese concentration (soft mass)
Mn-nc - manganese nodule or concretion
d - depletion

Contrast

f - faint
d - distinct
p - prominent

WETLAND DETERMINATION FORM - Arid West Region

Project/Site:	Access Road 21 Swale upland	City/County:	San Diego	Sampling Date:	2-28-07
Applicant/Owner:	MCB Camp Pendleton	State:	CA	Sampling Point:	21-w24
Investigator(s):	AR, MD	Section, Township, Range:	San Bernardino, T9S, R6W, sec24		
Landform (hillslope, terrace, etc.):	Upland, rolling hill above swale	Local relief (concave, convex, none):	Sloping	Slope (%):	1-5
Subregion (LRR):	LRR-C	Lat: 33° 22' 55.196"	Long: -117° 28' 9.802"	Datum:	NAD83
Soil Map Unit Name:	Las Flores loamy fine sand, 2-9% slopes			NWI classification:	

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks)

Are Vegetation ____, Soil ____, or Hydrology ____ significanly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ significanly disturbed? (If needed, explain any answers in Remarks).

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes		No	x
Hydric Soil Present?	Yes	x	No	
Wetland Hydrology Presnt?	Yes		No	x

Is the Sampled Area within a wetland? Yes ____ No x

Remarks:

VEGETATION

Tree Stratum (Use scientific names) woody plar	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:			
Sapling/Shrub Stratum (woody plants <3"dbh)			
1.			
2.			
3.			
4.			
5.			
Total Cover:			
Herb Stratum (non-woody plantss, regardless of size)			
Bromus spp.	40	Y	UPL
Isochoma menzisii var. vernonoides	20	Y	FAC
Brassica nigra	10	n	UPL
Foeniculum vulgare	10	n	FACU
Cynodol dactylon	10	n	FAC
6.			
7.			
8.			
Total Cover:	100		
Woody Vine Stratum (regardless of size)			
1.			
2.			
Total Cover:			

% Bare gourd in Herb Stratum 0 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That are OBL, FACW, or FAC 0.50 (A/B) (must be >0.5)

Prevalence index worksheet (test when Hydro and Soils indicate wetlands)

	Total % Cover (absolute) of:		Multiply by:
OBL species		x 1 =	0
FACW species		x 2 =	0
FAC species	30	x 3 =	90
FACU species	10	x 4 =	40
UPL species	50	x 5 =	250
Coumn Totals:	90 (A)		380 (B)

Prevalence Index = B/A = 4.2222222 (must be ≤3.0)

Hydrophytic vegetation indicators

N Dominance test is >50%

N Prevalence index is ≤ 3.0[1]

____ Morphological adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soils and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes** ____ **No** **X**

Remarks: Most species are upland aside from Isocoma menzisii var. vernonoides.

SOIL

Sampling point: 21-w24

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-1	2.5 Y 3/1					L	many roots
1-3	2.5 Y 3/2					L	
3-9	2.5 Y 3/2					L	Clay pockets
9-12+	10 YR 4/2		5 YR 4/6		M, 3cd	SC	Mottles, matrix is variable

[1]Type: C=Concretion, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR C)
- ___ Depleted Below Dark Surface (A11)
- ___ Thin Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Material (F1)
- ___ Loamy Gleyed Matrix (F3)
- ___ Depleted Matrix (F6)
- ___ Redox Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pool (F9)

Indicators for Problematic Hydric Soils:[3]

- ___ 1 cm Muck (A9) (LRR C)
- ___ 2 cm Muck (A 10) (LRR B)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

___ Listed on National/Local Hydric Soils List

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present

Restrictive Layer (if present):
Type:
Depth (inches):

Hydric Soil Present? **Yes** ___ **No** x

Remarks: Mottled layer at depth. Soil profile is moist, but not damp, and becomes drier with depth. Mottles may be relict redox features, but are dry now.

HYDROLOGY

Wetland Hydrology Indicators:

Primary indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (Nonriverine)
- ___ Sediment Deposits (B2) (Nonriverine)
- ___ Drift Deposits (B3) (Nonriverine)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soil (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (Riverine)
- ___ Sediment Deposits (B2) (Riverine)
- ___ Drift Deposits (B3) (Riverine)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): ___		
Water Table Present?	Yes ___	No X	Depth (inches): ___		
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches): ___ (12 inch determination)	**Wetland Hydrology Present?**	**Yes** ___ **No** x

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks: No hydrologic indicators

Texture and Rock Fragment Content

Texture

- cos - coarse sand
- s - sand
- fs - fine sand
- vfs - very fine sand
- lcos - loamy coarse sand
- ls - loamy sand
- lfs - loamy fine sand
- lvfs - loamy very fine sand
- cosl - coarse sandy loam
- sl - sandy loam
- fsl - fine sandy loam
- vfsl - very fine sandy loam
- l - loam
- sil - silt loam
- si - silt
- scl - sandy clay loam
- cl - clay loam
- sicl - silty clay loam
- sc - sandy clay
- sic - silty clay
- c - clay

Rock Fragments

- gr - gravelly
- vgr - very gravelly
- xgr - extremely gravelly
- cb - cobbly
- vcb - very cobbly
- xcb - extremely cobbly
- st - stony
- vst - very stony
- xst - extremely stony

Redoximorphic Feature Morphology

Abundance

- f - few
- c - common
- m - many

Size

- 1 - fine (<2mm)
- 2 - medium 2–5mm)
- 3 - coarse (5–20mm)
- 4 - very coarse (20–76mm)
- 5 - extremely coarse (>76mm)

Type

- Fe-x - iron concentration (soft mass)
- Fe-nc - iron nodule or concretion
- Mn-x - manganese concentration (soft mass)
- Mn-nc - manganese nodule or concretion
- d - depletion

Contrast

- f - faint
- d - distinct
- p - prominent

WETLAND DETERMINATION FORM - Arid West Region

Project/Site:	Access Road 22 Culvert	City/County:	San Diego	Sampling Date:	3-23-07
Applicant/Owner:	MCB Camp Pendleton	State:	CA	Sampling Point:	22-w103
Investigator(s):	AR	Section, Township, Range:	San Bernardino, T9S, R6W, sec14		
Landform (hillslope, terrace, etc.):	Drainage	Local relief (concave, convex, none):	Concave	Slope (%):	5-10
Subregion (LRR):	LRR-C	Lat: 33° 23' 48.587"	Long: -117° 28' 50.547"	Datum:	
Soil Map Unit Name:	Altamont clay, 5-9% slopes			NWI classification:	NAD83

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks)

Are Vegetation ____, Soil ____, or Hydrology ____ significanly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ significanly disturbed? (If needed, explain any answers in Remarks).

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes		No	x
Hydric Soil Present?	Yes		No	x
Wetland Hydrology Presnt?	Yes	x	No	

Is the Sampled Area within a wetland? Yes ____ No x

Remarks:

VEGETATION

Tree Stratum (Use scientific names) woody plants >3" dbh	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:			
Sapling/Shrub Stratum (woody plants <3"dbh)			
Toxicodendron diversilobum	10	Y	UPL
Baccharis salicifolia	10	Y	FACW
Heteromeles arbutifolia	10	Y	UPL
4.			
5.			
Total Cover:	30		
Herb Stratum (non-woody plantss, regardless of size)			
Sisyrinchium bellum	10	Y	FAC
Erodium cicutarium	10	Y	UPL
Galium angustifolium	10	Y	UPL
Marah macrocarpus	10	Y	UPL
Juncus spp.	5	n	FACW
6.			
7.			
8.			
Total Cover:	70		
Woody Vine Stratum (regardless of size)			
1.			
2.			
Total Cover:			

% Bare gourd in Herb Stratum 30 % Cover of Biotic Crust ____

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That are OBL, FACW, or FAC 0.29 (A/B) (must be >0.5)

Prevalence index worksheet (test when Hydro and Soils indicate wetlands)

Total % Cover (absolute) of:			Multiply by:
OBL species		x 1 =	0
FACW species	15	x 2 =	30
FAC species	10	x 3 =	30
FACU species		x 4 =	0
UPL species	40	x 5 =	200
Coumn Totals:	65 (A)		260 (B)

Prevalence Index = B/A = 4 (must be ≤3.0)

Hydrophytic vegetation indicators

N Dominance test is >50%

N Prevalence index is ≤ 3.0[1]

____ Morphological adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soils and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes** ____ **No** **X**

Remarks:

SOIL

Sampling point: 22-w103

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-2	7.5 YR 2.5/2					L	
2-10	7.5 YR 3/3					SL	
10+	Variable (stones)					St	Stones

[1]Type: C=Concretion, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR C)
- ___ Depleted Below Dark Surface (A11)
- ___ Thin Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Material (F1)
- ___ Loamy Gleyed Matrix (F3)
- ___ Depleted Matrix (F6)
- ___ Redox Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pool (F9)

Indicators for Problematic Hydric Soils:[3]

- ___ 1 cm Muck (A9) (LRR C)
- ___ 2 cm Muck (A 10) (LRR B)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

___ Listed on National/Local Hydric Soils List

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present

Restrictive Layer (if present):
Type:
Depth (inches):

Hydric Soil Present? **Yes** ___ **No** **X**

Remarks: Rain night before survey. Soil moist at surface, dry below. Very stony at depth.

HYDROLOGY

Wetland Hydrology Indicators:

Primary indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (Nonriverine)
- ___ Sediment Deposits (B2) (Nonriverine)
- ___ Drift Deposits (B3) (Nonriverine)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soil (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (Riverine)
- x Sediment Deposits (B2) (Riverine)
- x Drift Deposits (B3) (Riverine)
- x Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): ___	
Water Table Present?	Yes ___	No X	Depth (inches): ___	
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches): ___ (12 inch determination)	

Wetland Hydrology Present? **Yes** x **No** ___

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Texture and Rock Fragment Content

Texture

- cos - coarse sand
- s - sand
- fs - fine sand
- vfs - very fine sand
- lcos - loamy coarse sand
- ls - loamy sand
- lfs - loamy fine sand
- lvfs - loamy very fine sand
- cosl - coarse sandy loam
- sl - sandy loam
- fsl - fine sandy loam
- vfsl - very fine sandy loam
- l - loam
- sil - silt loam
- si - silt
- scl - sandy clay loam
- cl - clay loam
- sicl - silty clay loam
- sc - sandy clay
- sic - silty clay
- c - clay

Rock Fragments

- gr - gravelly
- vgr - very gravelly
- xgr - extremely gravelly
- cb - cobbly
- vcb - very cobbly
- xcb - extremely cobbly
- st - stony
- vst - very stony
- xst - extremely stony

Redoximorphic Feature Morphology

Abundance

- f - few
- c - common
- m - many

Size

- 1 - fine (<2mm)
- 2 - medium 2–5mm)
- 3 - coarse (5–20mm)
- 4 - very coarse (20–76mm)
- 5 - extremely coarse (>76mm)

Type

- Fe-x - iron concentration (soft mass)
- Fe-nc - iron nodule or concretion
- Mn-x - manganese concentration (soft mass)
- Mn-nc - manganese nodule or concretion
- d - depletion

Contrast

- f - faint
- d - distinct
- p - prominent

WETLAND DETERMINATION FORM - Arid West Region

Project/Site:	Access Road 22 roadside basin	City/County:	San Diego	Sampling Date:	3-23-07
Applicant/Owner:	MCB Camp Pendleton	State:	CA	Sampling Point:	22-w107
Investigator(s):	AR	Section, Township, Range:	San Bernardino, T9S, R6W, sec14		
Landform (hillslope, terrace, etc.):	basin	Local relief (concave, convex, none):	concave	Slope (%):	0-1
Subregion (LRR):	LRR-C	Lat: 33° 23' 50.245"	Long: -117° 29' 15.201"	Datum:	NAD83
Soil Map Unit Name:	Altamont clay, 5-9% slopes			NWI classification:	

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks)

Are Vegetation ____, Soil ____, or Hydrology ____ significanly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ significanly disturbed? (If needed, explain any answers in Remarks).

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area within a wetland?**	Yes ____ No X
Hydric Soil Present?	Yes ____	No X		
Wetland Hydrology Presnt?	Yes X	No ____		

Remarks: Isolated (no channel or strong hydrologic connection downstream or upstream).

VEGETATION

Tree Stratum (Use scientific names) woody plants >3" dbh	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:			
Sapling/Shrub Stratum (woody plants <3"dbh)			
1.			
2.			
3.			
4.			
5.			
Total Cover:			
Herb Stratum (non-woody plantss, regardless of size)			
Juncus (dubius or bufonius)	90	Y	FACW
Foeniculum vulgare	5	N	FACU
3.			
4.			
5.			
6.			
7.			
8.			
Total Cover:	95		
Woody Vine Stratum (regardless of size)			
1.			
2.			
Total Cover:			

% Bare gourd in Herb Stratum 5 % Cover of Biotic Crust 3

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That are OBL, FACW, or FAC 1.00 (A/B) (must be >0.5)

Prevalence index worksheet (test when Hydro and Soils indicate wetlands)

Total % Cover (absolute) of:			Multiply by:
OBL species		x 1 =	0
FACW species	90	x 2 =	180
FAC species		x 3 =	0
FACU species	5	x 4 =	20
UPL species		x 5 =	0
Coumn Totals:	95 (A)		200 (B)

Prevalence Index = B/A = 2.1052632 (must be ≤3.0)

Hydrophytic vegetation indicators

Y Dominance test is >50%

Y Prevalence index is ≤ 3.0[1]

____ Morphological adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soils and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks:

SOIL

Sampling point: 22-w107

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-4	10 YR 3/3					SCL	Fine roots 80%
4-12	10 YR 2/1					SCL	
12-23	10 YR 2/1					SC	

[1]Type: C=Concretion, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR C)
- ___ Depleted Below Dark Surface (A11)
- ___ Thin Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Material (F1)
- ___ Loamy Gleyed Matrix (F3)
- ___ Depleted Matrix (F6)
- ___ Redox Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pool (F9)

Indicators for Problematic Hydric Soils:[3]

- ___ 1 cm Muck (A9) (LRR C)
- ___ 2 cm Muck (A 10) (LRR B)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

___ Listed on National/Local Hydric Soils List

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present

Restrictive Layer (if present):
Type:
Depth (inches):

Hydric Soil Present? **Yes** ___ **No** **X**

Remarks: Soil moist, but not saturated. No redox features or sulfuric odor.

HYDROLOGY

Wetland Hydrology Indicators:

Primary indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (Nonriverine)
- ___ Sediment Deposits (B2) (Nonriverine)
- ___ Drift Deposits (B3) (Nonriverine)
- x Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soil (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (Riverine)
- ___ Sediment Deposits (B2) (Riverine)
- ___ Drift Deposits (B3) (Riverine)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- x FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No x	Depth (inches): ___		
Water Table Present?	Yes ___	No x	Depth (inches): ___		
Saturation Present? (includes capillary fringe)	Yes ___	No x	Depth (inches): ___ (12 inch determination)	**Wetland Hydrology Present?**	**Yes** X **No** ___

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks: Moss ground cover. Site appears to collect runoff from the roadway and hillside, but not for long enough duration to hold standing water or lead to anoxic soil.

Texture and Rock Fragment Content

Texture

- cos - coarse sand
- s - sand
- fs - fine sand
- vfs - very fine sand
- lcos - loamy coarse sand
- ls - loamy sand
- lfs - loamy fine sand
- lvfs - loamy very fine sand
- cosl - coarse sandy loam
- sl - sandy loam
- fsl - fine sandy loam
- vfsl - very fine sandy loam
- l - loam
- sil - silt loam
- si - silt
- scl - sandy clay loam
- cl - clay loam
- sicl - silty clay loam
- sc - sandy clay
- sic - silty clay
- c - clay

Rock Fragments

- gr - gravelly
- vgr - very gravelly
- xgr - extremely gravelly
- cb - cobbly
- vcb - very cobbly
- xcb - extremely cobbly
- st - stony
- vst - very stony
- xst - extremely stony

Redoximorphic Feature Morphology

Abundance

- f - few
- c - common
- m - many

Size

- 1 - fine (<2mm)
- 2 - medium 2–5mm)
- 3 - coarse (5–20mm)
- 4 - very coarse (20–76mm)
- 5 - extremely coarse (>76mm)

Type

- Fe-x - iron concentration (soft mass)
- Fe-nc - iron nodule or concretion
- Mn-x - manganese concentration (soft mass)
- Mn-nc - manganese nodule or concretion
- d - depletion

Contrast

- f - faint
- d - distinct
- p - prominent

WETLAND DETERMINATION FORM - Arid West Region

Project/Site:	Access Road	City/County:	San Diego	Sampling Date:	3-9-07
Applicant/Owner:	MCB Camp Pendleton	State:	CA	Sampling Point:	23-w1
Investigator(s):	MD, RK	Section, Township, Range:	San Bernardino, T9S, R5W, sec33		
Landform (hillslope, terrace, etc.):	Incised drainage gully	Local relief (concave, convex, none):	Concave	Slope (%):	5
Subregion (LRR):	LRR-C	Lat: 33° 20' 59.892"	Long: -117° 24' 16.678"	Datum:	NAD83
Soil Map Unit Name:	Salinas clay loam, 2-9% slopes			NWI classification:	

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks)

Are Vegetation ____, Soil ____, or Hydrology ____ significanly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ significanly disturbed? (If needed, explain any answers in Remarks).

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area within a wetland?**	Yes ____ No X
Hydric Soil Present?	Yes ____	No X		
Wetland Hydrology Presnt?	Yes ____	No X		

Remarks:

VEGETATION

Tree Stratum (Use scientific names) woody plants >3" dbh	Absolute % Cover	Dominant Species?	Indicator Status
Sambucus mexicana	10	Y	FAC
2.			
3.			
4.			
Total Cover:	10		
Sapling/Shrub Stratum (woody plants <3"dbh)			
Baccharis salicifolia	80	Y	FACW
Baccharis pilularis	20	n	UPL
3.			
4.			
5.			
Total Cover:	100		
Herb Stratum (non-woody plantss, regardless of size)			
Artemisia douglasiana	20	Y	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
Total Cover:	30		
Woody Vine Stratum (regardless of size)			
1.			
2.			
Total Cover:			

% Bare gourd in Herb Stratum 70 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That are OBL, FACW, or FAC 1.00 (A/B) (must be >0.5)

Prevalence index worksheet (test when Hydro and Soils indicate wetlands)

Total % Cover (absolute) of:			Multiply by:
OBL species		x 1 =	0
FACW species	80	x 2 =	160
FAC species	30	x 3 =	90
FACU species		x 4 =	0
UPL species	20	x 5 =	100
Coumn Totals:	130 (A)		350 (B)

Prevalence Index = B/A = 2.6923077 (must be ≤3.0)

Hydrophytic vegetation indicators

Y Dominance test is >50%

Y Prevalence index is ≤ 3.0[1]

____ Morphological adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soils and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks:

SOIL

Sampling point: 23-w1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-12	10 YR 2/2					S	
12-15	10 YR 3/2					L	

[1]Type: C=Concretion, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR C)
- ___ Depleted Below Dark Surface (A11)
- ___ Thin Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Material (F1)
- ___ Loamy Gleyed Matrix (F3)
- ___ Depleted Matrix (F6)
- ___ Redox Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pool (F9)

Indicators for Problematic Hydric Soils:[3]

- ___ 1 cm Muck (A9) (LRR C)
- ___ 2 cm Muck (A 10) (LRR B)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

___ Listed on National/Local Hydric Soils List

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present

Restrictive Layer (if present):
Type:
Depth (inches):

Hydric Soil Present? **Yes** ___ **No** **X**

Remarks: Surface moist, not saturated. Soil is well-drained.

HYDROLOGY

Wetland Hydrology Indicators:

Primary indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (Nonriverine)
- ___ Sediment Deposits (B2) (Nonriverine)
- ___ Drift Deposits (B3) (Nonriverine)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soil (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (Riverine)
- ___ Sediment Deposits (B2) (Riverine)
- ___ Drift Deposits (B3) (Riverine)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No	x	Depth (inches):	___
Water Table Present?	Yes ___	No	x	Depth (inches):	___
Saturation Present? (includes capillary fringe)	Yes ___	No	x	Depth (inches): (12 inch determination)	___

Wetland Hydrology Present? **Yes** ___ **No** **X**

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks: Former drainage area, crushed culvert. No sign of recent flow.

Texture and Rock Fragment Content

Texture

- cos - coarse sand
- s - sand
- fs - fine sand
- vfs - very fine sand
- lcos - loamy coarse sand
- ls - loamy sand
- lfs - loamy fine sand
- lvfs - loamy very fine sand
- cosl - coarse sandy loam
- sl - sandy loam
- fsl - fine sandy loam
- vfsl - very fine sandy loam
- l - loam
- sil - silt loam
- si - silt
- scl - sandy clay loam
- cl - clay loam
- sicl - silty clay loam
- sc - sandy clay
- sic - silty clay
- c - clay

Rock Fragments

- gr - gravelly
- vgr - very gravelly
- xgr - extremely gravelly
- cb - cobbly
- vcb - very cobbly
- xcb - extremely cobbly
- st - stony
- vst - very stony
- xst - extremely stony

Redoximorphic Feature Morphology

Abundance

- f - few
- c - common
- m - many

Size

- 1 - fine (<2mm)
- 2 - medium 2–5mm)
- 3 - coarse (5–20mm)
- 4 - very coarse (20–76mm)
- 5 - extremely coarse (>76mm)

Type

- Fe-x - iron concentration (soft mass)
- Fe-nc - iron nodule or concretion
- Mn-x - manganese concentration (soft mass)
- Mn-nc - manganese nodule or concretion
- d - depletion

Contrast

- f - faint
- d - distinct
- p - prominent

WETLAND DETERMINATION FORM - Arid West Region

Project/Site:	Access Roads-Road 24 Basilone Road Ditch	City/County:	San Diego	Sampling Date:	2-20-07
Applicant/Owner:	MCB Camp Pendleton	State:	CA	Sampling Point:	24-W5
Investigator(s):	Mike Dungan, Andrew Raaf, Melissa Tu	Section, Township, Range:	San Bernardino, T9S, R5W, sec34		
Landform (hillslope, terrace, etc.):	Roadside drainage ditch	Local relief (concave, convex, none):	Concave	Slope (%):	5-10
Subregion (LRR):	LRR-C	Lat: 33° 20' 46.101"	Long: -117° 24' 1.607"	Datum:	NAD83
Soil Map Unit Name:	Salinas clay loam, 2-9% slopes			NWI classification:	

Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ____ (If no, explain in Remarks)

Are Vegetation ____, Soil ____, or Hydrology ____ significanly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ significanly disturbed? (If needed, explain any answers in Remarks).

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area within a wetland?**	Yes ____ No X
Hydric Soil Present?	Yes ____	No X		
Wetland Hydrology Presnt?	Yes X	No ____		

Remarks: Drainage ditch shows strong indicators of periodic flow, but does not show wetland soils. Vegetation is dominated by wetland species, but also contains a few healthy, mature upland species. The channel is non-wetland, but a jurisdictional water body (Water of the U.S.).

VEGETATION

Tree Stratum (Use scientific names) woody plan	Absolute % Cover	Dominant Species?	Indicator Status
Salix lasiolepis	15	Y	FACW
3.			
4.			
Total Cover:	15		
Sapling/Shrub Stratum (woody plants <3"dbh)			
Baccharis salicifolia	35	Y	FACW
Salix lasiolepis	25	Y	FACW
Sambucus mexicana	5	N	FACU
4.			
5.			
Total Cover:	65		
Herb Stratum (non-woody plantss, regardless of size)			
Heterotheca grandifolia	15	Y	UPL
Hirschfeldia incana	10	Y	UPL
Arundo donax	5	Y	FAC
Artemisia douglasiana	5	Y	FAC
5.			
6.			
7.			
8.			
Total Cover:	35		
Woody Vine Stratum (regardless of size)			
1.			
2.			
Total Cover:			

% Bare gourd in Herb Stratum 20 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That are OBL, FACW, or FAC 0.71 (A/B) (must be >0.5)

Prevalence index worksheet (test when Hydro and Soils indicate wetlands)

Total % Cover (absolute) of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	70	x 2 =	140
FAC species	10	x 3 =	30
FACU species	5	x 4 =	20
UPL species	25	x 5 =	125
Coumn Totals:	110 (A)		315 (B)

Prevalence Index = B/A = 2.86 (must be ≤3.0)

Hydrophytic vegetation indicators

Y Dominance test is >50%

Y Prevalence index is ≤ 3.0[1]

N Morphological adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

N Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soils and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes** X **No** ____

Remarks: Arroyo willow riparian habitat with interspersed upland shrubs, grasses, and forbs. Surrounding uplands are shrubby, semi-disturbed along roadside.

SOIL

Sampling point: 24-W5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-1	5 Y 2.5/1					l	Highly organic, but not histic
1-3	10 YR 3/2					ls	
3-16	10 YR 5/2					s	

[1]Type: C=Concretion, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR C)
- ___ Depleted Below Dark Surface (A11)
- ___ Thin Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Material (F1)
- ___ Loamy Gleyed Matrix (F3)
- ___ Depleted Matrix (F6)
- ___ Redox Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pool (F9)

Indicators for Problematic Hydric Soils:[3]

- ___ 1 cm Muck (A9) (LRR C)
- ___ 2 cm Muck (A 10) (LRR B)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

___ Listed on National/Local Hydric Soils List

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present

Restrictive Layer (if present):
Type:
Depth (inches):

Hydric Soil Present? **Yes** ___ **No** **X**

Remarks: Becoming sandier with depth. Well drained.

HYDROLOGY

Wetland Hydrology Indicators:

Primary indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (Nonriverine)
- ___ Sediment Deposits (B2) (Nonriverine)
- ___ Drift Deposits (B3) (Nonriverine)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soil (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- x Water Marks (B1) (Riverine)
- x Sediment Deposits (B2) (Riverine)
- x Drift Deposits (B3) (Riverine)
- x Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No x	Depth (inches): ___	
Water Table Present?	Yes ___	No x	Depth (inches): ___	
Saturation Present? (includes capillary fringe)	Yes ___	No x	Depth (inches): ___ (12 inch determination)	

Wetland Hydrology Present? **Yes** x **No** ___

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks: Indicators or frequent flow through the drainage ditch.

Texture and Rock Fragment Content

Texture

cos - coarse sand
s - sand
fs - fine sand
vfs - very fine sand
lcos - loamy coarse sand
ls - loamy sand
lfs - loamy fine sand
lvfs - loamy very fine sand
cosl - coarse sandy loam
sl - sandy loam
fsl - fine sandy loam
vfsl - very fine sandy loam
l - loam
sil - silt loam
si - silt
scl - sandy clay loam
cl - clay loam
sicl - silty clay loam
sc - sandy clay
sic - silty clay
c - clay

Rock Fragments

gr - gravelly
vgr - very gravelly
xgr - extremely gravelly
cb - cobbly
vcb - very cobbly
xcb - extremely cobbly
st - stony
vst - very stony
xst - extremely stony

Redoximorphic Feature Morphology

Abundance

f - few
c - common
m - many

Size

1 - fine (<2mm)
2 - medium 2–5mm)
3 - coarse (5–20mm)
4 - very coarse (20–76mm)
5 - extremely coarse (>76mm)

Type

Fe-x - iron concentration (soft mass)
Fe-nc - iron nodule or concretion
Mn-x - manganese concentration (soft mass)
Mn-nc - manganese nodule or concretion
d - depletion

Contrast

f - faint
d - distinct
p - prominent

WETLAND DETERMINATION FORM - Arid West Region

Project/Site:	Access Roads-Road 24 Drainage headwater	City/County:	San Diego	Sampling Date:	2-20-07
Applicant/Owner:	MCB Camp Pendleton	State:	CA	Sampling Point:	24-W6
Investigator(s):	Mike Dungan, Andrew Raaf, Melissa Tu	Section, Township, Range:	San Bernardino, T9S, R5W, sec34		
Landform (hillslope, terrace, etc.):	Upper reach of drainage pattern	Local relief (concave, convex, none):	Concave	Slope (%):	<5
Subregion (LRR):	LRR-C	Lat: 33° 20' 49.837"	Long: -117° 23' 14.166"	Datum:	NAD83
Soil Map Unit Name:	Las Flores loamy fine sand, 2-9% slopes			NWI classification:	

Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ____ (If no, explain in Remarks)

Are Vegetation ____, Soil ____, or Hydrology ____ significanly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ significanly disturbed? (If needed, explain any answers in Remarks).

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area within a wetland?**	Yes ____ No X
Hydric Soil Present?	Yes ____	No X		
Wetland Hydrology Presnt?	Yes ____	No X		

Remarks: Site is a low spot between dirt road ways. Vegetation is hydrophytic, but a drainage culvert connects to downstream channel and likely prevents long-term saturation and reducing soil conditions in the sandy soil.

VEGETATION

Tree Stratum (Use scientific names) woody plan	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	0		
Sapling/Shrub Stratum (woody plants <3"dbh)			
Baccharis salicifolia	50	Y	FACW
4.			
5.			
Total Cover:	50		
Herb Stratum (non-woody plantss, regardless of size)			
Juncus dubia	40	Y	FACW
Bromus madritensis/rubens	30	Y	UPL
Erodium botrys	10	n	FACU
Lolium multiflorum	5	n	UPL
Rumex spp.	5	n	FACW
6.			
7.			
8.			
Total Cover:	90		
Woody Vine Stratum (regardless of size)			
1.			
2.			
Total Cover:			

% Bare gourd in Herb Stratum 20 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That are OBL, FACW, or FAC 0.67 (A/B) (must be >0.5)

Prevalence index worksheet (test when Hydro and Soils indicate wetlands)

Total % Cover (absolute) of:			Multiply by:
OBL species	0	x 1 =	0
FACW species	90	x 2 =	180
FAC species	10	x 3 =	30
FACU species	5	x 4 =	20
UPL species	25	x 5 =	125
Coumn Totals:	130 (A)		355 (B)

Prevalence Index = B/A = 2.73 (must be ≤3.0)

Hydrophytic vegetation indicators

Y Dominance test is >50%

Y Prevalence index is ≤ 3.0[1]

N Morphological adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

N Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soils and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes** X **No** ____

Remarks: Patch of moist vegetation between dirt road corridors.

SOIL

Sampling point: 24-W6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-1	5 Y 4/2					cl	
1-10	10 YR 5/3					s	Pockets of clay
10-12	5 Y 4/2					sl	

[1]Type: C=Concretion, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR C)
- ___ Depleted Below Dark Surface (A11)
- ___ Thin Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Material (F1)
- ___ Loamy Gleyed Matrix (F3)
- ___ Depleted Matrix (F6)
- ___ Redox Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pool (F9)

Indicators for Problematic Hydric Soils:[3]

- ___ 1 cm Muck (A9) (LRR C)
- ___ 2 cm Muck (A 10) (LRR B)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

___ Listed on National/Local Hydric Soils List

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present

Restrictive Layer (if present):
Type:
Depth (inches):

Hydric Soil Present? **Yes** ___ **No** X

Remarks: No redox features evident. Becoming sandier with depth.

HYDROLOGY

Wetland Hydrology Indicators:

Primary indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (Nonriverine)
- ___ Sediment Deposits (B2) (Nonriverine)
- ___ Drift Deposits (B3) (Nonriverine)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soil (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (Riverine)
- ___ Sediment Deposits (B2) (Riverine)
- ___ Drift Deposits (B3) (Riverine)
- x Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No x	Depth (inches): ___	
Water Table Present?	Yes ___	No x	Depth (inches): ___	
Saturation Present? (includes capillary fringe)	Yes ___	No x	Depth (inches): ___ (12 inch determination)	

Wetland Hydrology Present? **Yes** ___ **No** X

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks: Low spot between dirt roads. Area collects water, but a drainage culvert connects to downstream--probably prevent long-term saturation.

Texture and Rock Fragment Content

Texture

- cos - coarse sand
- s - sand
- fs - fine sand
- vfs - very fine sand
- lcos - loamy coarse sand
- ls - loamy sand
- lfs - loamy fine sand
- lvfs - loamy very fine sand
- cosl - coarse sandy loam
- sl - sandy loam
- fsl - fine sandy loam
- vfsl - very fine sandy loam
- l - loam
- sil - silt loam
- si - silt
- scl - sandy clay loam
- cl - clay loam
- sicl - silty clay loam
- sc - sandy clay
- sic - silty clay
- c - clay

Rock Fragments

- gr - gravelly
- vgr - very gravelly
- xgr - extremely gravelly
- cb - cobbly
- vcb - very cobbly
- xcb - extremely cobbly
- st - stony
- vst - very stony
- xst - extremely stony

Redoximorphic Feature Morphology

Abundance

- f - few
- c - common
- m - many

Size

- 1 - fine (<2mm)
- 2 - medium 2–5mm)
- 3 - coarse (5–20mm)
- 4 - very coarse (20–76mm)
- 5 - extremely coarse (>76mm)

Type

- Fe-x - iron concentration (soft mass)
- Fe-nc - iron nodule or concretion
- Mn-x - manganese concentration (soft mass)
- Mn-nc - manganese nodule or concretion
- d - depletion

Contrast

- f - faint
- d - distinct
- p - prominent

Figures

The attached figures are organized by road number. An overview figure is provided for each road, showing the study area the jurisdictional waters of the U.S. survey transects and the study area. Wetlands were delineated at Roads 8, 9, 14, and 21. For each of these roads, additional insets of the wetland locations are provided at a scale of 1:4800. To ensure consistency, the Figure numbers correspond with the Figure numbers provided in the Plant Community Mapping Report (prepared by TEC in July 2007) and thus are not always sequential in this Wetland Report.

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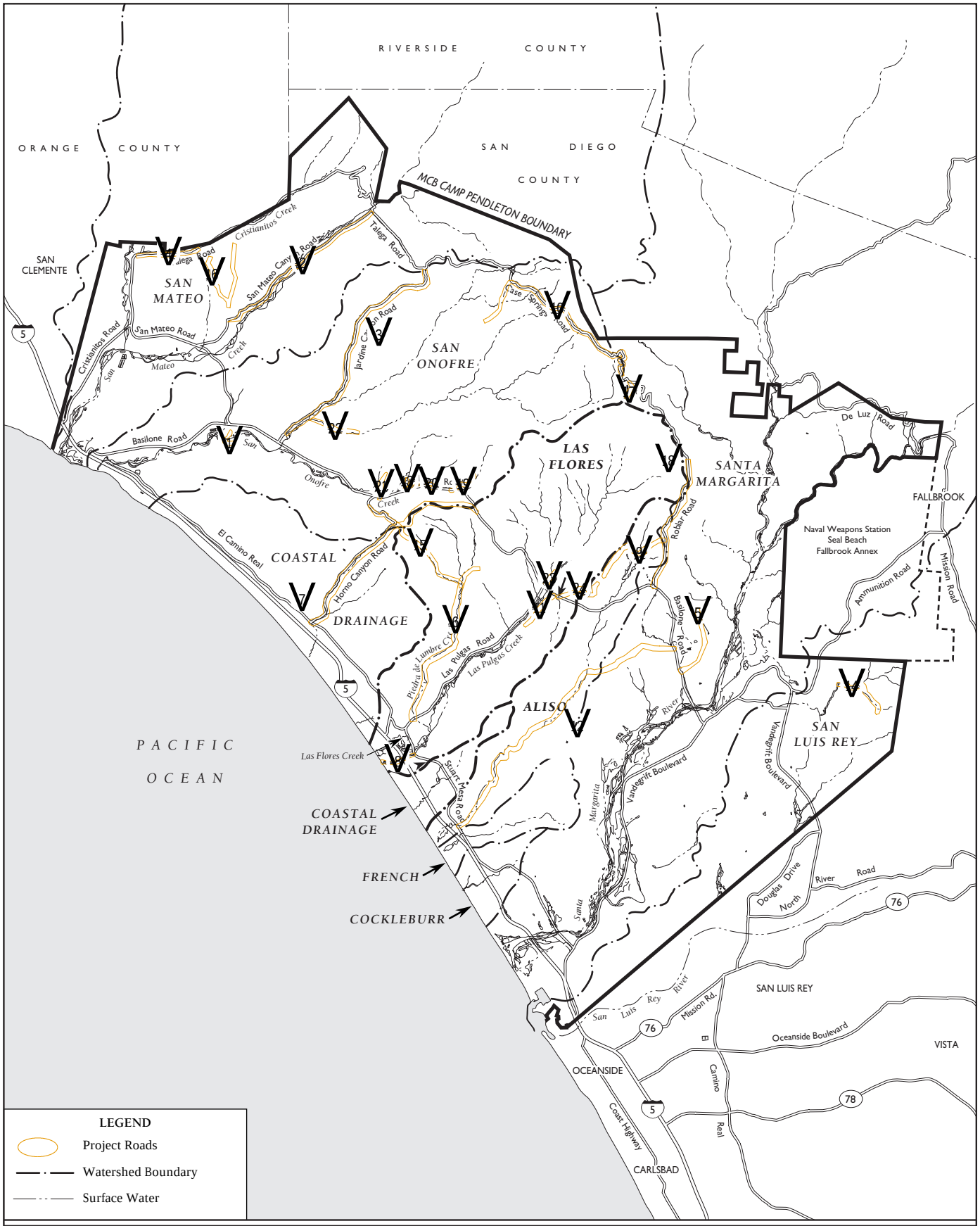
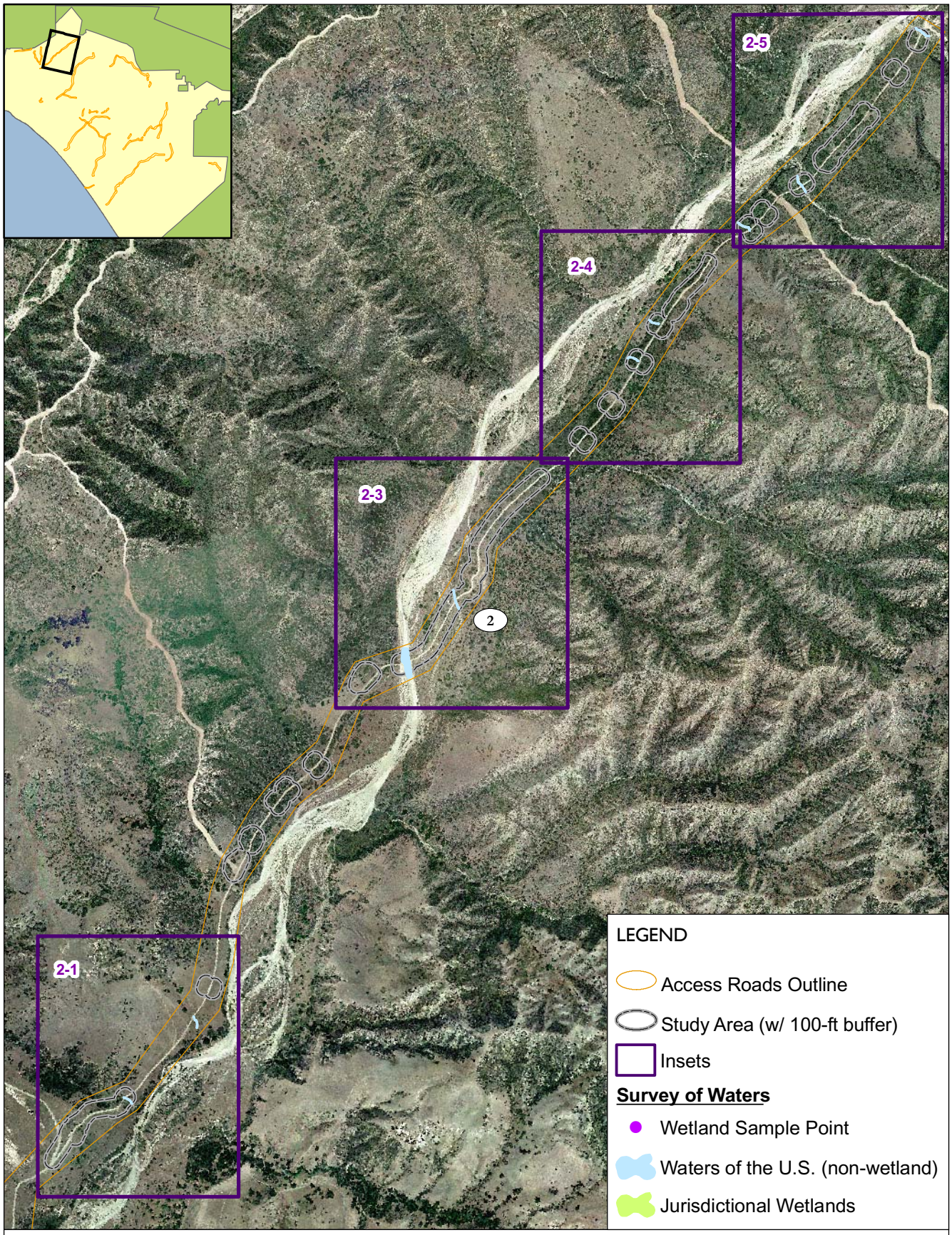


Figure F-1
Watersheds of
MCB Camp Pendleton

0 Meters 50

0 200 Feet

Figure 1-0
Road 1: Area 52 Combat Town. Overview
Jurisdictional Waters and Wetlands



0 Meters 240

0 Feet 950

Figure 2-0
Road 2: San Mateo Canyon. Overview
Jurisdictional Waters and Wetlands

0 Meters 50

0 Feet 200

Figure 2-1
Road 2: San Mateo Canyon. Inset
Jurisdictional Waters and Wetlands

0 Meters 50

0 Feet 200

Figure 2-3
Road 2: San Mateo Canyon. Inset
Jurisdictional Waters and Wetlands

0 Meters 50

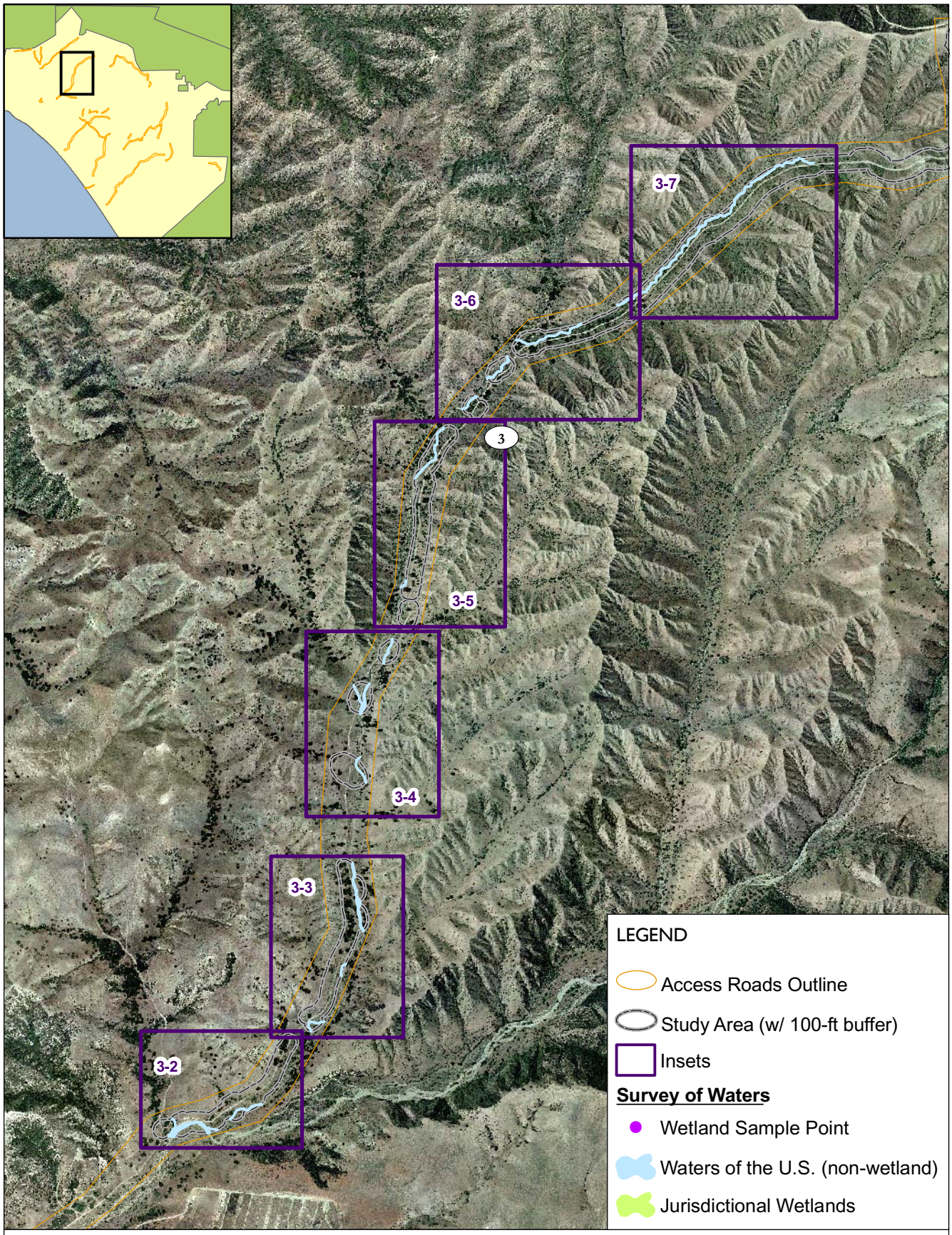
0 Feet 200

Figure 2-4
Road 2: San Mateo Canyon. Inset
Jurisdictional Waters and Wetlands

0 Meters 50

0 Feet 200

Figure 2-5
Road 2: San Mateo Canyon. Inset
Jurisdictional Waters and Wetlands



0 Meters 250

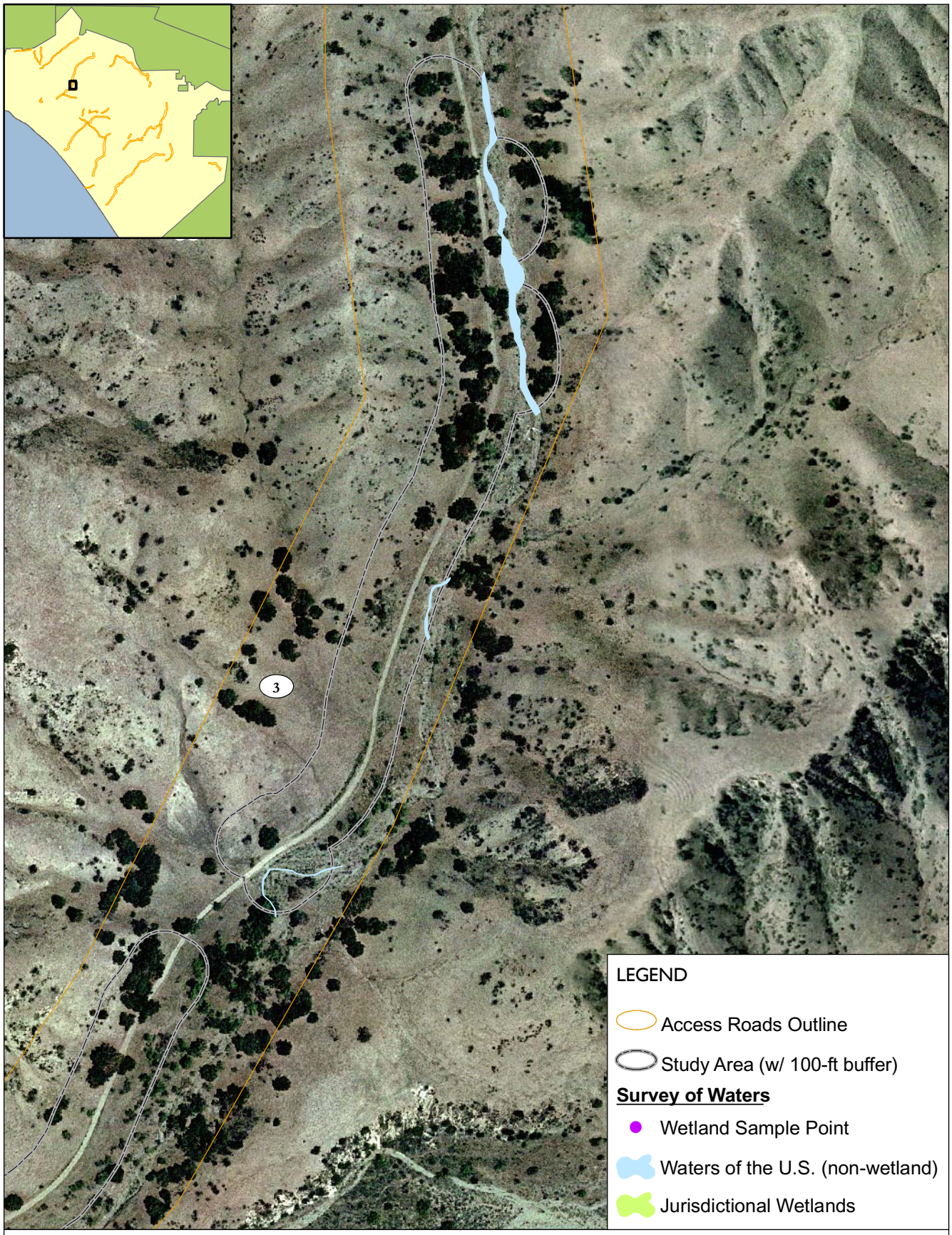
0 1,000 Feet

Figure 3-0
Road 3: Jardine Canyon. Overview
Jurisdictional Waters and Wetlands

0 Meters 50

0 Feet 200

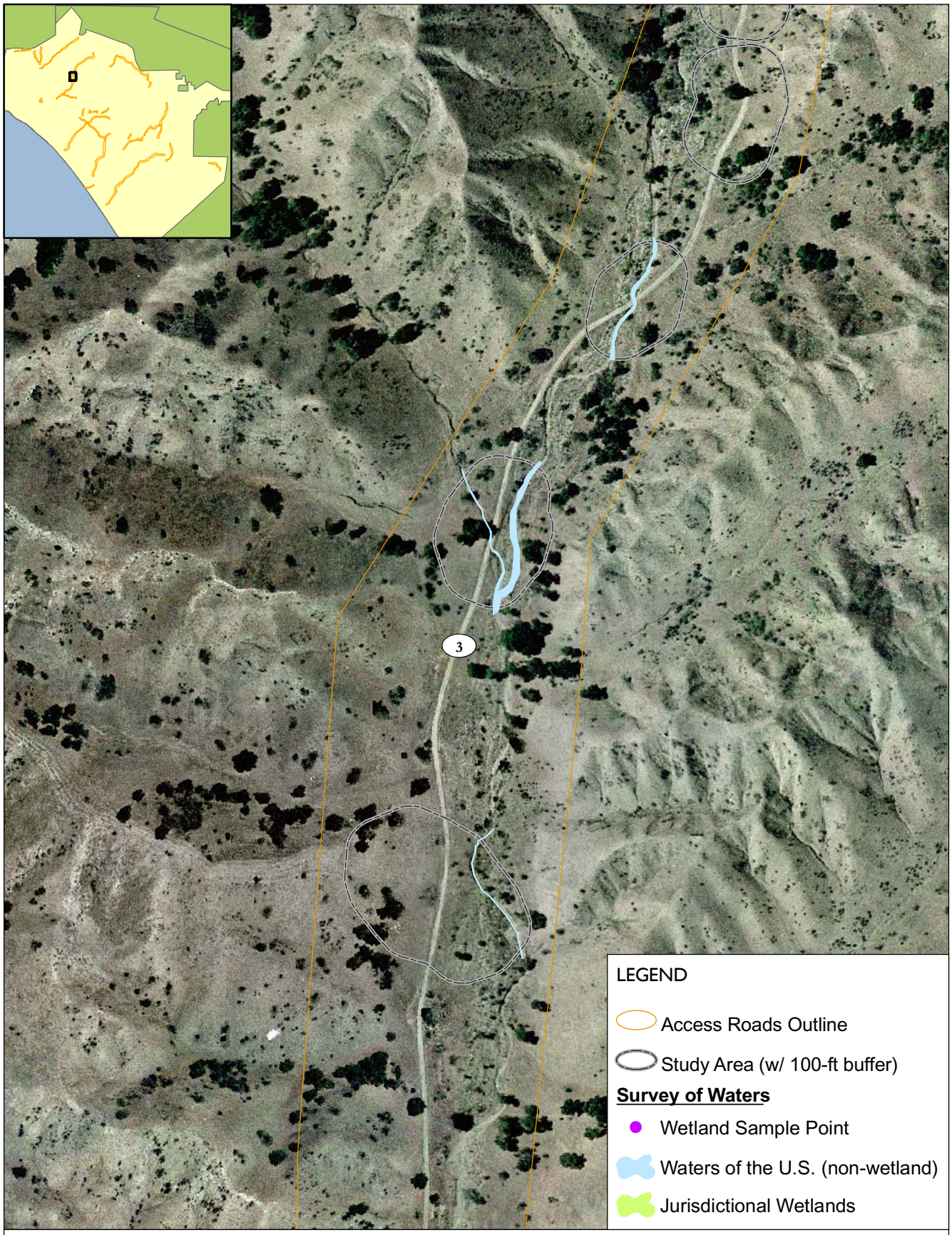
Figure 3-2
Road 3: Jardine Canyon. Inset
Jurisdictional Waters and Wetlands



0 Meters 50

0 200 Feet

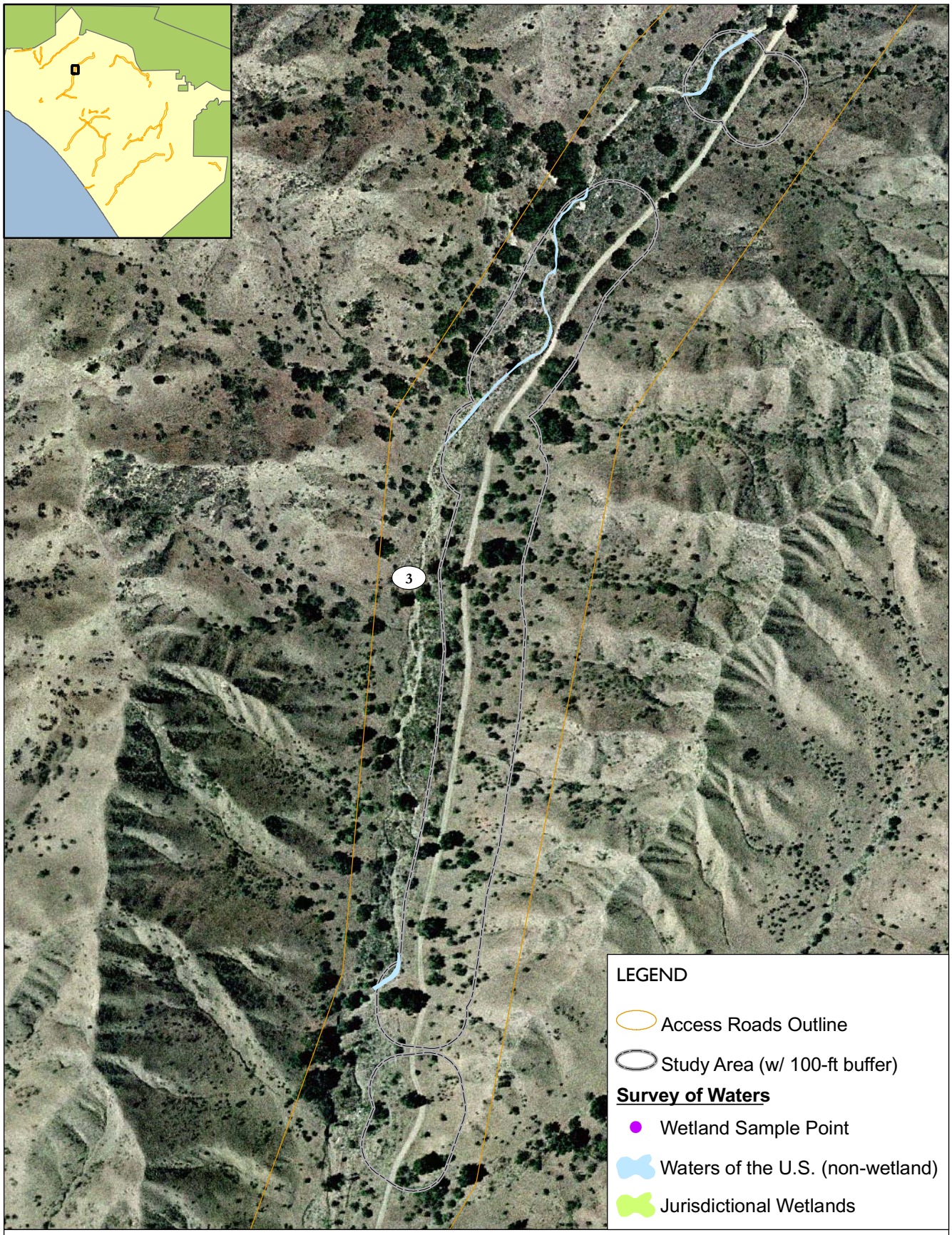
Figure 3-3
Road 3: Jardine Canyon. Inset
Jurisdictional Waters and Wetlands



0 Meters 50

0 Feet 200

Figure 3-4
Road 3: Jardine Canyon. Inset
Jurisdictional Waters and Wetlands



0 Meters 50

0 Feet 200

Figure 3-5
Road 3: Jardine Canyon. Inset
Jurisdictional Waters and Wetlands

0 Meters 50

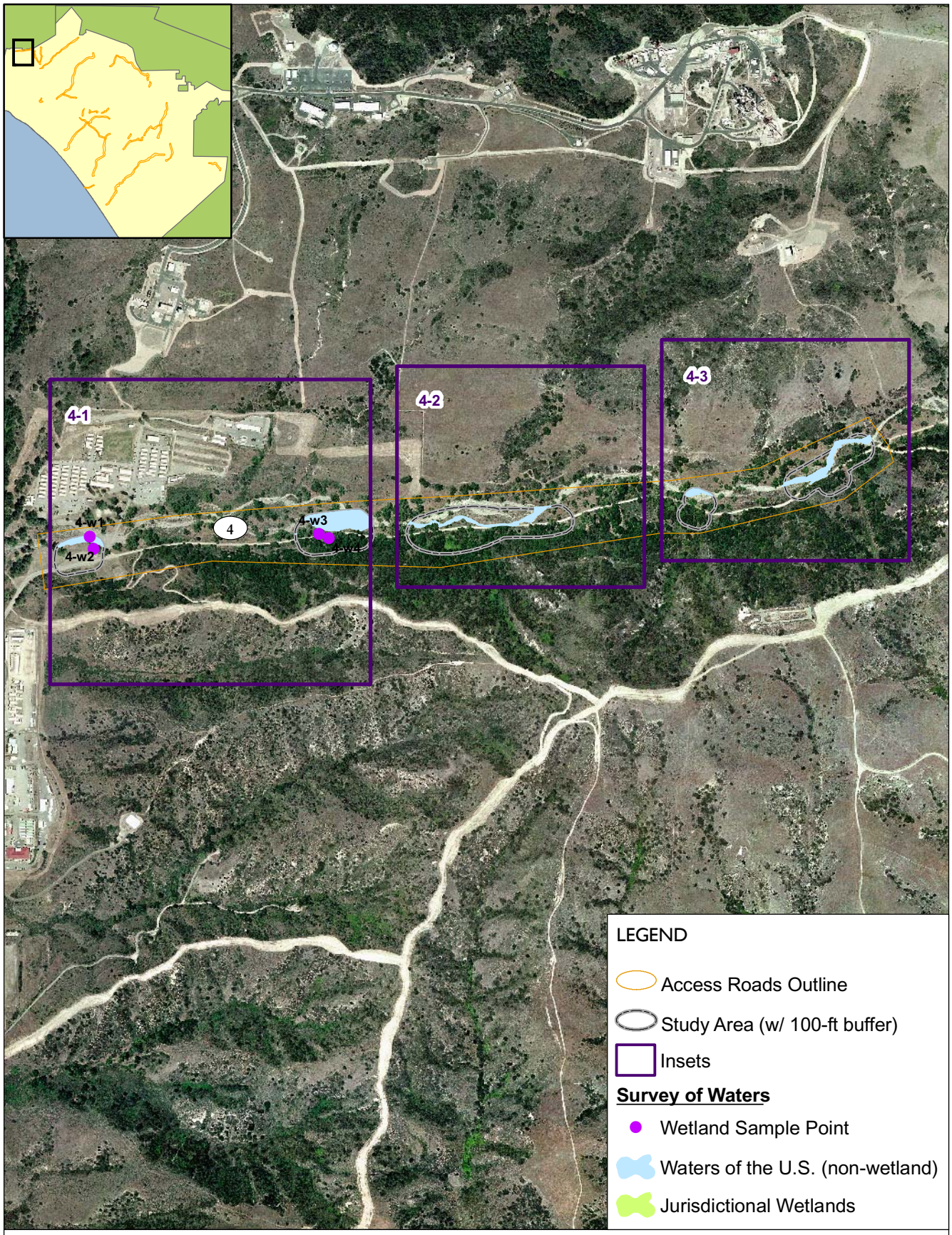
0 Feet 200

Figure 3-6
Road 3: Jardine Canyon. Inset
Jurisdictional Waters and Wetlands

0 Meters 50

0 Feet 200

Figure 3-7
Road 3: Jardine Canyon. Inset
Jurisdictional Waters and Wetlands



0 Meters 250

0 Feet 1,000

Figure 4-0
Road 4: Talega Canyon. Overview
Jurisdictional Waters and Wetlands

0 Meters 50

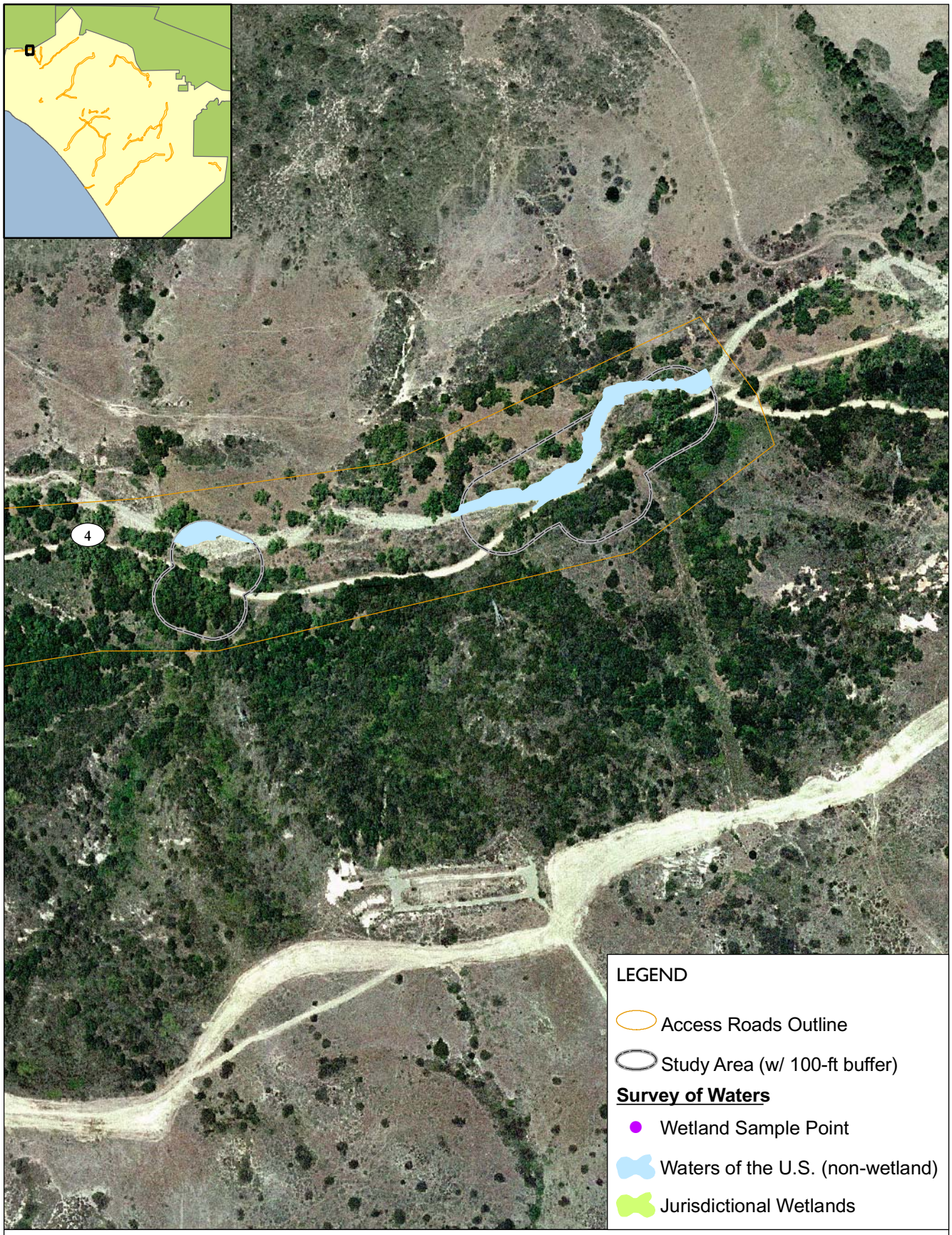
0 200 Feet

Figure 4-1
Road 4: Talega Canyon. Inset
Jurisdictional Waters and Wetlands

0 Meters 50

0 200 Feet

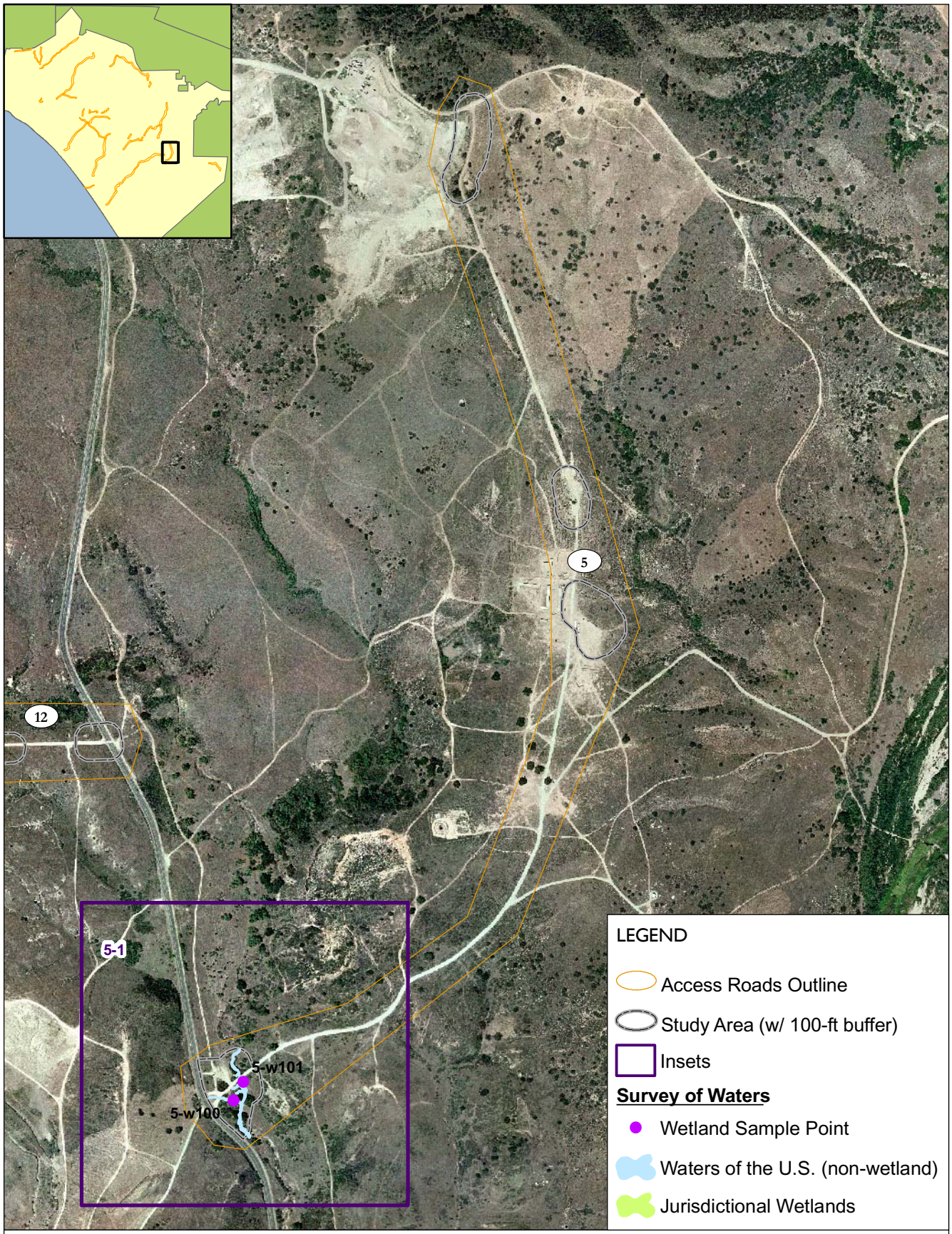
Figure 4-2
Road 4: Talega Canyon. Inset
Jurisdictional Waters and Wetlands



0 Meters 50

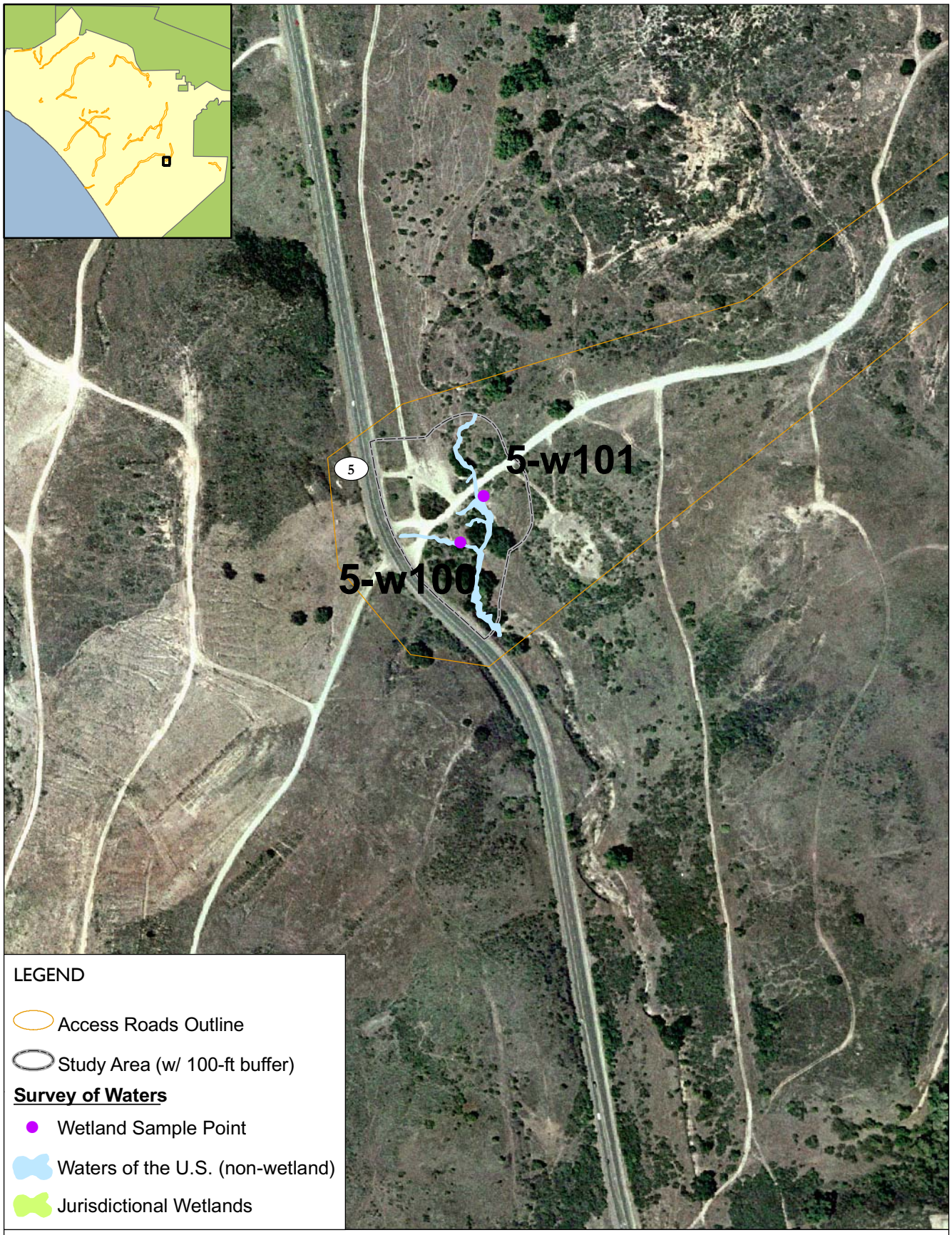
0 200 Feet

Figure 4-3
Road 4: Talega Canyon. Inset
Jurisdictional Waters and Wetlands



Meters 0 100
0 500 Feet

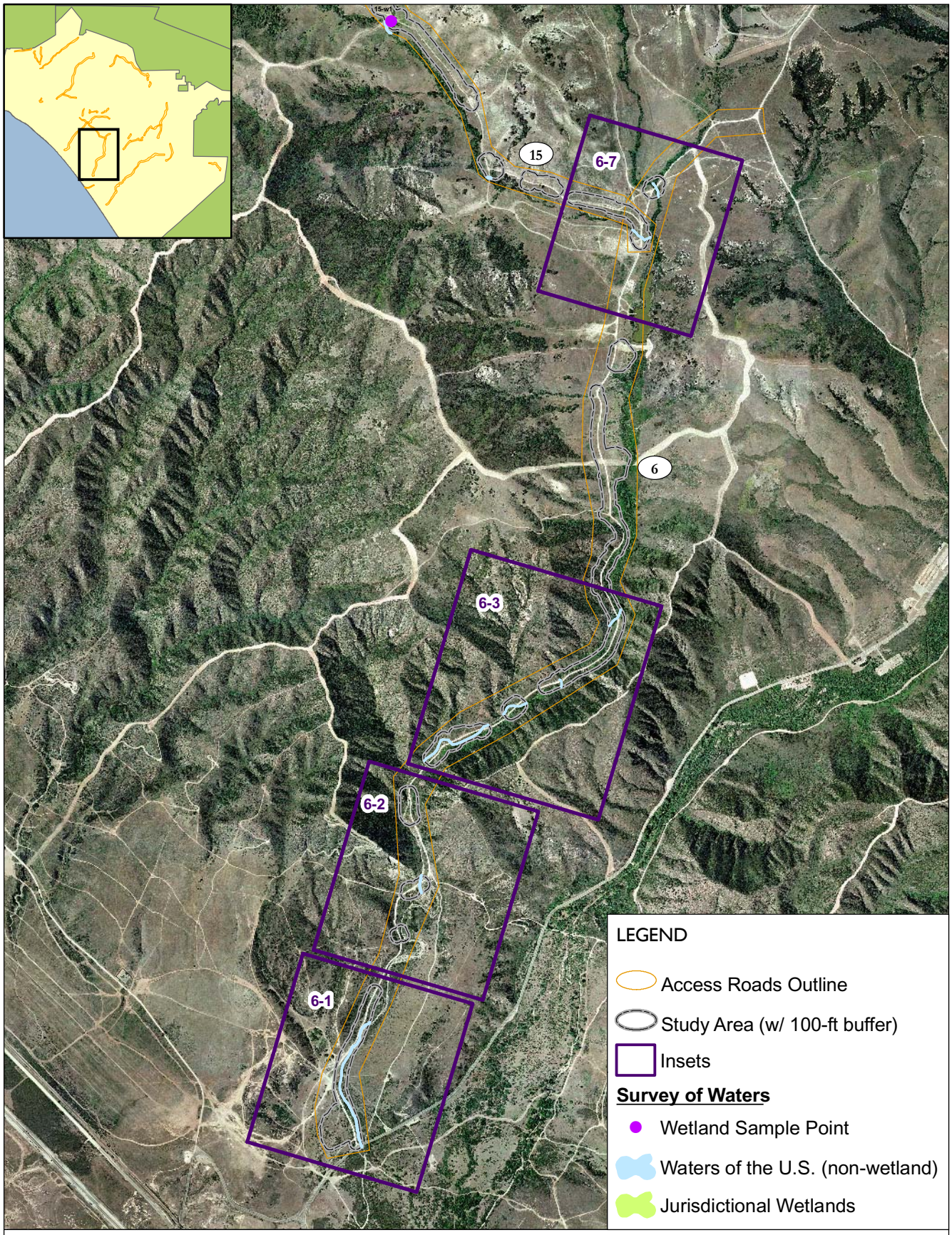
Figure 5-0
Road 5: Combat Town. Overview
Jurisdictional Waters and Wetlands



0 Meters 50

0 200 Feet

Figure 5-1
Road 5: Combat Town. Inset
Jurisdictional Waters and Wetlands



0 Meters 400

0 Feet 1,540

Figure 6-0
Road 6: Piedra de Lumbre Canyon. Overview
Jurisdictional Waters and Wetlands

0 Meters 50

0 250 Feet

Figure 6-1
Road 6: Piedra de Lumbre Canyon. Inset
Jurisdictional Waters and Wetlands

0 Meters 60

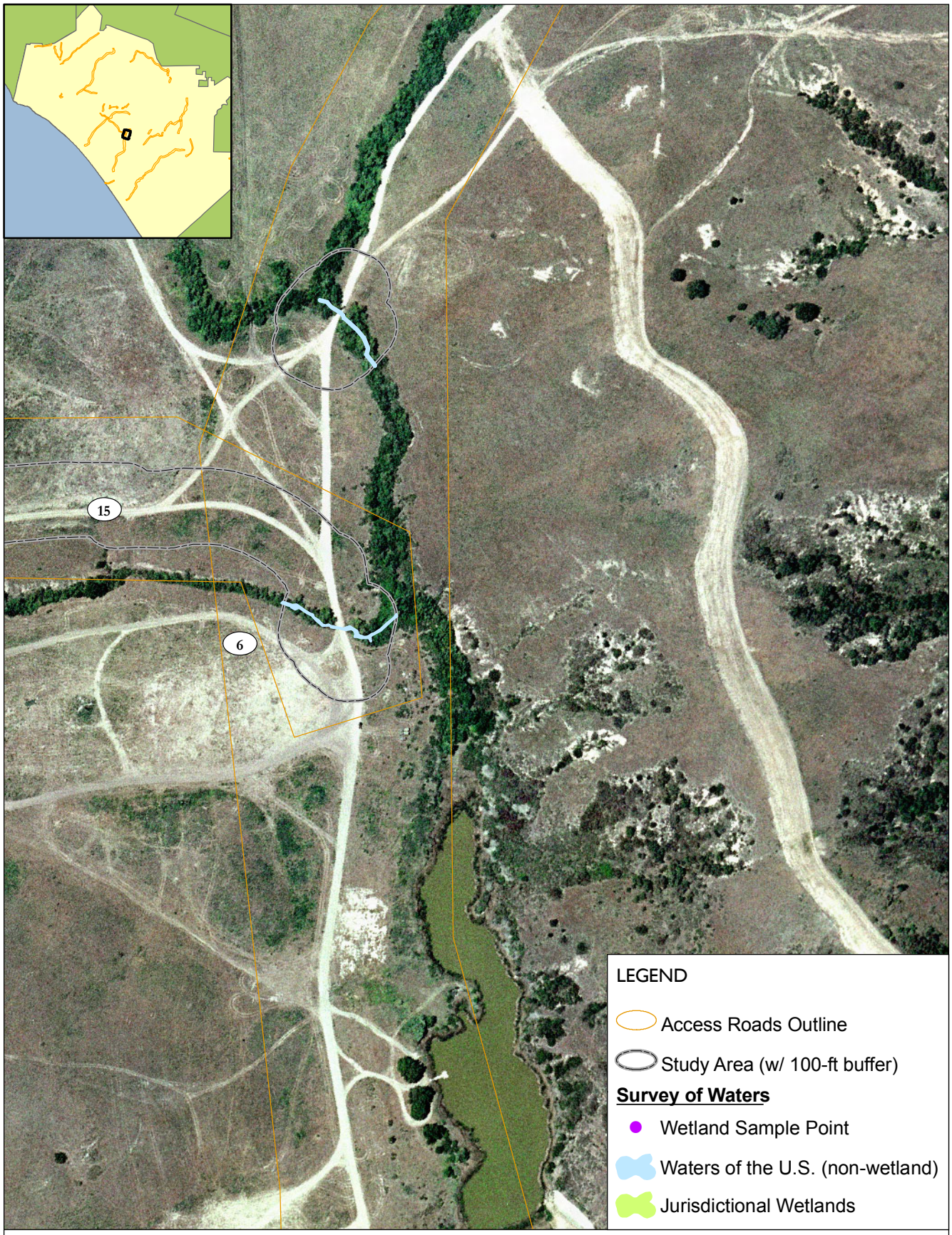
0 Feet 250

Figure 6-2
Road 6: Piedra de Lumbre Canyon. Inset
Jurisdictional Waters and Wetlands

0 Meters 50

0 200 Feet

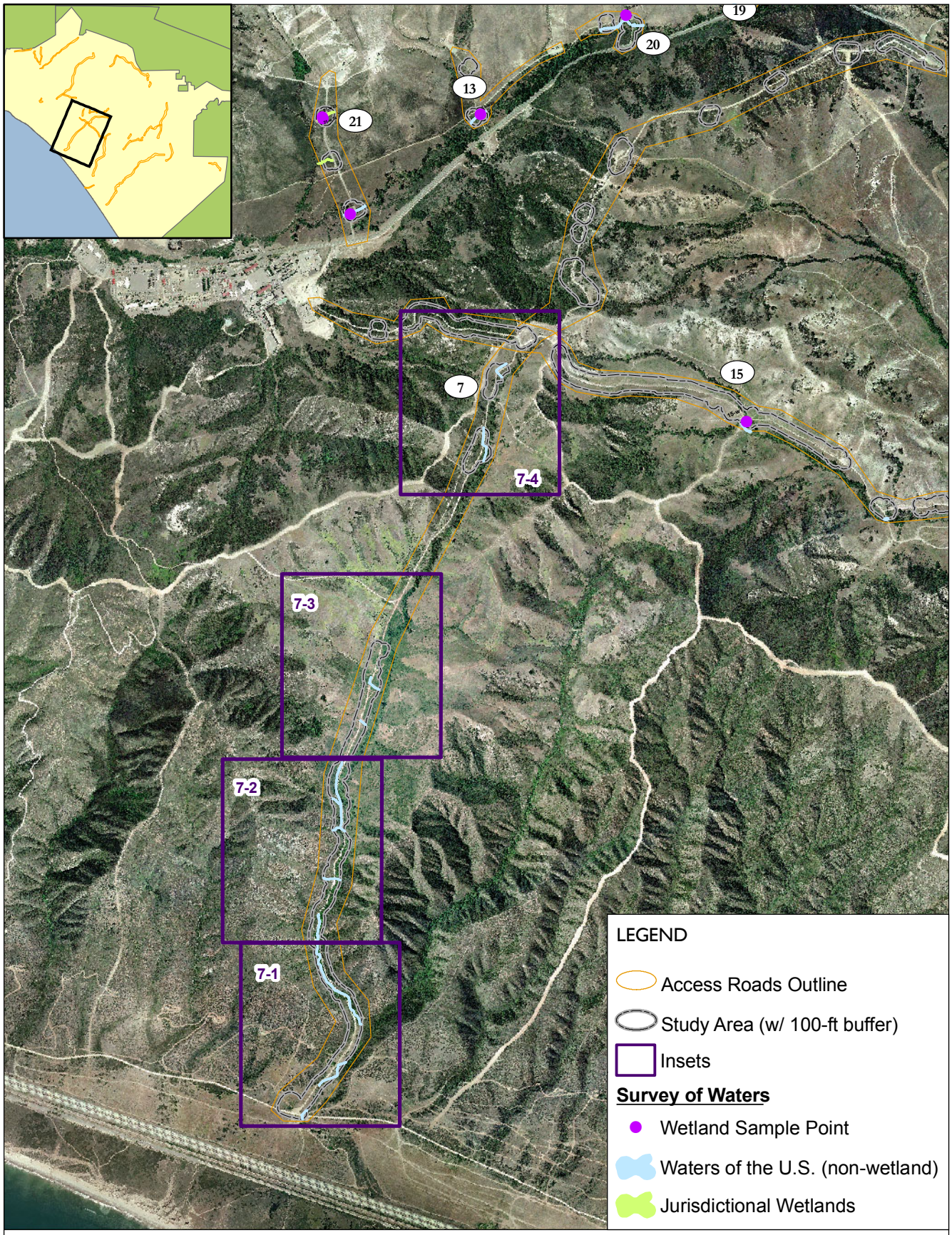
Figure 6-3
Road 6: Piedra de Lumbre Canyon. Inset
Jurisdictional Waters and Wetlands



0 Meters 50

0 200 Feet

Figure 6-7
Road 6: Piedra de Lumbre Canyon. Inset
Jurisdictional Waters and Wetlands



0 Meters 500

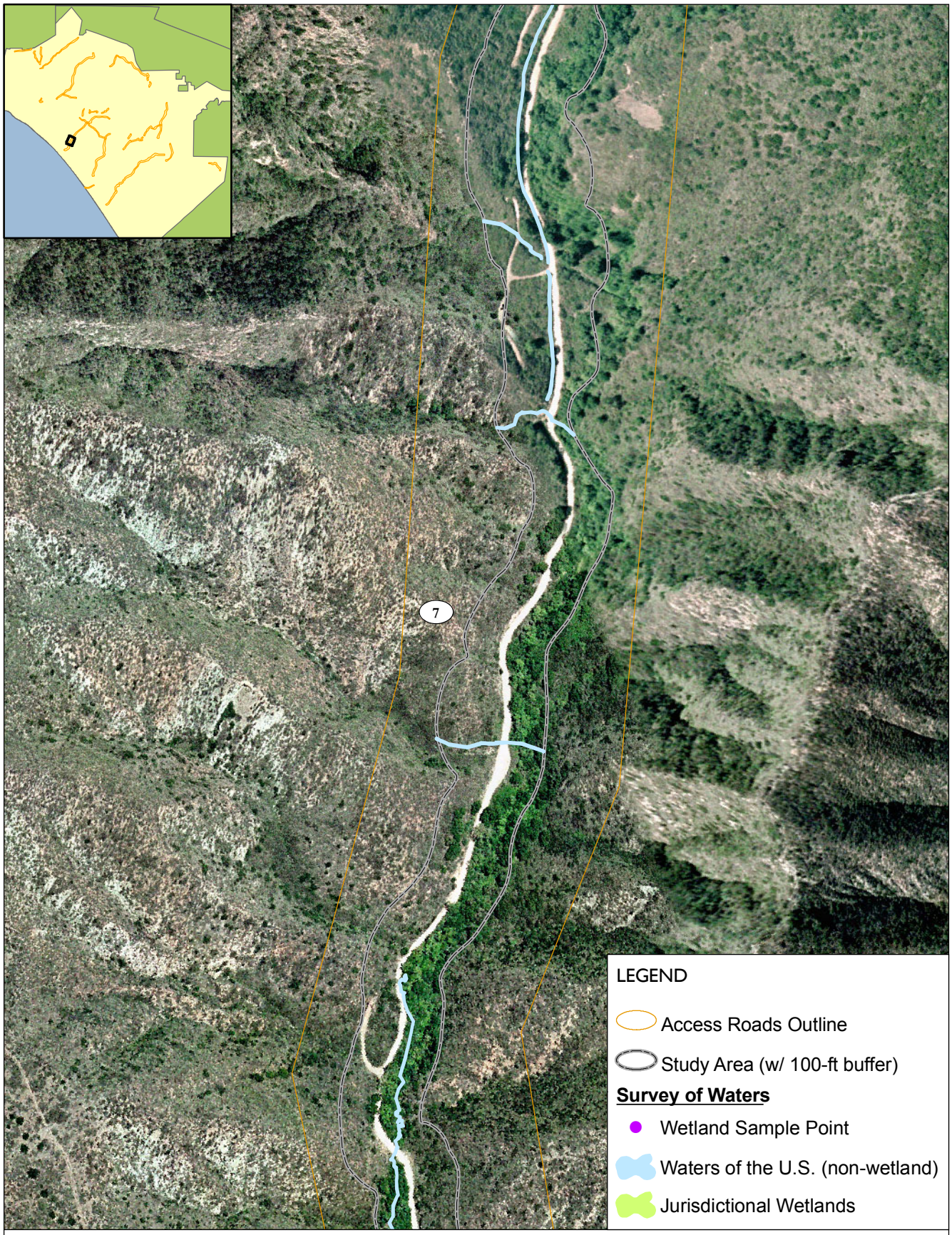
0 Feet 2,000

Figure 7-0
Road 7: Horno Canyon. Overview
Jurisdictional Waters and Wetlands

0 Meters 100

0 Feet 400

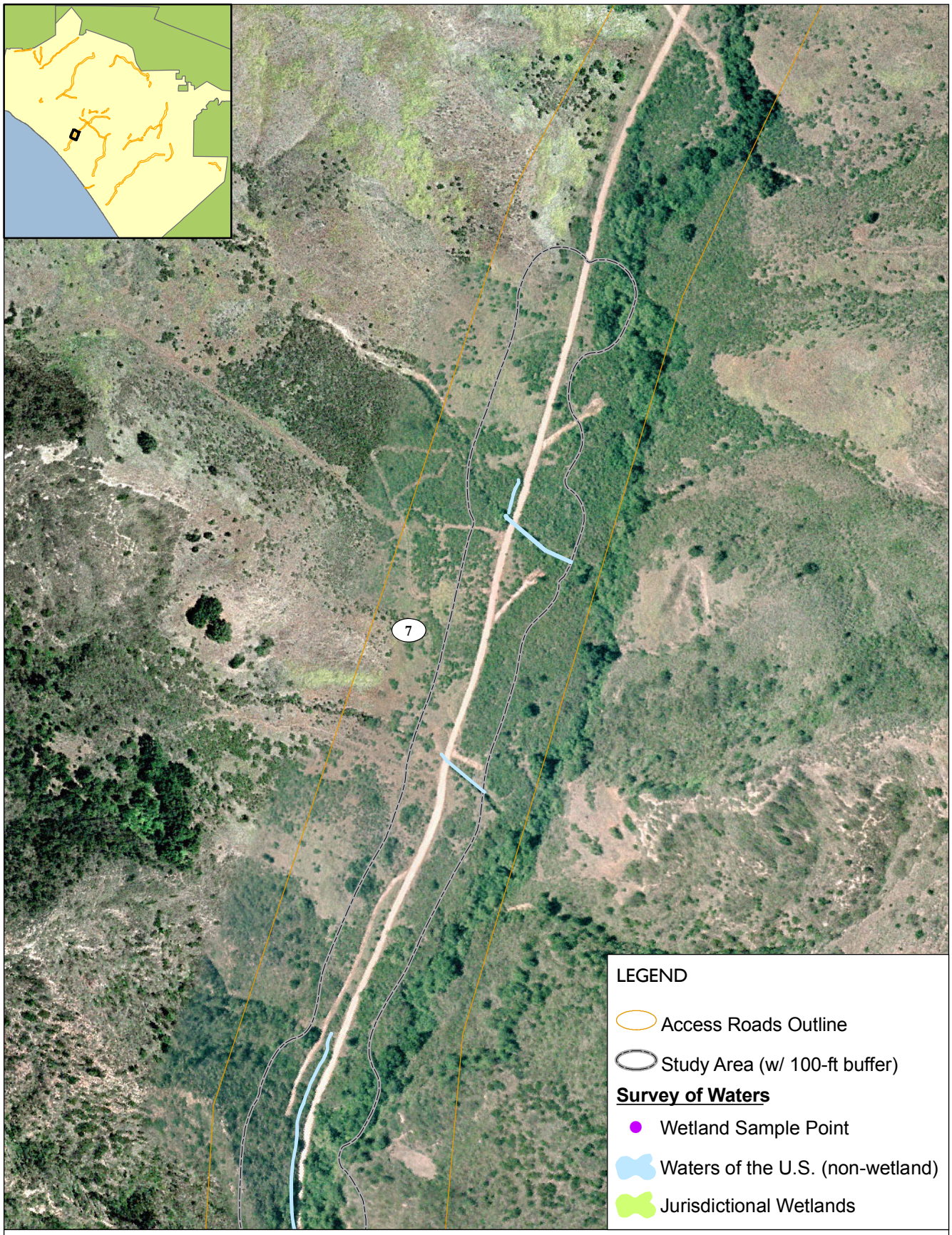
Figure 7-1
Road 7: Horno Canyon. Inset
Jurisdictional Waters and Wetlands



0 Meters 100

0 Feet 400

Figure 7-2
Road 7: Horno Canyon. Inset
Jurisdictional Waters and Wetlands



0 Meters 100

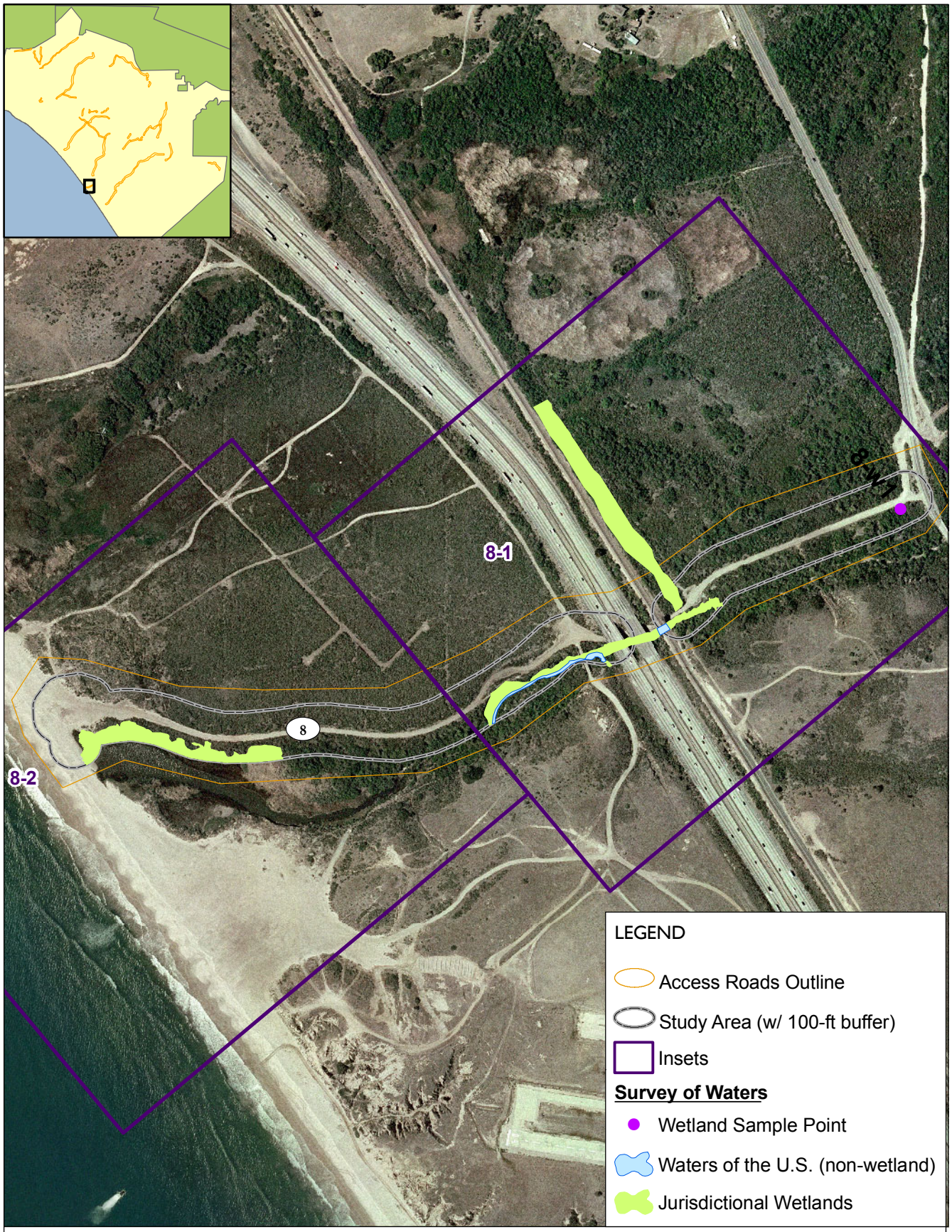
0 Feet 400

Figure 7-3
Road 7: Horno Canyon. Inset
Jurisdictional Waters and Wetlands

0 Meters 100

0 Feet 400

Figure 7-4
Road 7: Horno Canyon. Inset
Jurisdictional Waters and Wetlands



0 Meters 150
0 Feet 600

Figure 8-0
Road 8: Red Beach. Overview
Jurisdictional Waters and Wetlands

0 Meters 100

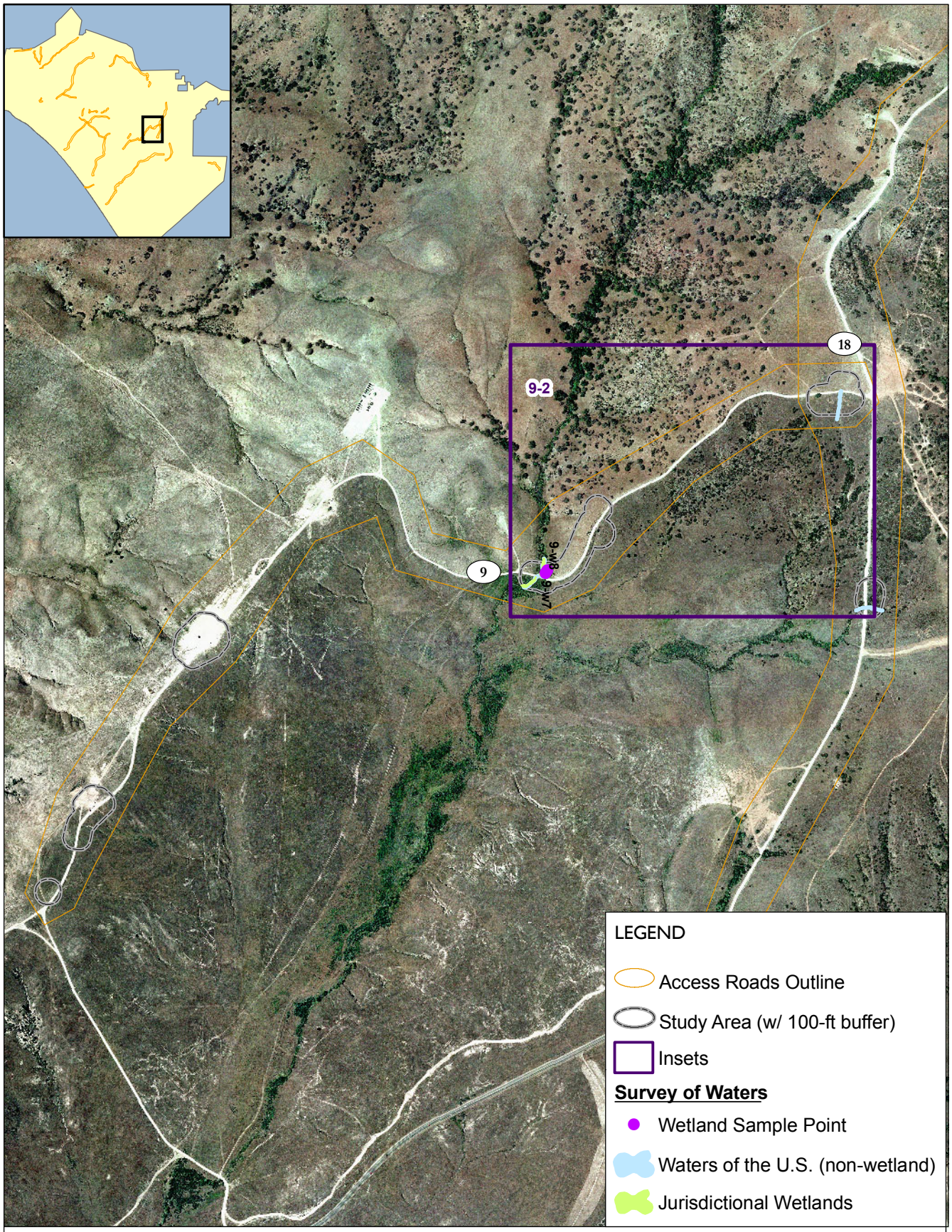
0 Feet 400

Figure 8-1
Road 8: Red Beach. Inset (East End)
Jurisdictional Waters and Wetlands

0 Meters 100

0 Feet 400

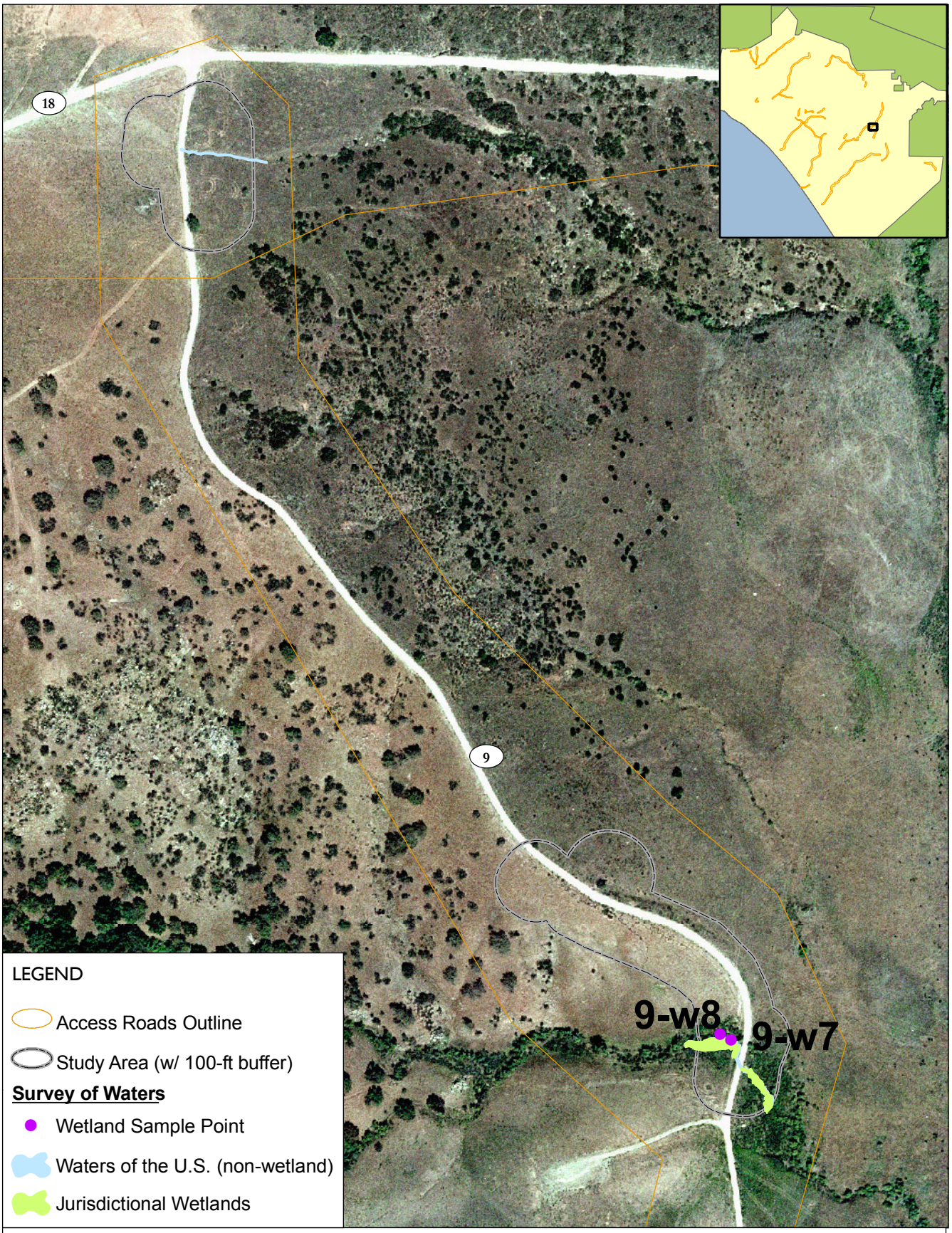
Figure 8-2
Road 8: Red Beach. Inset (West End)
Jurisdictional Waters and Wetlands



0 Meters 250

0 Feet 1,000

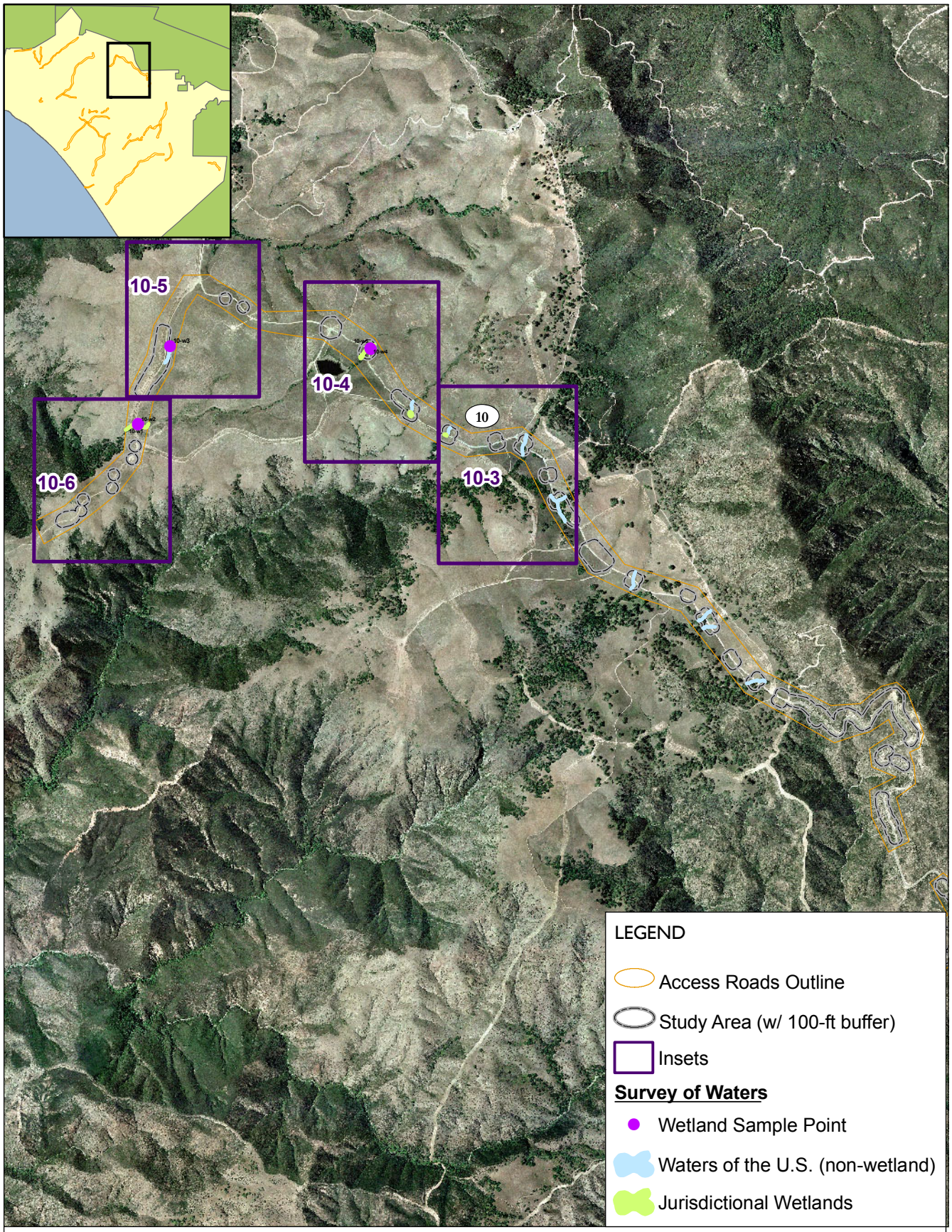
Figure 9-0
Road 9: Range 407. Overview
Jurisdictional Waters and Wetlands



0 Meters 100

0 Feet 400

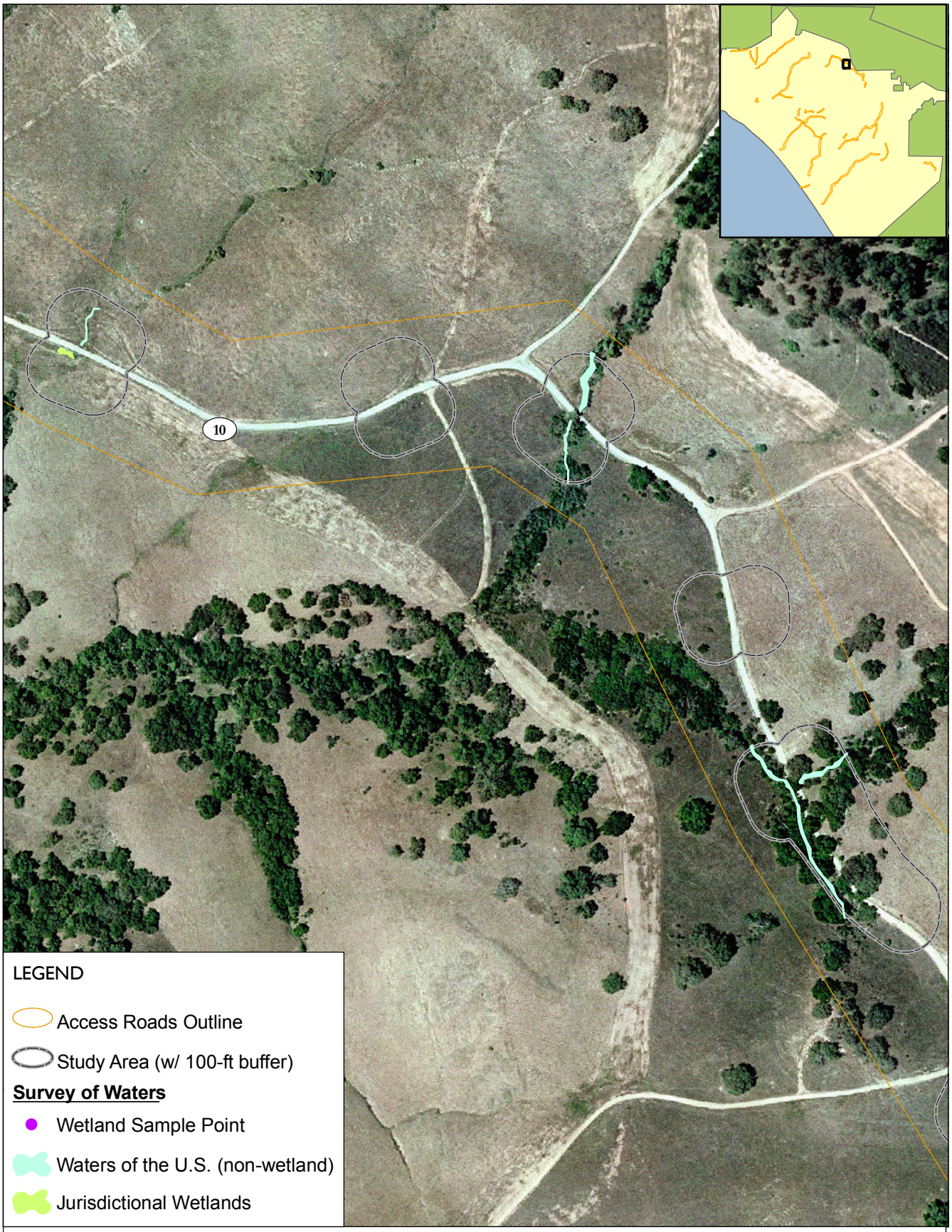
Figure 9-2
Road 9: Range 407. Inset
Jurisdictional Waters and Wetlands



0 Meters 480

0 Feet 2,000

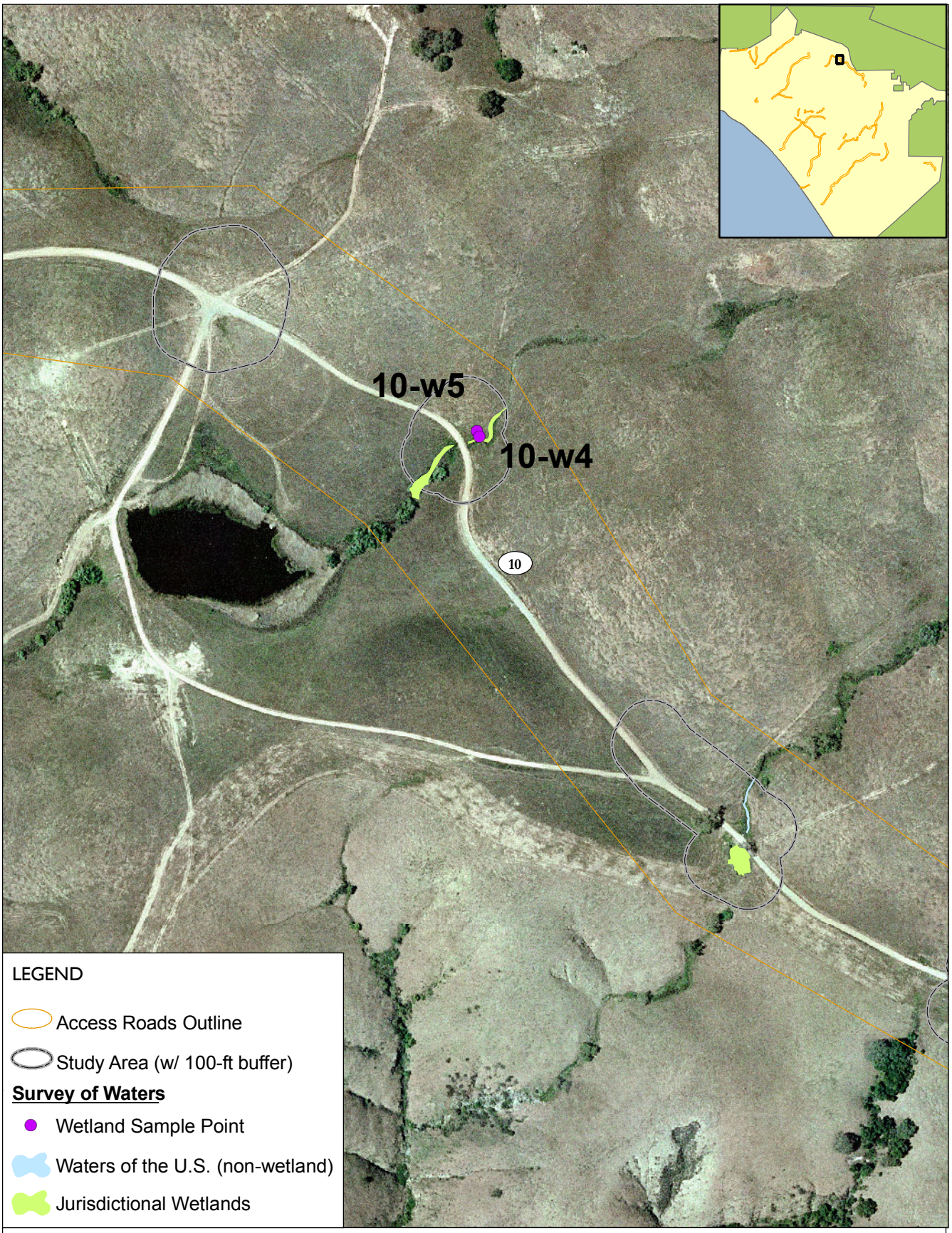
Figure 10-0
Road 10: Observation Post J. Overview
Jurisdictional Waters and Wetlands



0 Meters 100

0 Feet 400

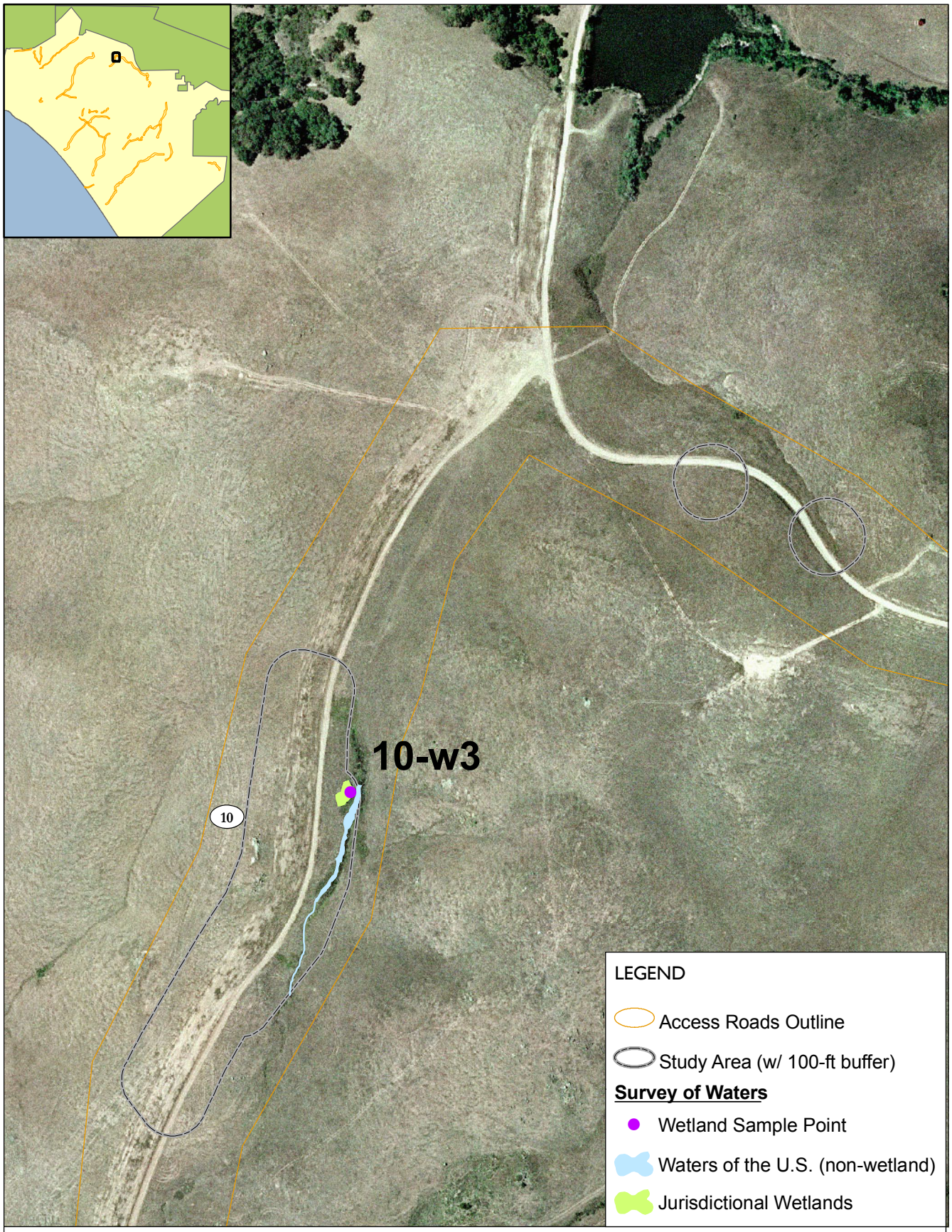
Figure 10-3
Road 10: Observation Post J. Inset
Jurisdictional Waters and Wetlands



0 Meters 100

0 Feet 400

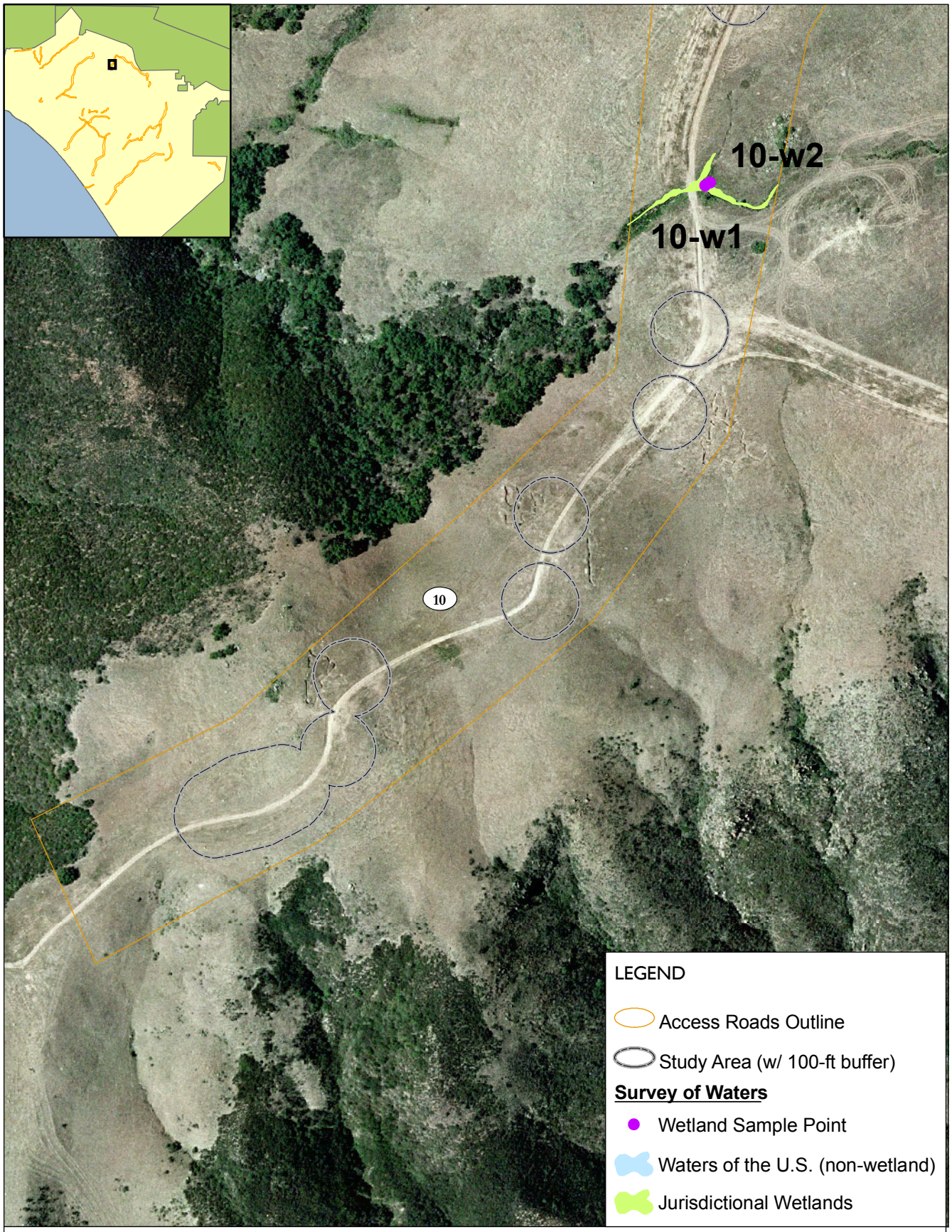
Figure 10-4
Road 10: Observation Post J. Inset
Jurisdictional Waters and Wetlands



0 Meters 100

0 Feet 400

Figure 10-5
Road 10: Observation Post J. Inset
Jurisdictional Waters and Wetlands



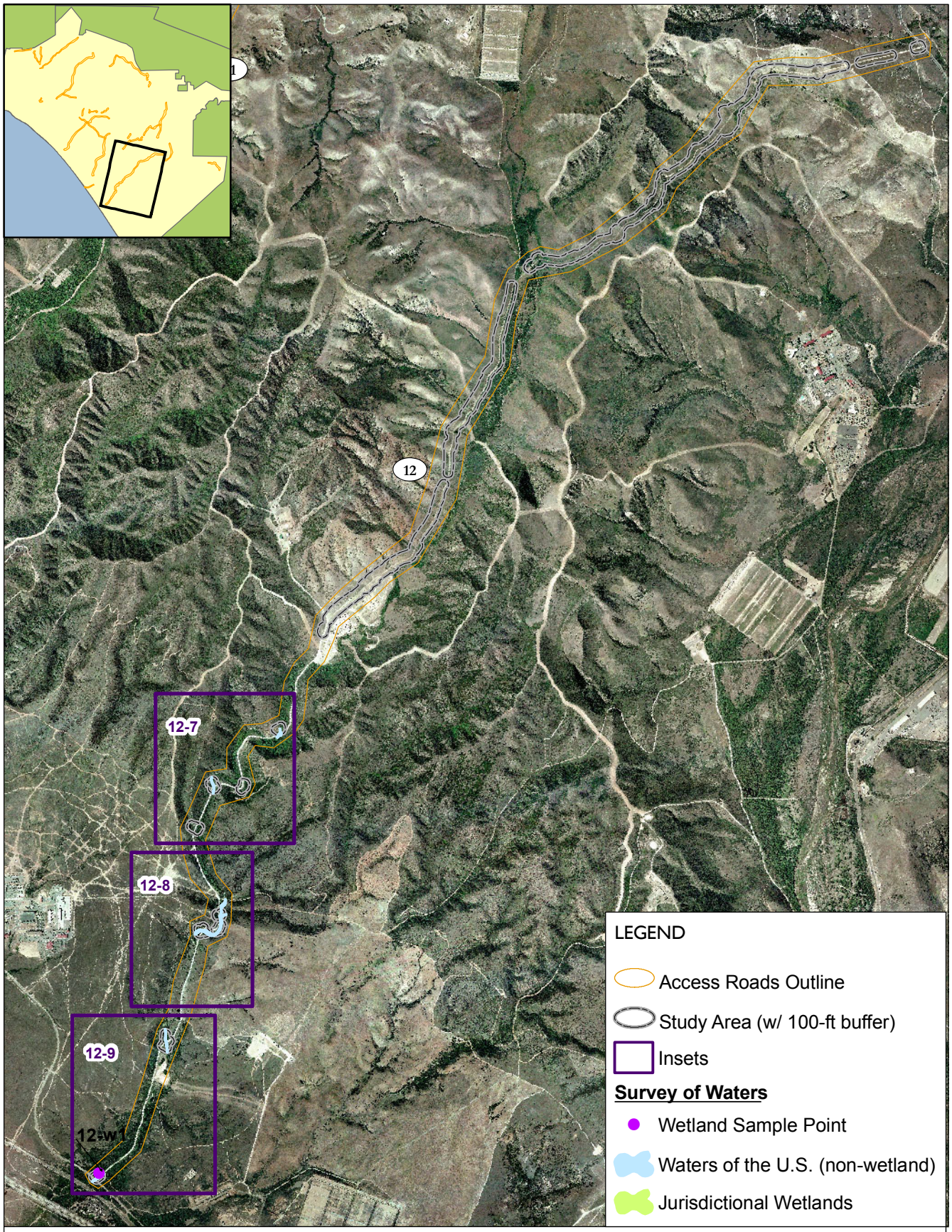
0 Meters 100

0 Feet 400

Figure 10-6
Road 10: Observation Post J. Inset
Jurisdictional Waters and Wetlands

0 Meters 120
0 Feet 500

Figure 11-0
Road 11: Range 111. Overview
Jurisdictional Waters and Wetlands



0 Meters 840

0 Feet 3,200

Figure 12-0
Road 12: Aliso Canyon. Overview
Jurisdictional Waters and Wetlands

0 Meters 100

0 Feet 400

Figure 12-7
Road 12: Aliso Canyon. Overview
Jurisdictional Waters and Wetlands

0 Meters 100

0 Feet 400

Figure 12-8
Road 12: Aliso Canyon. Overview
Jurisdictional Waters and Wetlands

0 Meters 100

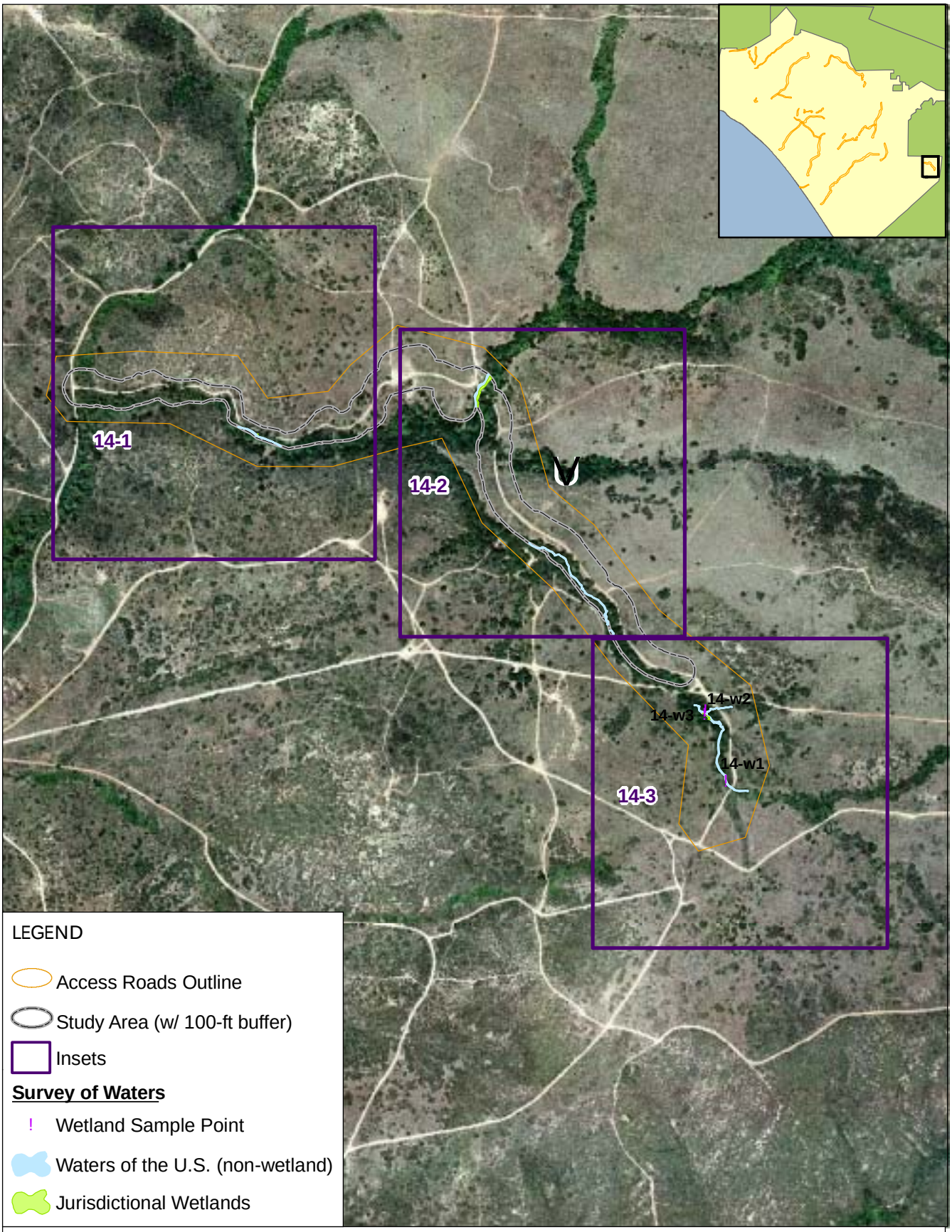
0 Feet 400

Figure 12-9
Road 12: Aliso Canyon. Overview
Jurisdictional Waters and Wetlands

0 Meters 100

0 Feet 400

Figure 13-0
Road 13: Range 216. Overview
Jurisdictional Waters and Wetlands



0 Meters 250

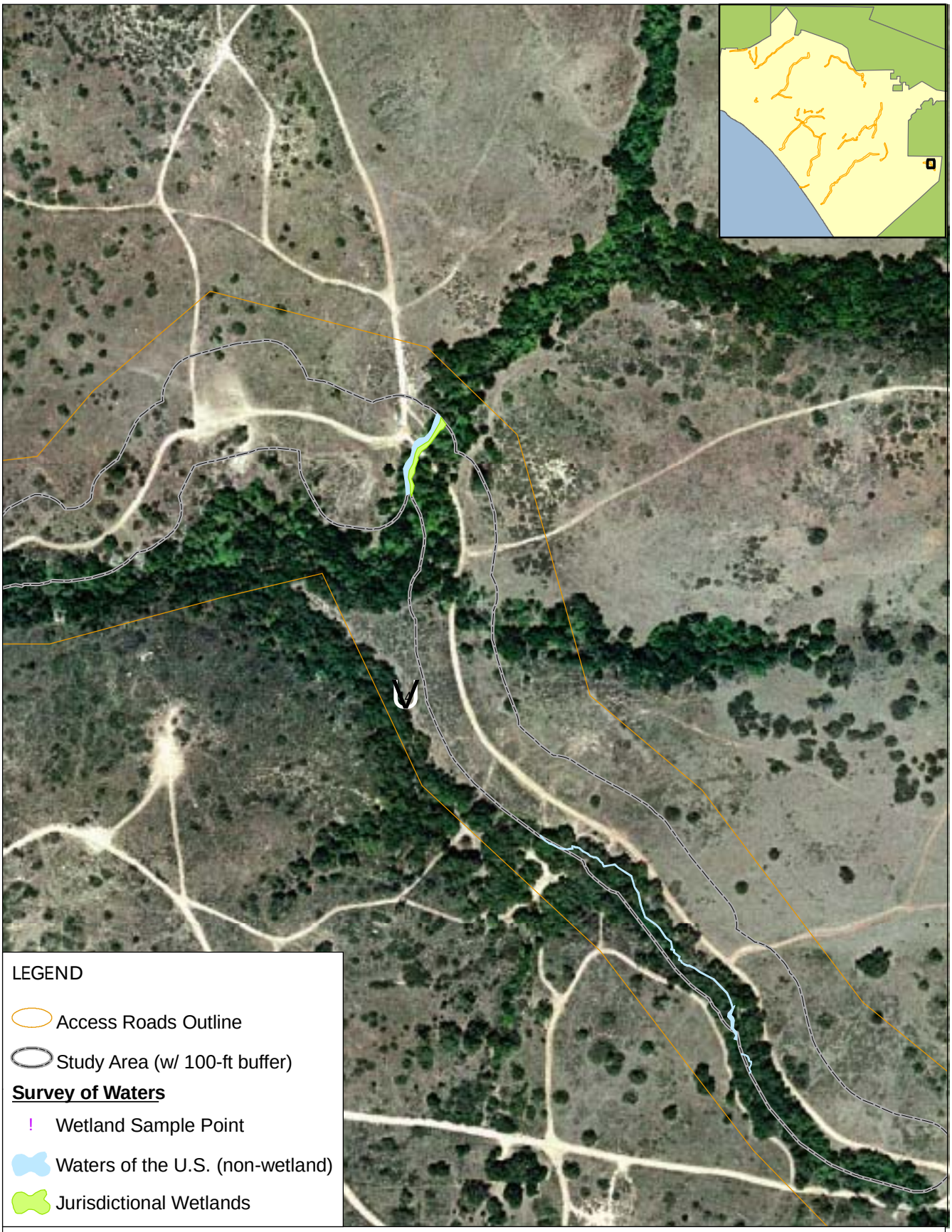
0 Feet 950

Figure 14-0
Road 14: Juliet. Overview
Jurisdictional Waters and Wetlands

0 Meters 100

0 Feet 400

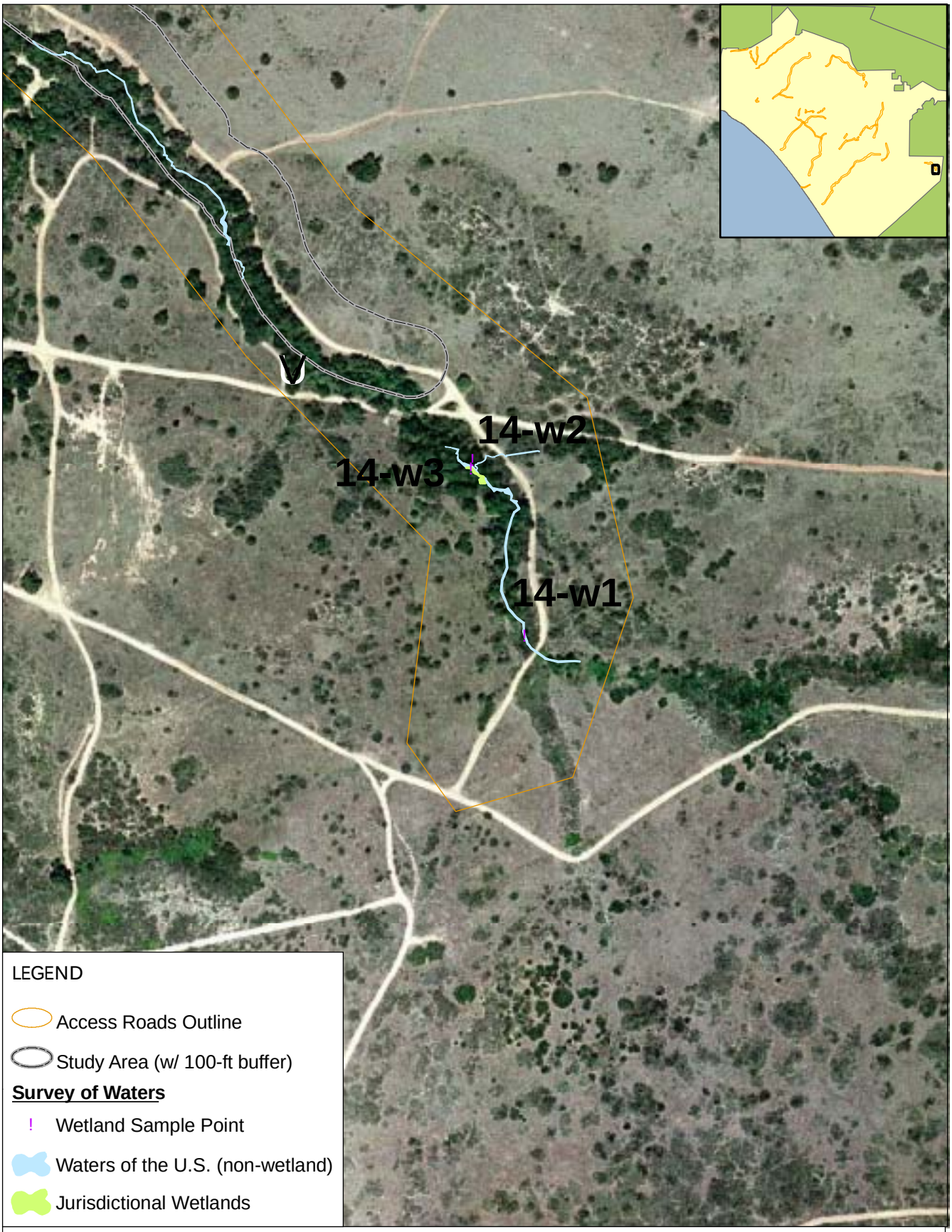
Figure 14-1
Road 14: Juliet. Inset
Jurisdictional Waters and Wetlands



0 Meters 100

0 Feet 400

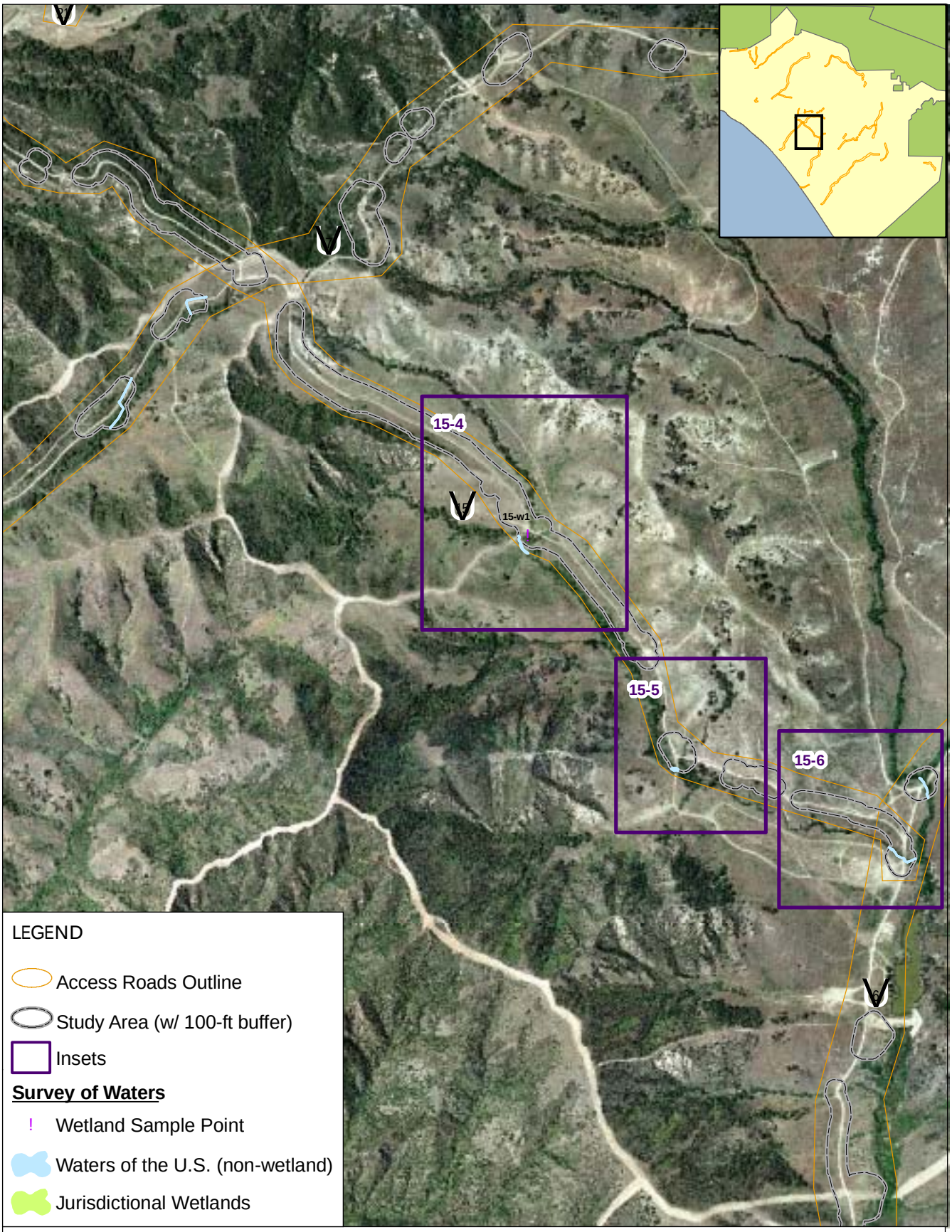
Figure 14-2
Road 14: Juliet. Inset
Jurisdictional Waters and Wetlands



0 Meters 100

0 Feet 400

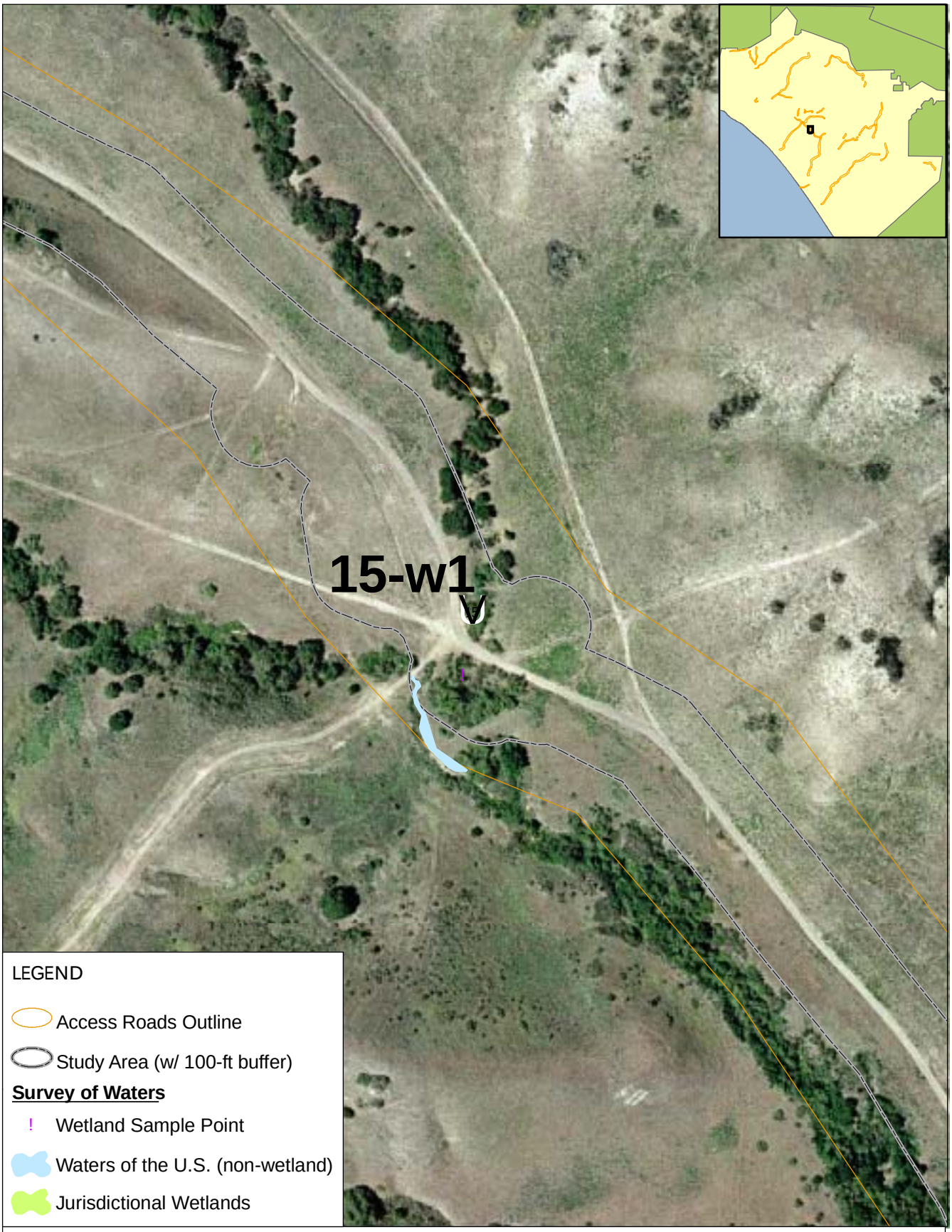
Figure 14-3
Road 14: Juliet. Inset
Jurisdictional Waters and Wetlands



0 Meters 400

0 Feet 1,380

Figure 15-0
Road 15: Papa III. Overview
Jurisdictional Waters and Wetlands



0 Meters 80

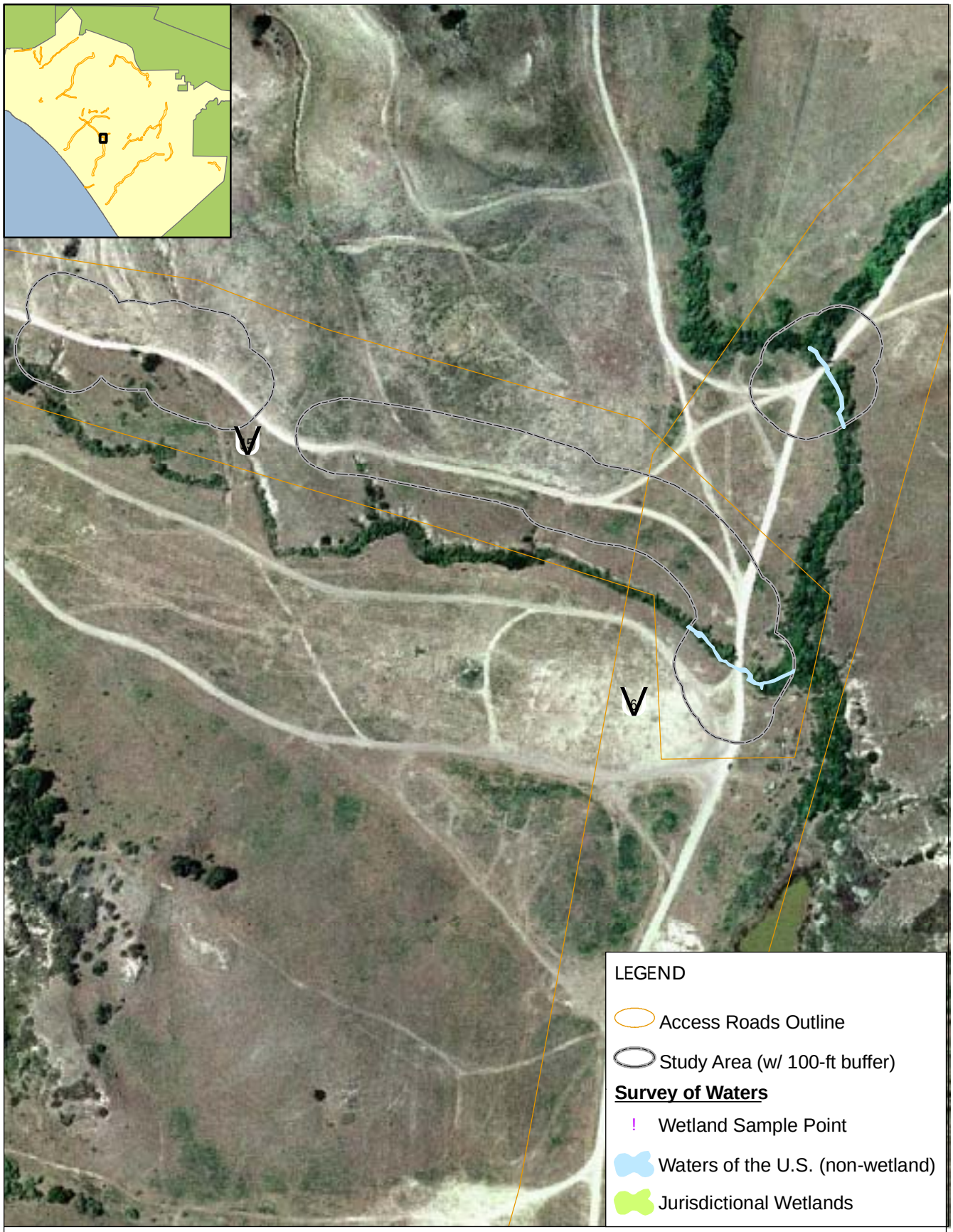
0 Feet 250

Figure 15-4
Road 15: Papa III. Inset
Jurisdictional Waters and Wetlands

0 Meters 100

0 Feet 350

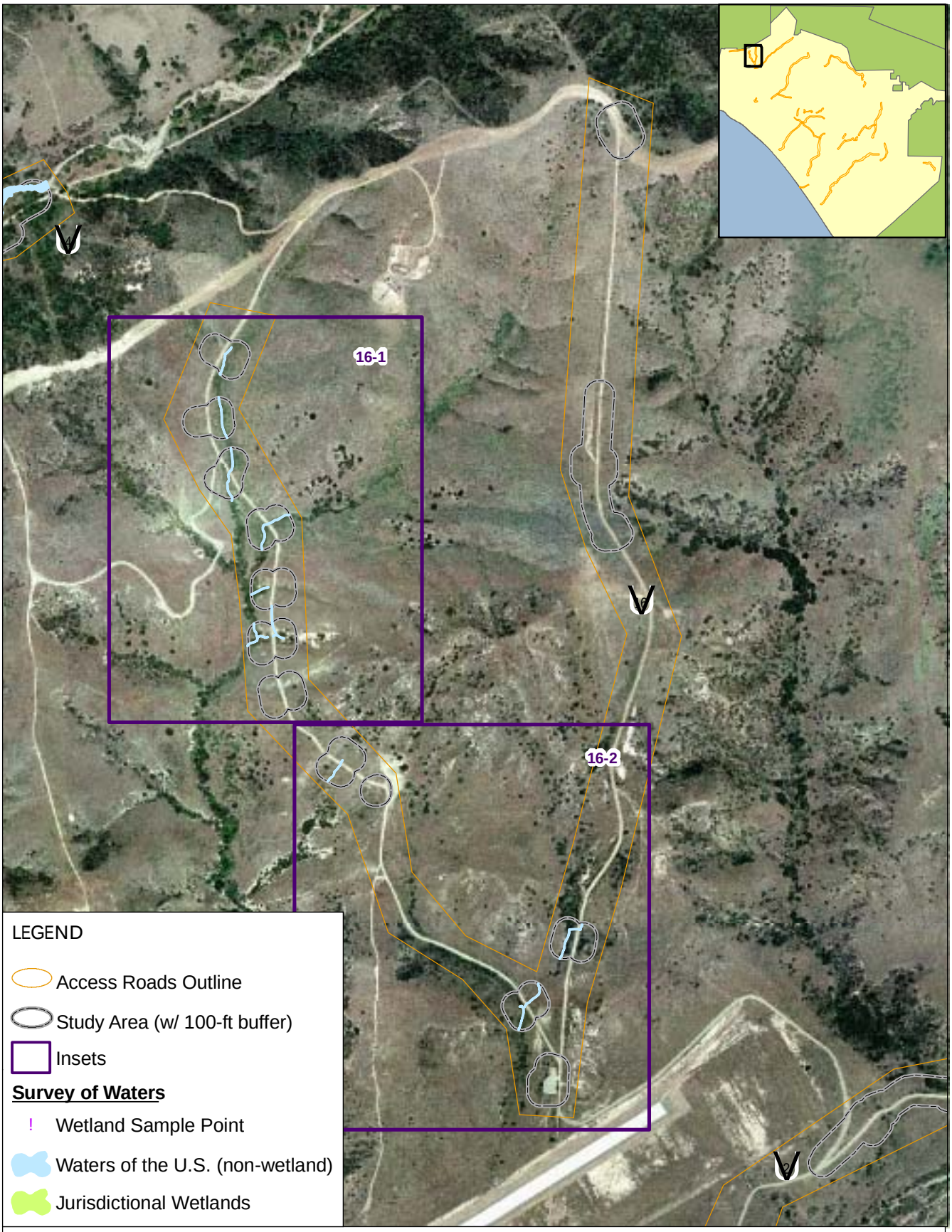
Figure 15-5
Road 15: Papa III. Inset
Jurisdictional Waters and Wetlands



0 Meters 100

0 Feet 350

Figure 15-6
Road 15: Papa III. Inset
Jurisdictional Waters and Wetlands



0 Meters 250

0 Feet 800

Figure 16-0
Road 16: Northern Range. Overview
Jurisdictional Waters and Wetlands

0 Meters 100

0 Feet 320

Figure 16-1
Road 16: Northern Range. Inset
Jurisdictional Waters and Wetlands

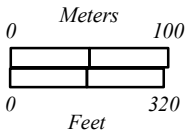
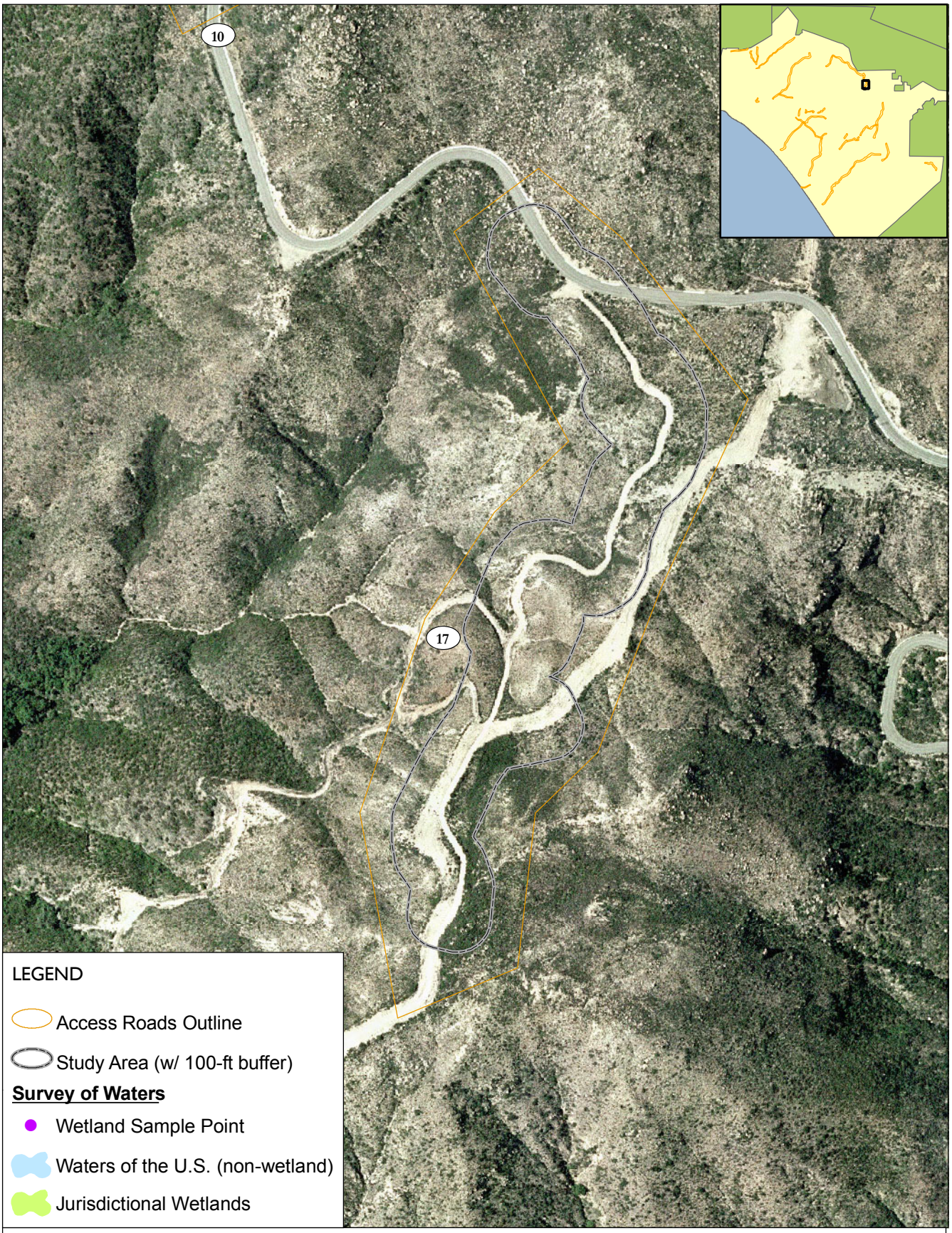


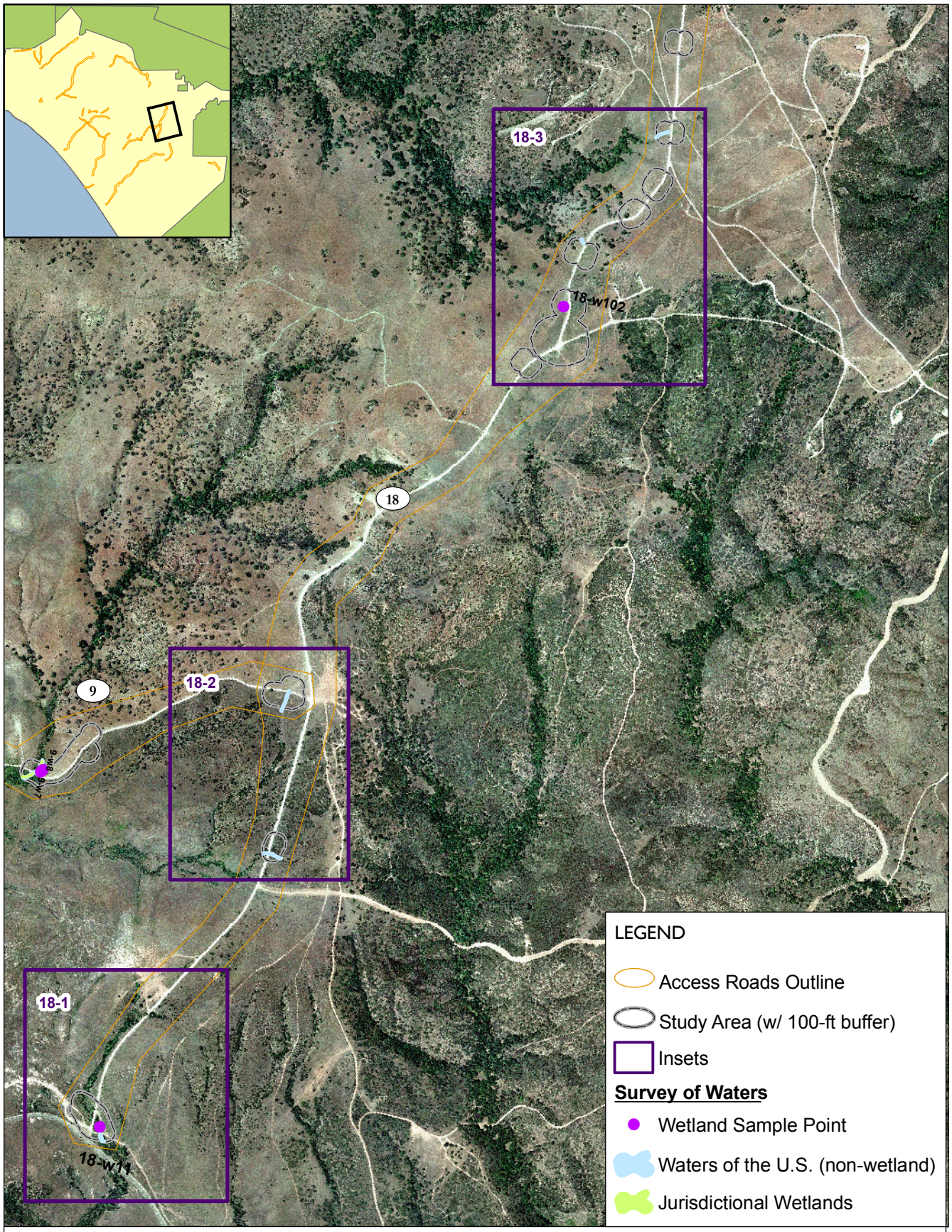
Figure 16-2
Road 16: Northern Range. Inset
Jurisdictional Waters and Wetlands



0 Meters 100

0 Feet 400

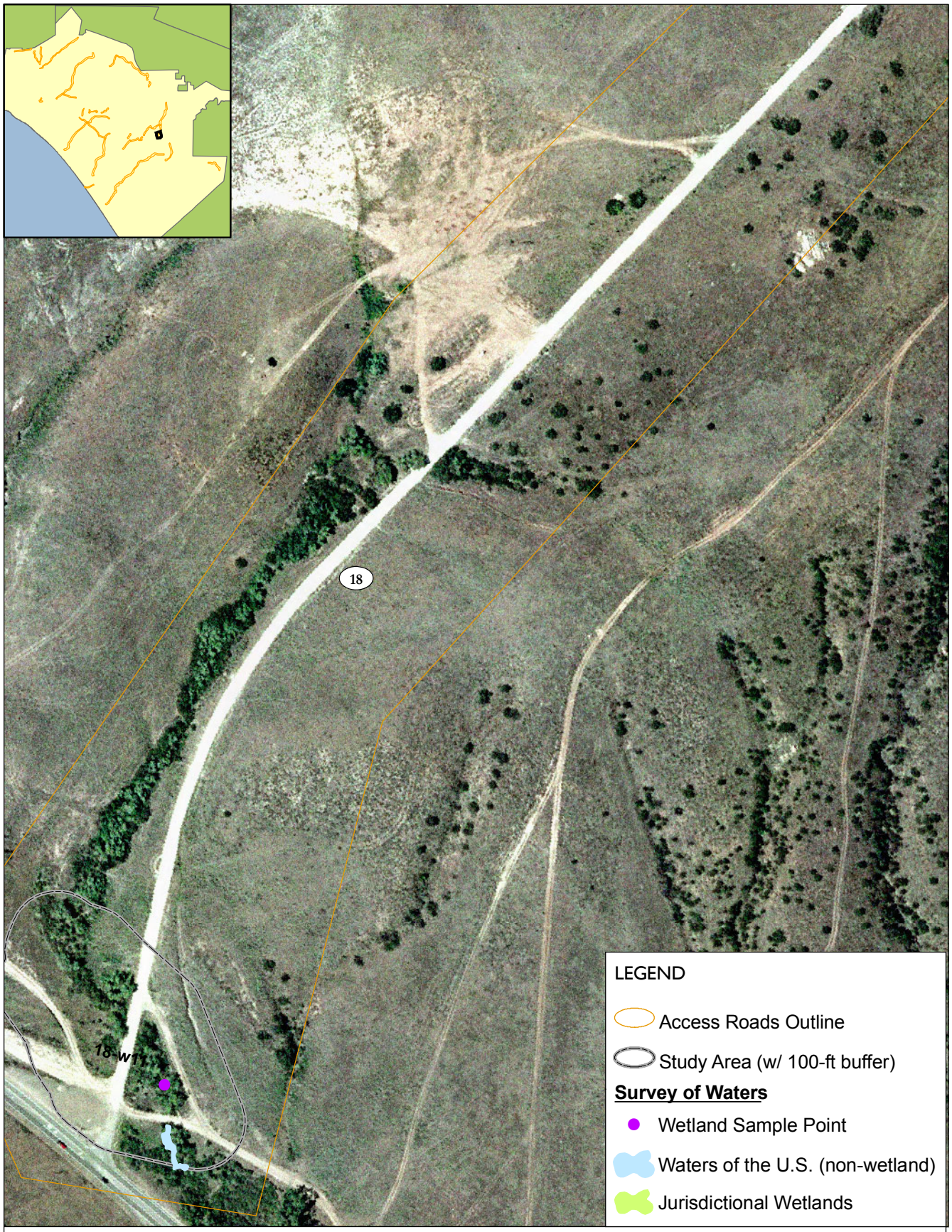
Figure 17-0
Road 17: Observation Post India. Overview
Jurisdictional Waters and Wetlands



0 Meters 400

0 Feet 1,240

Figure 18-0
Road 18: Roblar Road. Overview
Jurisdictional Waters and Wetlands



0 Meters 80

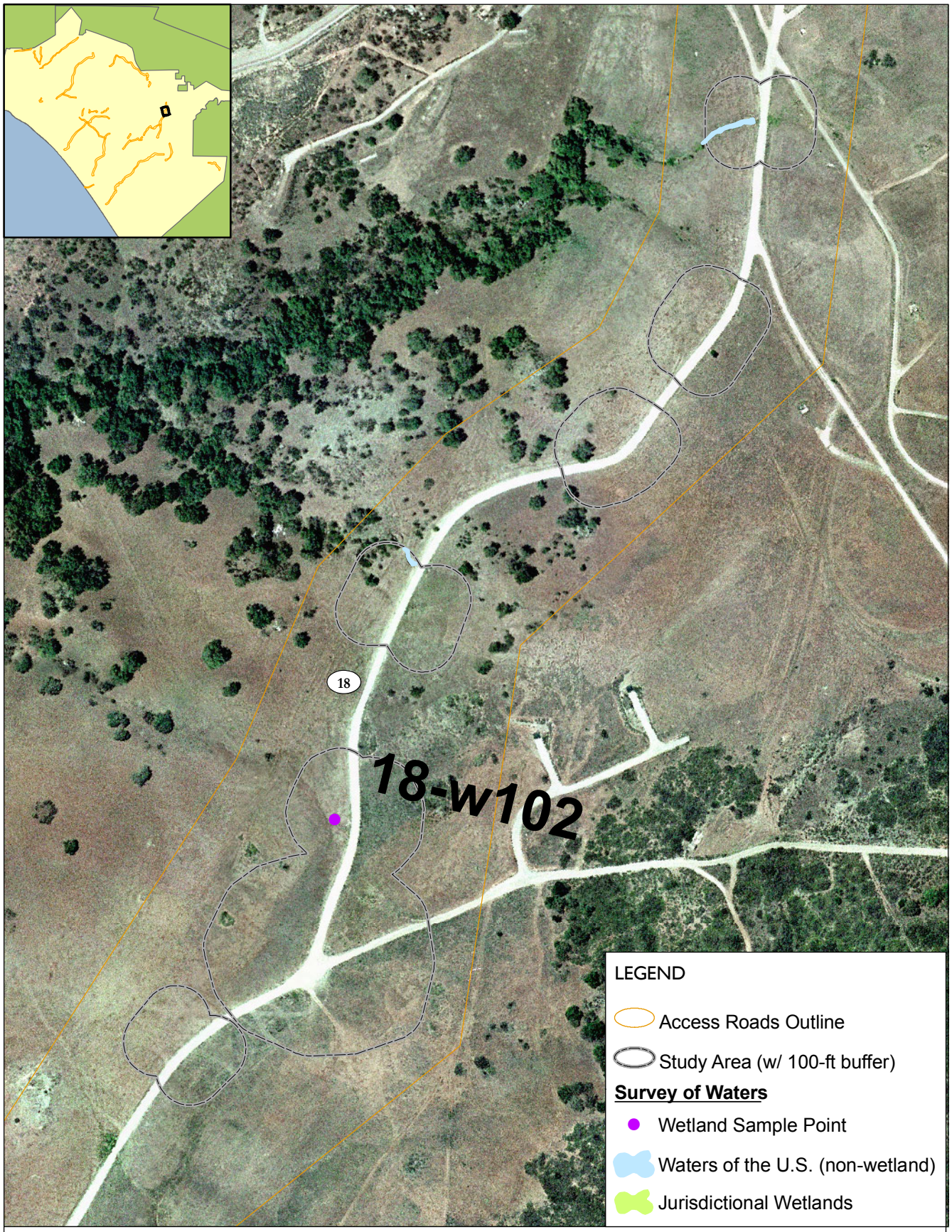
0 Feet 220

Figure 18-1
Road 18: Roblar Road. Inset
Jurisdictional Waters and Wetlands

0 Meters 80

0 Feet 220

Figure 18-2
Road 18: Roblar Road. Inset
Jurisdictional Waters and Wetlands



0 Meters 100
0 Feet 300

Figure 18-3
Road 18: Roblar Road. Inset
Jurisdictional Waters and Wetlands

0 Meters 100

0 Feet 400

Figure 19-0
Road 19: Range 219. Overview
Jurisdictional Waters and Wetlands

0 Meters 100

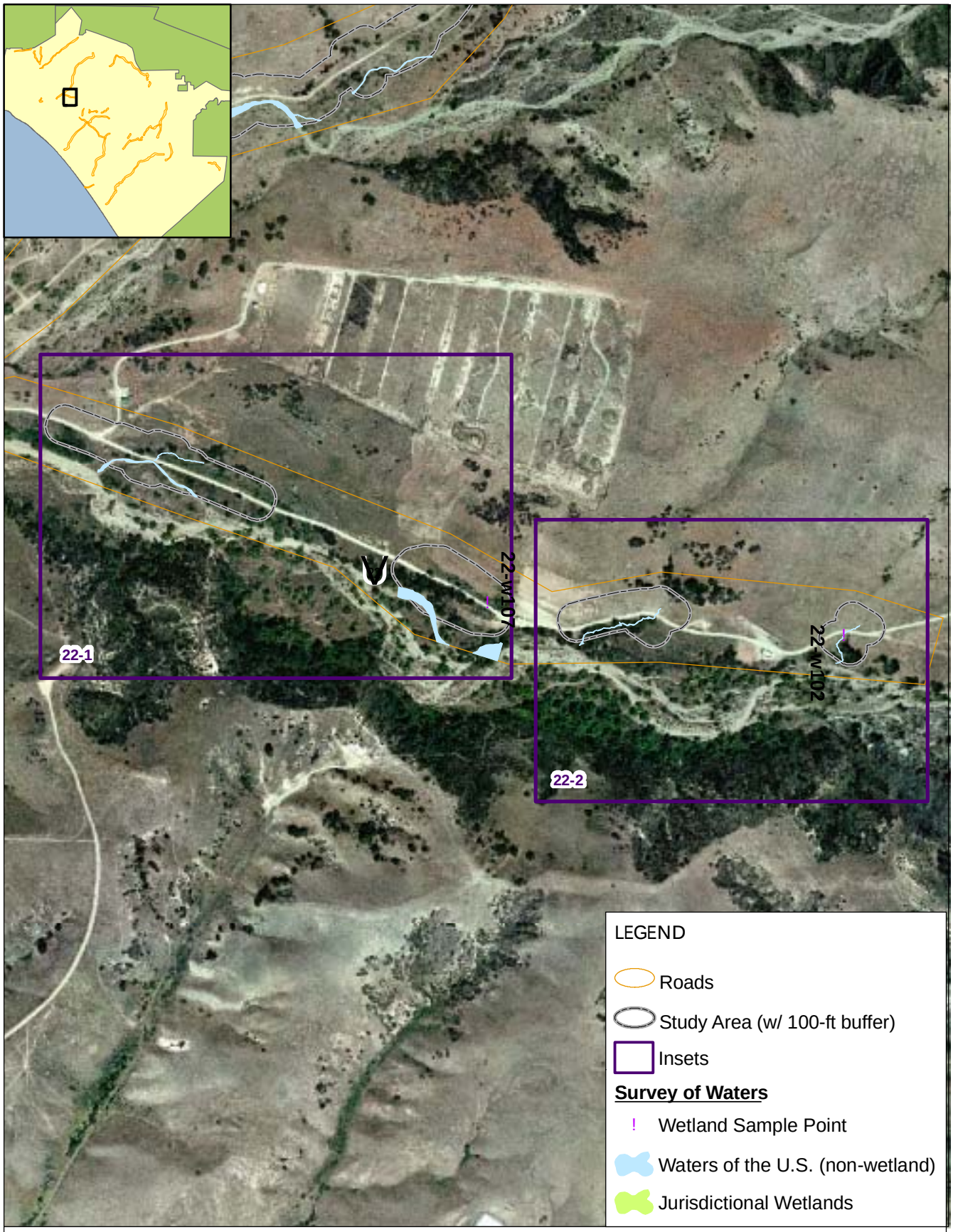
0 Feet 400

Figure 20-0
Road 20: Range 218. Overview
Jurisdictional Waters and Wetlands

0 Meters 100

0 Feet 400

Figure 21-0
Road 21: Range 214/215. Overview
Jurisdictional Waters and Wetlands



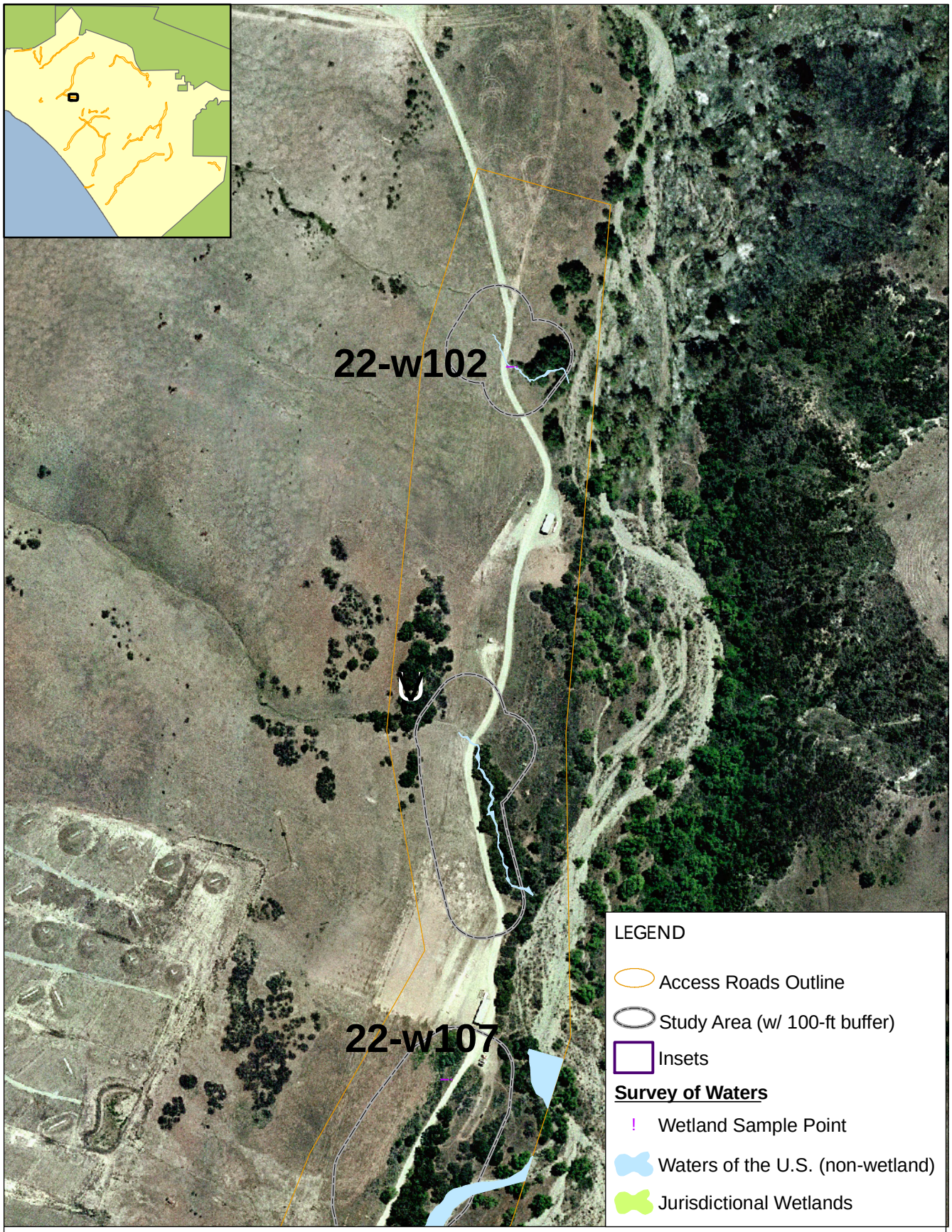
0 Meters 200

0 Feet 800

Figure 22-0
Road 22: Range 210. Overview
Jurisdictional Waters and Wetlands

0 Meters 100
0 Feet 400

Figure 22-1
Road 22: Range 210. Inset
Jurisdictional Waters and Wetlands



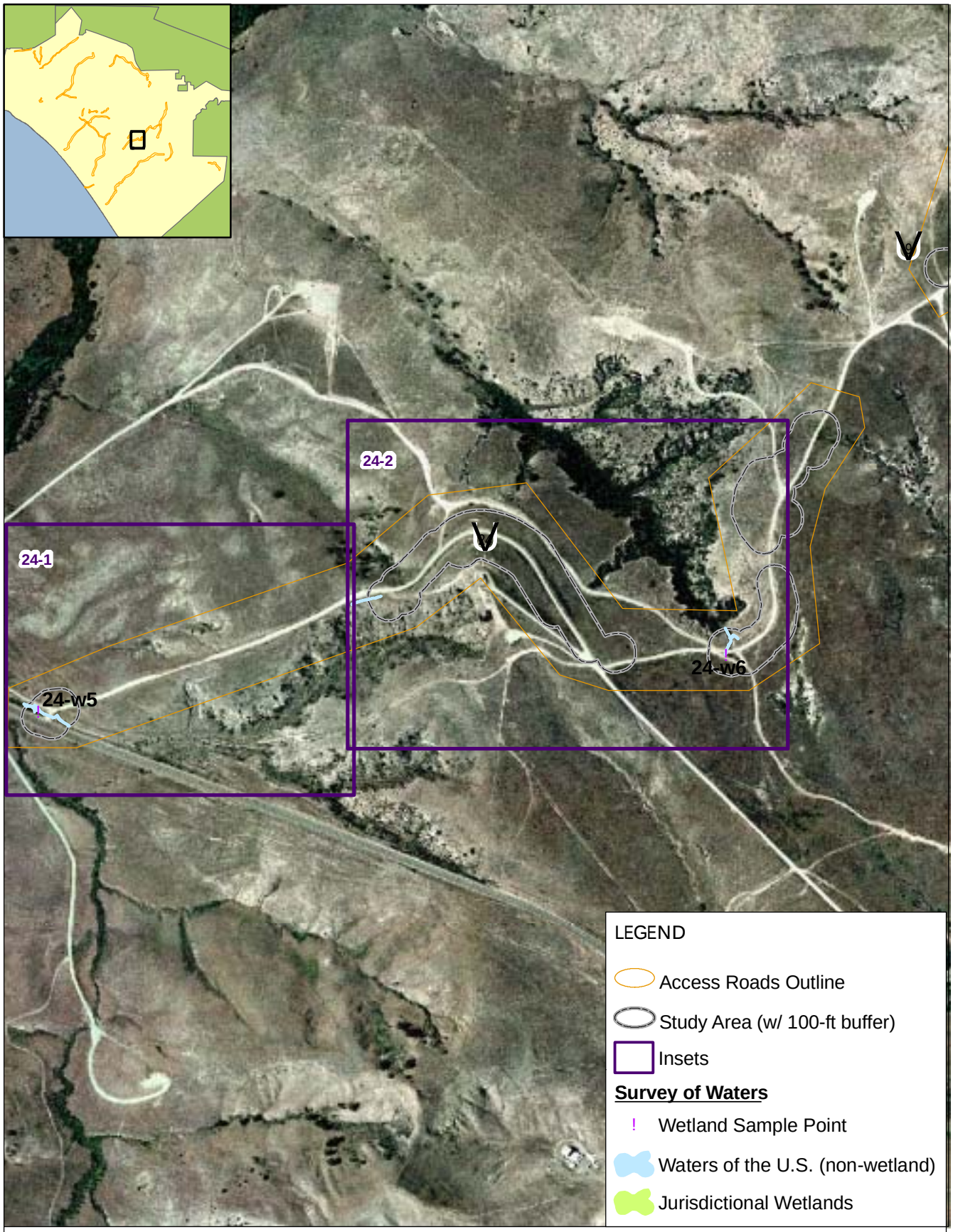
0 Meters 100
0 Feet 400

Figure 22-2
Road 22: Range 210. Inset
Jurisdictional Waters and Wetlands

0 Meters 100

0 Feet 400

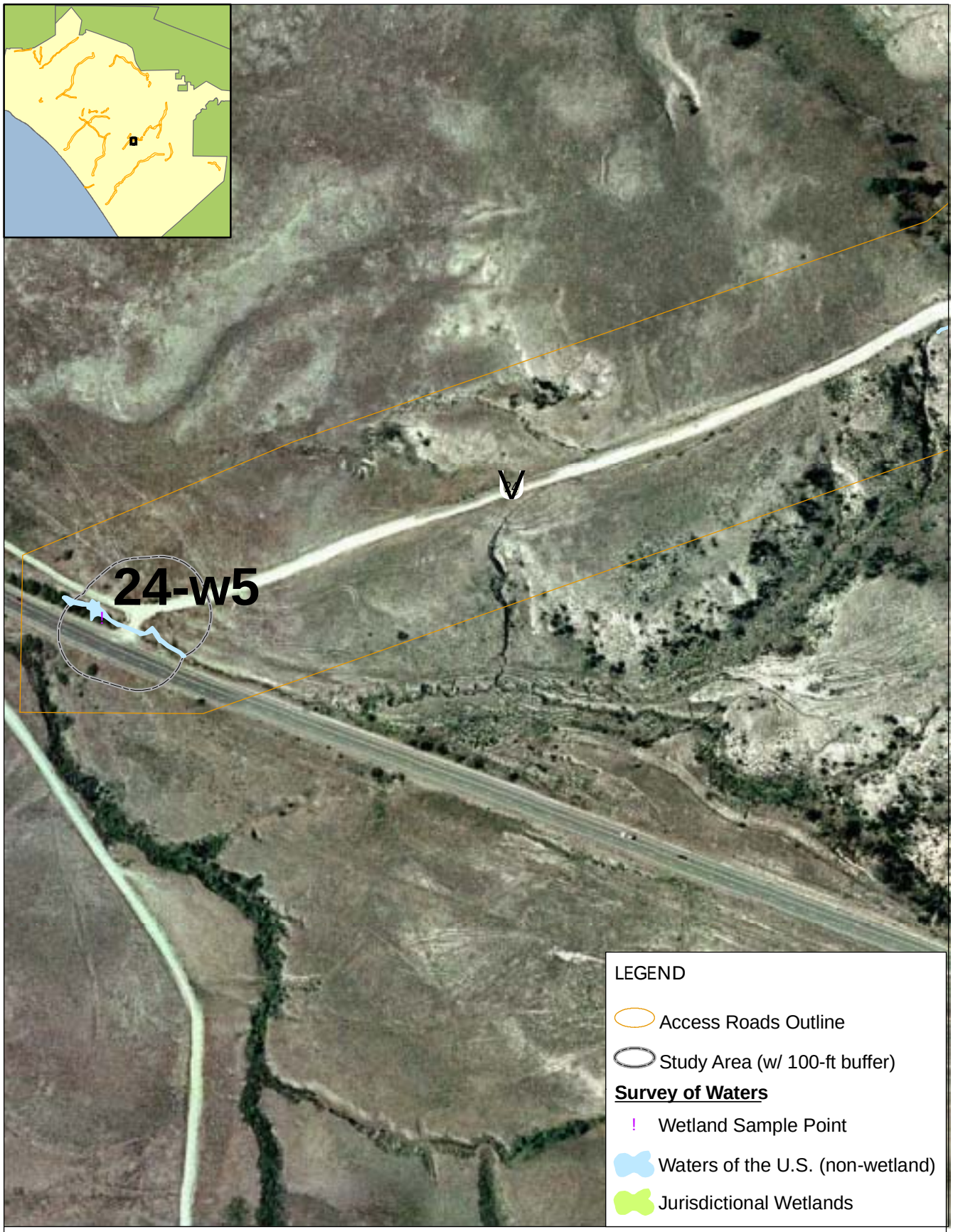
Figure 23-0
Road 23: Artillery Area 17. Overview
Jurisdictional Waters and Wetlands



0 Meters 200

0 Feet 800

Figure 24-0
Road 24: Range 407/Artillery 18. Overview
Jurisdictional Waters and Wetlands



0 Meters 80
0 Feet 300

Figure 24-1
Road 24: Range 407/Artillery 18. Inset
Jurisdictional Waters and Wetlands

0 Meters 100
0 Feet 400

Figure 24-2
Road 24: Range 407/Artillery 18. Inset
Jurisdictional Waters and Wetlands

APPENDIX D
PLANT COMMUNITY MAPPING REPORT

Plant Community Mapping

24 Range Access Roads

Marine Corps Base Camp Pendleton, California

Prepared by TEC Inc.
1819 Cliff Drive, Suite F
Santa Barbara, CA 93109

June 2007

Plant Community Mapping

24 Range Access Roads

Marine Corps Base
Camp Pendleton, California

Prepared by TEC Inc.
1819 Cliff Drive, Suite F
Santa Barbara, CA 93109

June 2007

PLANT COMMUNITY MAPPING
ACCESS ROADS REPAIR PROJECT

Plant communities along the range access roads were delineated and classified based on fieldwork conducted by TEC Inc. during 2006 and 2007. This classification is based on the Sawyer and Keeler-Wolf system, as adopted by the California Native Plant Society (CNPS; www.cnps.org). The system is based on physiognomy (the structure/dominant growth form of the vegetation) and floristics (the dominant species). The classification is applied to *stands* of vegetation that have relatively consistent composition and structure and discernable natural or manmade boundaries that separate them from other stands. Plant communities are referred to as series, which are grouped according to the dominant growth form. *Tree-dominated series* are those in which more than about 25 % canopy cover is provided by trees or large shrubs more than 5 m (16 ft) high. *Shrub-dominated series* have less than 25 % cover of trees, and at least 25 % cover of shrubs that range from 0.5 to 5 m tall. *Herbaceous series* have less than 25 % cover of trees and shrubs combined but greater than 25% cover of non-woody plants. Series are assigned on the basis of dominant or important species. A *dominant* species is one with high abundance and crown cover in comparison to other species. Two or more *important* species have similar abundance and crown cover.

The survey area includes the road segments proposed for repair and refurbishment, plus an approximate 100-foot buffer or margin extending from construction areas into adjacent habitat. The 100-foot survey area was reduced in areas where access is limited by topography. Moderate slopes (15-29%) and steep slopes (>30%) were evaluated on a site-specific basis to determine if ground surveys were feasible.

Within the stands of vegetation at each project area, the dominant plant species were identified and recorded. The field results were compared with previous plant community mapping on the installation (MCB Camp Pendleton 2003, USMC 2007). Plant communities were classified into the Sawyer Keeler-Wolf system (1997), modified for consistency with local circumstances, and mapped digitally onto aerial photographs at a scale of an approximately 1:4800, with the scale adjusted to minimize splitting survey areas across pages (Figures 1-0 through 24-2). The map legend is provided at the front of the figure package. The communities (series) defined by Sawyer and Keeler-Wolf (1997) are often intermingled. The following plant communities are recognized, sometimes in combination, in the project area:

- ***Arroyo Willow Series.*** A type of riparian woodland in which arroyo willow (*Salix lasiolepis*) is the predominant woody riparian species, typically forming a canopy about 30 ft high and closely associated with a stream.
- ***Mixed Willow Series.*** A type of riparian scrub or woodland that is closely associated with streams and includes a mixture of woody riparian species, no one of which is dominant, but in which one or more species of willows are important. Other important species typically include mulefat or coyote brush. Scattered coast live oaks or sycamores may be present as an overstory. The understory includes herbaceous wetland species.
- ***Mulefat Series.*** A type of riparian scrub that is directly associated with stream channels and bordering floodplains, and is strongly dominated by mulefat. Scattered willows, elderberry, coyote brush, or isolated sycamore may also be present. This series typically occurs on coarse alluvium.
- ***California Sagebrush Series.*** Coastal sage scrub (CSS) in which California sagebrush (*Artemisia californica*) is dominant, usually accounting for more than half of total shrub cover. This series usually occurs on dry, open slopes. Other shrub species are present but singly or combined typically do not account for more than half of total shrub cover.

- ***Mixed Sage Series.*** A diverse type of coastal sage scrub in which no single shrub species is strongly dominant. Composition varies and may include laurel sumac (*Malosma laurelina*), California sagebrush, deerweed (*Lotus scoparia*), black sage (*Salvia mellifera*), elderberry, white sage (*Salvia apiana*), California buckwheat (*Eriogonum fasciculatum*), lemonadeberry (*Rhus integrifolia*), toyon (*Heteromeles arbutifolia*), and coyote brush. This type has been mapped in the past as coastal sage scrub-chaparral. This series usually occurs on more mesic sites than California sagebrush series.
- ***White Sage Series.*** A local variant of CSS in which white sage is conspicuously dominant.
- ***Black Sage Series.*** A local variant of CSS in which black sage is conspicuously dominant. This series is often found along roadsides.
- ***Buckwheat/Deerweed Series.*** A local variant of CSS in which the subshrubs deerweed or buckwheat are dominant or important. This series is found on disturbed sites and probably successional to CSS more typically dominated by larger shrubs.
- ***Coyote Brush Series.*** A variant of coastal sage scrub that is strongly dominated by coyote brush, usually occurring on old disturbed sites and mesic slopes above drainages.
- ***Elderberry Series***. An open scrub or low-woodland community in which blue elderberry accounts for a majority of the overstory cover.
- ***Sumac Series.*** On MCB Camp Pendleton, areas in which laurel sumac, lemonadeberry, and/or sugar bush (*Rhus ovata*) are dominant or important along with other shrubs fit within this category.
- ***California Annual Grassland.*** Grassland vegetation strongly dominated by non-native grasses and forbs, including fennel, but may also include native grasses and forbs, especially ragweed (*Ambrosia psilostachya*) and fascicled tarweed (*Deinandra fasciculata*).
- ***Needlegrass Series***. Native perennial grassland dominated by one or more species of *Nassella*.
- ***Mixed Grassland.*** Grassland in which native perennial species are prevalent but not strongly dominant. Native perennials may be sub-dominant to or co-dominant with non-native species.
- ***California Sycamore Series.*** A type of riparian woodland or forest in which large California sycamores (*Platanus racemosa*) dominate the canopy over a riparian understory, which may include willows (*Salix* spp.), mulefat (*Baccharis salicifolia*), coyote brush (*Baccharis pilularis*), elderberry (*Sambucus mexicana*), or herbaceous species. In some locations, sycamores are relicts of past flooding, and the understory is dominated by upland grasses. Coast live oaks (*Quercus agrifolia*) are often present on slopes above the flooded area, resulting in a mosaic canopy of sycamores and coast live oaks along the upland-riparian transition.
- ***Chamise Chaparral.*** In the CNPS system, this category encompasses numerous series in which chamise (*Adenostoma fasciculatum*) is important or dominant. Areas previously mapped as southern mixed chaparral typically fit within this category.
- ***Coast Live Oak Series.*** A type of woodland vegetation in which coast live oak is an important or dominant component of the canopy. This community may occur along water courses as a riparian community, in which case sycamore and willow are also likely to be important in the canopy. In canyons and on shaded slopes away from streams, coast live oak is more likely to be the sole canopy dominant or may be mixed with Engelmann oak (*Quercus englemannii*). The understory is variable and may include chaparral and coastal sage scrub species, elderberry or grassland.

- ***Engelmann Oak Series.*** Oak woodland in which Engelmann oak is a conspicuously dominant species, although coast live oak may be important. Coast live oak and mixed oak series contain a less dominant Englemann oak component. The Englemann oak series is usually found with grassland or coastal sage scrub understory.
- ***Mixed Oak Series.*** Oak forest or woodland vegetation comprising roughly equal numbers and canopy coverage of Engelmann and coast live oaks.
- ***Scrub Oak Series.*** Scrub or woodland in which scrub oak speceis (*Quercus* spp.)
- ***Exotics – Acacia Series.*** Stands of planted or invasive acacias (*Acacia* spp.) that strongly dominate the vegetation.
- ***Exotics – Fennel Series.*** A site that is dominated by fennel (*Foeniculum vulgare*).
- ***Cattail/Bulrush Series***. A freshwater marsh community that includes Olney's bulrush (*Shoenoplectus americanus*), spike-rush (*Eleocharis* spp.), cattail (*Typha dominguensis*), leather root (*Hoita macrostachya*), seep monkey flower (*Mimulus guttatus*), water-cress (*Rorippa nasturtium-aquaticum*), water-pimpernel (*Samolus parviflorus*), great marsh primrose (*Oenothera elata*), and horsetail (*Equisetum* sp.).
- ***Pickleweed Series***. A brackish or estuarine community dominated by pickleweed (*Salicornia virginica*). The pickleweed series is often found along the edges of coastal lagoons and rivermouths.
- ***Rush Series.*** Herbaceous community in mesic swales and depressions in which rushes (*Juncus* spp.) are dominant or important along with other low-growing herbaceous wetland species.
- ***Saltgrass Series***. A coastal salt marsh community dominated by saltgrass (*Distichlis spicata*).
- ***Scalebroom Series.*** A type of interior sage scrub vegetation that occurs on rocky alluvial soils in the floodplains of the largest streams on MCB Camp Pendleton. This is equivalent to the alluvial fan sage scrub of Holland (1986). Scalebroom (*Lepidospartum squamatum*) is not strongly dominant, but is found only in this community. A association of sage scrub and chaparral species and cacti are present
- ***Burned Areas.*** Areas recently burned and for which the vegetation community is uncertain.
- ***Disturbed/Developed Areas.*** Disturbed areas include pavement, graded land, firebreaks, roads, paths, buildings and other human structures.
- ***Disturbed – Ruderal.*** A recently disturbed habitat with much open ground but tending to be dominated by non-native weedy species of grasses and forbs, with occasional native forbs. The composition and percent cover of vegetation are highly variable.
- ***Bare Ground.*** May include river washes, bare slopes, and other areas with little or no vegetation, but not disturbed by direct human activity

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APPENDIX E
RARE PLANT SURVEY REPORT

Rare Plant Survey Report

Repair of 24 Access Roads to Training Ranges
Marine Corps Base Camp Pendleton, California

Prepared by:
TEC Inc.
514 Via de la Valle, Suite 308
Solana Beach, CA 92075

November 2008

INTRODUCTION

Surveys for rare plants were conducted within the areas that could be affected by the proposed repair of 24 Access Roads to training ranges on MCB Camp Pendleton. Sixteen roads were completely surveyed in 2007. Roads 9 and 12 were partially surveyed in 2007 and completed in 2008. The remaining six roads were surveyed in 2008. The survey area included the road segment proposed for repair, construction staging areas, plus an approximate 100-foot buffer or margin extending from project construction areas into adjacent habitat. The 100-ft buffer was included to identify rare plants and other environmental resources that could be subject to incidental effects, and to accommodate future modifications that may be required as the project is designed and implemented. The actual limits of construction disturbance would generally be much smaller based on the relative ease of construction in most locations, and on the topography, geology, hydrologic conditions, and vegetation surrounding the project sites. The 100-ft buffer survey area was reduced in a small number of cases where steep slopes, incised drainages, or large paved roads provided a distinct boundary that limited the extent of potential disturbance around the project footprint.

Surveys were conducted from May through June 2007 and April through June 2008, which is the appropriate season for the detection of rare plants with a reasonable likelihood of occurrence. The survey area is illustrated in Figures 0-1 through 24-2 (Appendix A).

The scope of the rare plant surveys was to search for all potentially occurring federally and state-listed and proposed species and California Native Plant Society (CNPS) list 1B through 4 species (Appendix B) within all potential areas of ground disturbance, including buffer areas around areas of potential construction. Sites were also searched for unusual occurrences of plant species that could represent new (previously undescribed) taxa, range extensions or new introductions to the region. An emphasis was placed on searching for the federally listed threatened thread-leaved brodiaea (TLB, *Brodiaea filifolia*) according to the MCB Camp Pendleton protocol. TLB occurs in grassland and coastal sage scrub (CSS) vegetation, with most occurrences in loamy to clayey soil, usually on slopes less than 10 percent.

METHODOLOGY

AutoCAD drawings of construction plans were prepared by MCB Camp Pendleton. Based on field reviews conducted by MCB Camp Pendleton and NAVFAC SW personnel, site-specific changes were identified and incorporated into the plans, which were provided to TEC Inc. (TEC). From the plans and instructions, TEC created Geographic information systems (GIS) maps of the proposed construction sites and added the corresponding buffers.

Three rare plant survey sessions were conducted along the access roads on MCB Camp Pendleton in 2007 and 2008. All potentially occurring federally and state-listed and proposed species and CNPS list 1B through 4 species were censused. Surveys were conducted by subcontractors Carolyn Martus and Margie Mulligan (San Diego Natural History Museum); and Melissa Tu, Deanna Meier, Andrew Raaf, and Emily Althoen of TEC. Margie Mulligan and Carolyn Martus conducted all of the rare plant surveys in 2007 and Carolyn Martus conducted the majority of the rare plant surveys in 2008. Surveys were conducted from April 26-June 14 (Table 1). Roads 1, 4, 6-13, 15-22 were surveyed in 2007 and Roads 2, 3, 5, 9, 12, 14, 23, and 24 were surveyed in 2008. A Geographic Positioning System (GPS) was used to identify survey routes in the field.

Field surveys were initiated as soon as possible following observations of TLB in flower on MCB Camp Pendleton. Access to all Training Areas was coordinated with MCB Camp Pendleton. Biologists

surveyed areas of potential TLB habitat by walking transects approximately 20 feet apart, repeated at approximate two-week intervals, consistent with MCB Camp Pendleton's survey protocol for TLB. The dates of surveys conducted are located in Table 1. Highly disturbed areas determined on the basis of the first survey to have no potential to contain rare plants were not surveyed again.

Table 1. 2007 & 2008 Rare Plant Survey Dates

Road	1st Visit	2nd Visit	3rd Visit
1	May 23, 2007	June 5, 2007	June 18, 2007
2	April 30, 2008	May 15, 2008	May 28, 2008
3	April 26, 2008	May 10, 2008	May 24, 2008
4	May 23, 2007	June 5, 2007	June 20, 2007
5	May 9 and 15 , 2008	May 23, 2008	June 6, 2008
6	May 15, 2007	May 30, 2007	June 15, 2007
7	May 15, 2007	May 29 and 30, 2007	June 13 and 15, 2007
8	May 22, 2007	June 4, 2007	June 18, 2007
9 (southwest)	May 25, 2007	June 15, 2007	June 25, 2007
9 (northeast)	May 9, 2008	May 23, 2008	June 6, 2008
10	May 25, 2007	June 8, 2007	June 22, 2007
11	May 22, 2007	June 4, 2007	June 18, 2007
12 (northeast)	May 22, 2007	June 4, 2007	June 20, 2007
12 (southwest)	May 15, 2008	May 25, 2008	June 12 and 14, 2008
13	May 18, 2007	May 30, 2007	June 18, 2007
14	May 2, 2008	May 16, 2008	June 6, 2008
15	May 15, 2007	May 30, 2007	June 15, 2007
16	May 23, 2007	June 5, 2007	June 20, 2007
17	May 25, 2007	June 8, 2007	June 22, 2007
18	May 9, 2007	May 25 and 28, 2007	June 8 and 15, 2007
19	May 18, 2007	May 30, 2007	June 18, 2007
20	May 18, 2007	May 30, 2007	June 18, 2007
21	May 18, 2007	May 30, 2007	June 18, 2007
22	May 13, 2007	May 28, 2007	June 18, 2007
23	May 9, 2008	May 23, 2008	June 6, 2008
24	May 9, 2008	May 23, 2008	June 6, 2008

MAPPING

A Trimble sub-meter GPS was used in 2007 and a Thales Mobile Mapper GPS was used in 2008 to document survey transects and rare plant locations. One botanist carried the GPS unit while the other botanist(s) walked in parallel. When rare plants were detected, a GPS point was collected. Individual plants of the same species less than 7 m apart were mapped in a combined polygon, consistent with the MCB Camp Pendleton TLB survey guidelines.

The survey transects recorded with the GPS units are included in Appendix A. The figures include an overview of each road. Detailed insets are provided for locations in which rare plants were detected. No detailed insets are provided for map sections in which no rare plants were detected. For visual simplicity,

previous rare plant detections from the MCB Camp Pendleton GIS database are included only for points and polygons that fall within the road corridors under review.

For consistency with existing documents for the Access Roads project, the field maps and section numbers were taken from the Plant Community Mapping Report and Wetland Delineation provided by TEC Inc. in 2007 (TEC 2007a, 2007b). As such, the figure numbers in Appendix A are not always sequential, but can be cross-referenced with the other environmental documentation in the Plant Community Mapping Report and Wetland Delineation.

RESULTS

A summary of all rare plants encountered by road number is provided in Table 2. Appendix C contains a plant species list for the proposed project areas.

Table 2. Rare Plants Found Within the Proposed Project Area.

Road	Common Name	Scientific Name	Status* Fed/CA/CNPS	Year	Estimated Number
2	**many-stemmed dudleya**	*Dudleya multicaulis*	**-/-/1B.2**	2008	228
10	**Rainbow manzanita**	*Arctostaphylos rainbowensis*	**-/-/1B.1**	2007	50
10	**Ramona horkelia**	*Horkelia truncata*	**-/-/1B.3**	2007	150
16	**many-stemmed dudleya**	*Dudleya multicaulis*	**-/-/1B.2**	2007	25
17	**Rainbow manzanita**	*Arctostaphylos rainbowensis*	**-/-/1B.1**	2007	50
17	**Ramona horkelia**	*Horkelia truncata*	**-/-/1B.3**	2007	150
18	**many-stemmed dudleya**	*Dudleya multicaulis*	**-/-/1B.2**	2007	50
19	**Engelmann oak**	*Quercus engelmannii*	**-/-/4.2**	2007	10
24	**many-stemmed dudleya**	*Dudleya multicaulis*	**-/-/1B.2**	2008	491

* See Appendix B for explanation of categories.

No TLB were found during 2007 and 2008 rare plant surveys within the proposed project areas. The more common dwarf brodiaea *(Brodiaea terrestris* ssp. k*ernensis)* was found along Roads 10 and 22. Many-stemmed dudleya, a CNPS list 1B species, was found on slopes along four of the training roads see details below. Rainbow manzanita, a CNPS list 1B species which is only found in northeastern San Diego County and southwestern Riverside County, was found along Roads 10 and 17. Another CNPS 1B species, Romona horkelia, was found along Road 10. Ten Engelmann oaks, a CNPS list 4 species, were found along Road 19.

In addition to rare plant occurrences, several other noteworthy discoveries were made during the surveys. (*Ericameria palmeri* var. *pachylepis*) a species never before documented on MCB Camp Pendleton was found on the east edge of Road 9. A population of an unusual *Senecio* shrub was found in riparian habitat along Road 7 at the intersection of Horno Canyon Rd and Basilone Rd. and along Road 20. A portion of the shrub was collected sent to the San Diego Natural History Museum for identification (it remains unidentified as of August 2008). A possible new *Ceanothus*, differing from other members of the genus known to occur in San Diego County, was found along Road 10. It appears to have affinities to chaparral whitethorn (*Ceanothus leucodermis*) (Mulligan, pers. comm.). A specimen was collected and sent to an expert at the San Diego Natural History Museum for taxonomic analysis, which is still being conducted.

The years of 2006 and 2007 were marked by unusually low rainfall therefore habitat conditions were very dry, especially for annuals. These conditions could decrease the diversity of species, and therefore decrease the probability of finding rare plants during 2007 surveys.

Below is a summary for each road which includes overall habitat description, habitat quality, and rare plant species encountered during surveys, and analysis of MCB Camp Pendleton GIS layer data of rare plants for the area. MCB Camp Pendleton recently awarded a contract to perform TLB surveys in spring of 2009 along Roads 6, 11, 15, 18, 24 and adjacent areas. MCB Camp Pendleton will share the results from this survey with the Project Team as well as potential biologists assigned to monitor proposed repair activities in these areas (MCB Camp Pendleton 2008).

Road 1: San Onofre Creek Crossing and 52 Combat Town. Most habitats were highly disturbed and degraded, apart from the riparian area (mulefat scrub) which had no standing water and few annual species due to dry habitat conditions. No rare plants were encountered during protocol surveys. The MCB Camp Pendleton GIS layer data had no rare plant occurrences for this area.

Road 2: San Mateo Canyon. Habitats consisted of riparian woodland (mulefat scrub with some sycamores) bordered by coastal sage scrub and patches of grassland. Two populations of many-stemmed dudleya were found and recorded (Figure 2-1). The first population was found on a steep north facing slope on the northeast end of Road 2 and consisted of approximately 100 individuals (Appendix D, CNDDB forms). The second population was found on a south facing slope on the southwest end of Road 2 and consisted of 128 individuals. Existing GIS data from MCB Camp Pendleton showed previous records of many-stemmed dudleya at the southwest end of Road 2 near the HOLF. These records were from 1995.

Photos 1 and 2. Many-stemmed dudleya and habitat at Road 2.

Road 3: Jardine Canyon. This is an impact area and Longrifle instructed that the surveyors should walk only on the road. The habitats consisted of riparian woodland with stands of oak, sycamores, and mulfefat scrub bordered by coastal sage scrub, native grassland and non-native grassland. There is high potential for TLB to occur; however, most of the areas had burned during the year of the surveys or in previous years. There exists the potential for corns to remain dormant in the soil in this area. The MCB Camp Pendleton GIS layer data had no rare plant occurrences for this area.

Road 4: Talega Creek. Habitat consisted of mostly oak woodland and mulefat scrub with a few small patches of native grassland, potential TLB habitat. The native grasslands were very dry and consisted of mostly vegetative species. No rare plants were encountered during protocol surveys. However, two interesting finds on this road were *Salvia spathacea* and *Clarkia bottae*, both previously documented only

once in the County (Mulligan, pers. comm.). Both are unusual, but not listed as rare by Federal, State, or CNPS. The MCB Camp Pendleton GIS layer data had no rare plant occurrences for this area.

Road 5: **Combat Town Access Road**. Habitat consisted of riparian areas, coastal sage scrub, and disturbed areas that are used intensely for training. No rare plants were encountered during protocol surveys. The MCB Camp Pendleton GIS layer data had no rare plant occurrences for this area.

Road 6: Piedra de Lumbre. Habitat of the southern half of the road consisted of mostly dry coastal sage scrub. The northern half consisted of mostly degraded and dry grassland, with low to moderate potential for TLB. No rare plants were encountered during protocol surveys. The MCB Camp Pendleton GIS layer data provided showed a pre-1997 occurrence of unconfirmed *Caulanthus simulans* (a CNPS List 4 species). This species was not detected in the current surveys.

Photo 3. Unknown *Senecio* sp. at Road 7

Road 7: Horno Canyon. Habitat consisted of mostly steep ridges of dry coastal sage scrub with a few flat areas of dry, degraded mixed grasslands. No rare plants were encountered during protocol surveys. The MCB Camp Pendleton GIS layer data had no rare plant occurrences for this road; however, TLB was reported a half mile southeast on Basilone Rd from northern end of Horno Canyon Rd (well outside of the current project area).

A population of an unusual *Senecio* shrub was found on the intersection of Horno Canyon Rd and Basilone Rd. This same shrub was also found on Road 20: Range 218. A specimen was collected and sent to an expert at the San Diego Natural History Museum for identification and is under investigation (Martus, pers. comm.).

Road 8: Red Beach Road. Habitat consisted of mostly moderate-quality mulefat scrub and coyote brush with a wetland area under the I-5 Bridge. No rare plants were encountered during protocol surveys. On the path parallel to I-5 and the train tracks (perpendicular to and above Red Beach Road), *Atriplex coulteri* and *Eryngium pendletonense* were located by TEC in 2006, outside of the current project area (TEC 2006). According to the MCB Camp Pendleton GIS layer data, the west side of the I-5 Bridge is mapped for vernal pools but no evidence of them was found. This area under the bridge does consist of wetland hydrology (moving stream) and riparian vegetation but not vernal pool hydrology and vegetation.

Road 9: Range 407 Access. Habitat consisted of mostly highly disturbed (by fire and vehicles) mixed grassland. No rare plants were encountered during protocol surveys. However, *Ericameria palmeri* var. *pachylepis*, a new county record, was discovered near the southeast beginning of this road (Mulligan, pers. comm.). The MCB Camp Pendleton GIS layer data had no rare plant occurrences for this area.

Road 10: Observation Post J. Habitat for most of this road consisted of mainly native and mixed grasslands and with some riparian areas. Much of the grassland had been recently burned Approximately 300 individuals of dwarf Brodiaea *(Brodiaea terrestris* ssp. k*ernensis)* were found near the southeastern end of this section of the road.

At the very southeast end of the road, adjacent habitat consisted of good quality chamise chaparral recovering from a recent fire (approximately two years ago). Two rare plants, Ramona horkelia and Rainbow manzanita, were found intermingled throughout the chaparral (Figure 10-0). According to the MCB Camp Pendleton GIS layer data, Ramona horkelia had been previously documented in the area, however, this year's survey expanded its range. Another noteworthy find was the possible new *Ceanothus* species mentioned previously. This unusual shrub is common in the area of Road 10. GPS locations were mapped at two points along Road 17, where this species was first encountered (see Road 17 below). A specimen was collected and sent to an expert at the San Diego Natural History Museum for identification and taxonomic analysis. Preliminary taxonomy indicates that the specimen may have some affinities to chaparral whitethorn (*Ceanothus leucodermis*) (Mulligan, pers. comm.).

Road 11: Range 111. Habitat consisted of dense coyote brush on the southeast side of road and degraded mixed grassland on the northwest side of road. There were patches of good quality native grassland found but in very dry conditions with few flowering plants present. No rare plants were encountered during protocol surveys. The MCB Camp Pendleton GIS layer data had no rare plant occurrences for this area.

Road 12: Aliso Canyon. The western section of this road's habitat consisted of steep slopes of high quality coastal sage scrub with focus areas concentrated in riparian areas of willow and mixed sage scrub. According to the MCB Camp Pendleton GIS layer data, *Dudleya viscida* was found along the project area approximately 3 miles north of Stuart Mesa Road in pre-1997 surveys (Figure 12-0). *Dudleya viscida* was not found in any of the focus areas and no rare plants were encountered during 2007 protocol surveys. The central eastern section of this road was within the X-ray impact area; the area is burned repeatedly; and consisted mostly of dense patches of non-native grassland and exotic vegetation. Moderate size patches of native grassland occur near the eastern section of this road east of the X-ray impact area.

Road 13: Range 216 Access Road. Habitat consisted of moderate quality riparian vegetation of mule fat scrub and coyote brush to the south and mixed grassland highly degraded by fire to the north. No rare plants were encountered during protocol surveys. The MCB Camp Pendleton GIS layer data had no rare plant occurrences for this area. The data showed TLB occurring approximately one mile west on the frontage road parallel to Basilone Road, well outside of the project area.

Road 14: Juliet Training Area. Habitat consisted of high quality coast live oak woodland and riparian habitat and moderate quality coastal sage scrub with small patches of native grassland. No rare plants were encountered during protocol surveys. Steep slopes along much of the access road limited the project area and the extent of the survey. The MCB Camp Pendleton GIS layer data had no rare plant occurrences for this area.

Road 15: Papa 3 Road. Most of the habitat adjacent to this road consisted of highly degraded grasslands. Some had patches of native grassland with potential TLB habitat in very dry conditions. No rare plants were encountered during protocol surveys. The MCB Camp Pendleton GIS layer data had no rare plant occurrences for this area.

Road 16: Northern Ridge. Habitat between the western and eastern branch of this road consisted of bare ground due to a recent fire which had cleared all vegetation. The habitat of the west side of the western branch was mostly moderate quality riparian with some mixed grassland patches. The habitat of the east side of the eastern branch consisted of high-quality native grassland, with high potential for TLB. According to the MCB Camp Pendleton GIS layer data, in this area, but at two different locations, TLB was documented in 2005 and pre-1997. However, no plants were located during this year's survey probably due to the burned vegetation of the west side and the dry conditions on the east side of the east branch of this road. About 25 individuals of many-stemmed dudleya were discovered on the east side of the eastern branch (Figure 16-2) and a GPS point was collected. The population was confined to a small area (approx 1-3 m^2 and thus, a GPS polygon was not created in the field). This population, as well as records of an "unknown rare plant," are noted in the MCB Camp Pendleton GIS data.

Road 17: Observation Post India. Habitat consisted of good quality chamise chaparral recovering from a recent fire (approximately two years ago). Two rare plants, Ramona horkelia and Rainbow manzanita, were found spotty throughout the area (Figure 17-1). The MCB Camp Pendleton GIS layer data had Ramona horkelia documented on Road 10, less than a half mile to the northwest. The habitat conditions and plant community at Road 17 are similar to areas of Road 10 in which the possible new *Ceanothus* species was detected. This plant may have some affinities to *Ceanothus leucodermis*, a non-listed species, but appears distinct (photos 1 and 2) (Mulligan, pers. comm.). The possible new *Ceanothus* was detected at two locations along Road 17 and is common throughout the general area (Figure 7-9).

Photos 4 and 5. Probable new *Ceanothus* sp. with affinities to *Ceanothus leucodermis*, found at Roads 10 and 17.

Road 18: Roblar Rd. Habitat consisted of mostly degraded mixed and native grasslands with some riparian areas. Much of the grassland area to the north has been burned in the last year. A population of about 50 individuals of many-stemmed dudleya was located on the east side of the road, north of the Road 9 intersection (Figure 18-2). According to MCB Camp Pendleton GIS layer data, many-stemmed dudleya was previously documented near this area (outside of the road corridor). The current finding in the project area is a new locality of the species. Also, TLB has been previously documented in MCB Camp Pendleton GIS data on the northern end of the road, but was not located during this survey. This could be due to the recent fire and dry conditions.

Road 19: Range 219. Habitat consisted of mostly recently (early 2008) burned low quality grasslands and oak woodlands. No rare plants were encountered during protocol surveys, except for a few Engelmann oaks found in the riparian area in the central section of the road. The MCB Camp Pendleton

GIS layer data had no rare plant occurrences for this area. A least Bell's vireo was heard several times on the third survey in the coast live oak woodland near Basilone Road.

Road 20: Range 218. Habitat consisted of mostly coyote brush, riparian, and some highly degraded mixed grassland. No rare plants were encountered during protocol surveys, however, one unusual *Senecio* shrub was found in the riparian area on the west side of the road. A larger population of the shrub was also found on Road 7. A specimen was collected and sent to an expert for identification. The MCB Camp Pendleton GIS layer data had no rare plant occurrences for this area.

Road 21: Range 214/215. Habitat consisted of mostly mixed, non-native and native grasslands, most of which were burned this year. No rare plants were encountered during protocol surveys, but potential occurrence for TLB is moderate to high. This area should be searched after the area has recovered from the fire. The MCB Camp Pendleton GIS layer data had no rare plant occurrences for this area, however TLB was documented about one mile west on the frontage road parallel to Basilone Rd, well outside of the project area.

Road 22: Range 210. Habitat consisted of mostly mixed and native grassland and coast live oak riparian. The grassland areas were mostly burned in a recent fire, therefore were not in very good condition. Approximately 200 individuals of dwarf brodiaea were found at the eastern end of the survey area and 3 individuals were found in the next focus area to the west. The MCB Camp Pendleton GIS layer data had no rare plant occurrences for this area.

Road 23: Artillery/Storage Area 17. Habitat is mostly developed for training and consisted mostly of non-native grasslands with some disturbed coastal sage scrub. No rare plants were found during protocol surveys. The MCB Camp Pendleton GIS layer data had no rare plant occurrences for this area.

Road 24: Range 407/Artillery 18. Habitat consisted mostly of non-native and native grasslands. One population of 491 many-stemmed dudleya was found and recorded at this site on a north facing slope south of the dirt access road and north of the SIAC (Appendix D, CNDDB forms and Figure 24-2). The MCB Camp Pendleton GIS layer data had no rare plant occurrences for the project area at Road 24. A pre-1997 record of *Dichondra occidentalis* is identified in the MCB Camp Pendleton GIS data along the Range 407 access road, but not within or near the current project.

CONCLUSIONS AND RECOMMENDATIONS

No state or federally threatened or endangered or proposed species were encountered during 2007 and 2008 rare plant surveys. Three CNPS list 1B species and 1 CNPS list 4 species were encountered during 2007 and 2008 rare plant surveys. Recommend that the three CNPS 1B species and the Engelmann oaks, CNPS list 4, be avoided during the repair of the access roads. Further investigation of the taxonomic status of the unidentified *Senecio* and *Ceanothus* and, depending on the resolution, the extent of their occurrence on MCB Camp Pendleton is recommended.

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APPENDIX A
FIGURES

The attached figures are organized by road number. An overview figure is provided for each road, showing the survey transects and the study area. Rare plants were found at Roads 2, 10, 16, 17, 18, and 24; unusual or otherwise notable species were mapped at Roads 9 and 22. For each of these roads, insets of the rare plant locations are provided at a scale of 1:4800. To ensure consistency, the Figure numbers correspond with the Figure numbers provided in the Plant Community Mapping Report and Wetland Delineation (TEC 2007a, 2007b), and thus are not always sequential in this Rare Plant Report.

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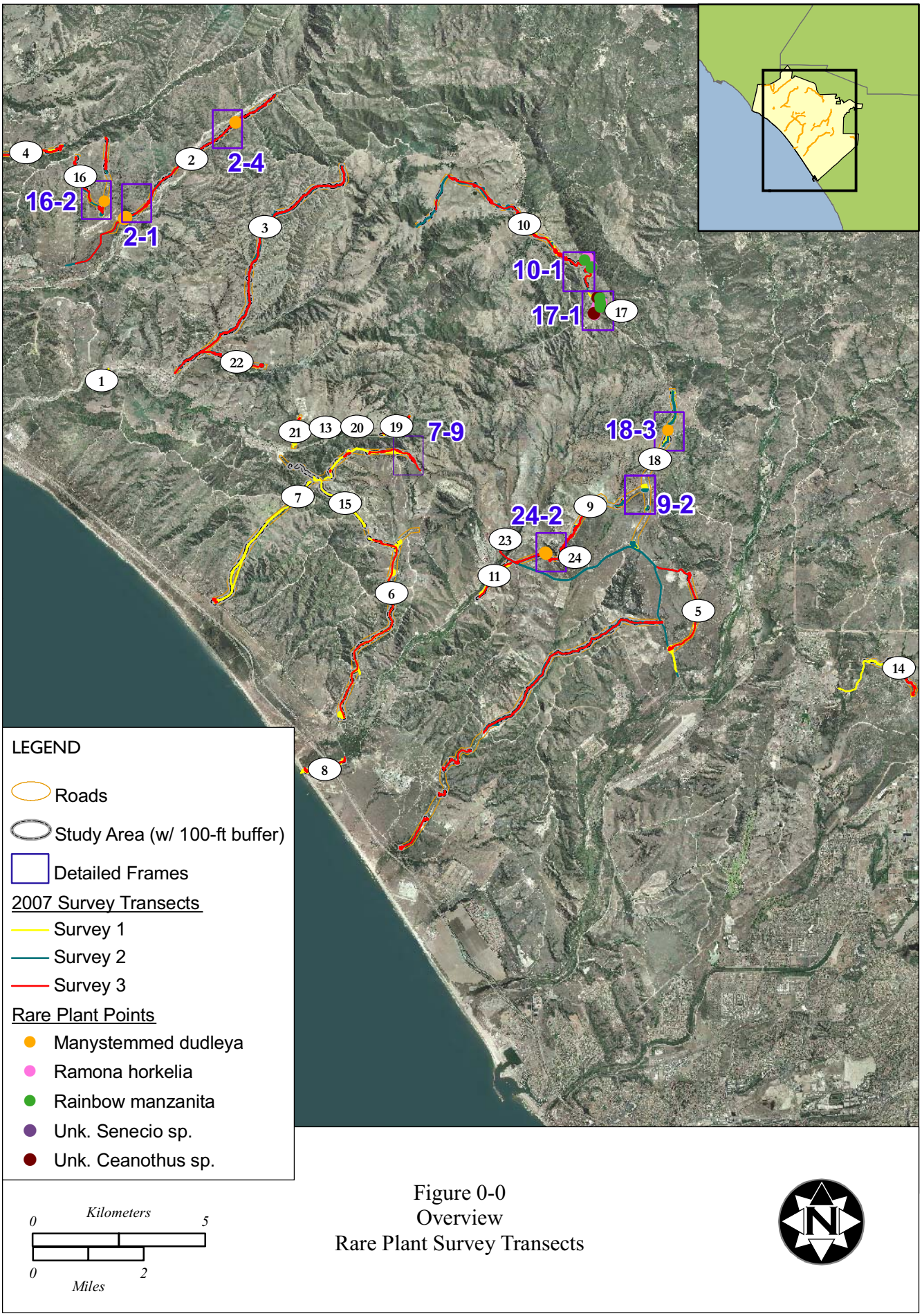
Figure 21-0 Road 21 Overview A-29
Figure 22-0 Road 22 Overview A-30
Figure 23-0 Road 23 Overview A-31
Figure 24-0 Road 24 Overview A-32
Figure 24-2 Road 24 Inset A-33



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Overview
Rare Plant Survey Transects

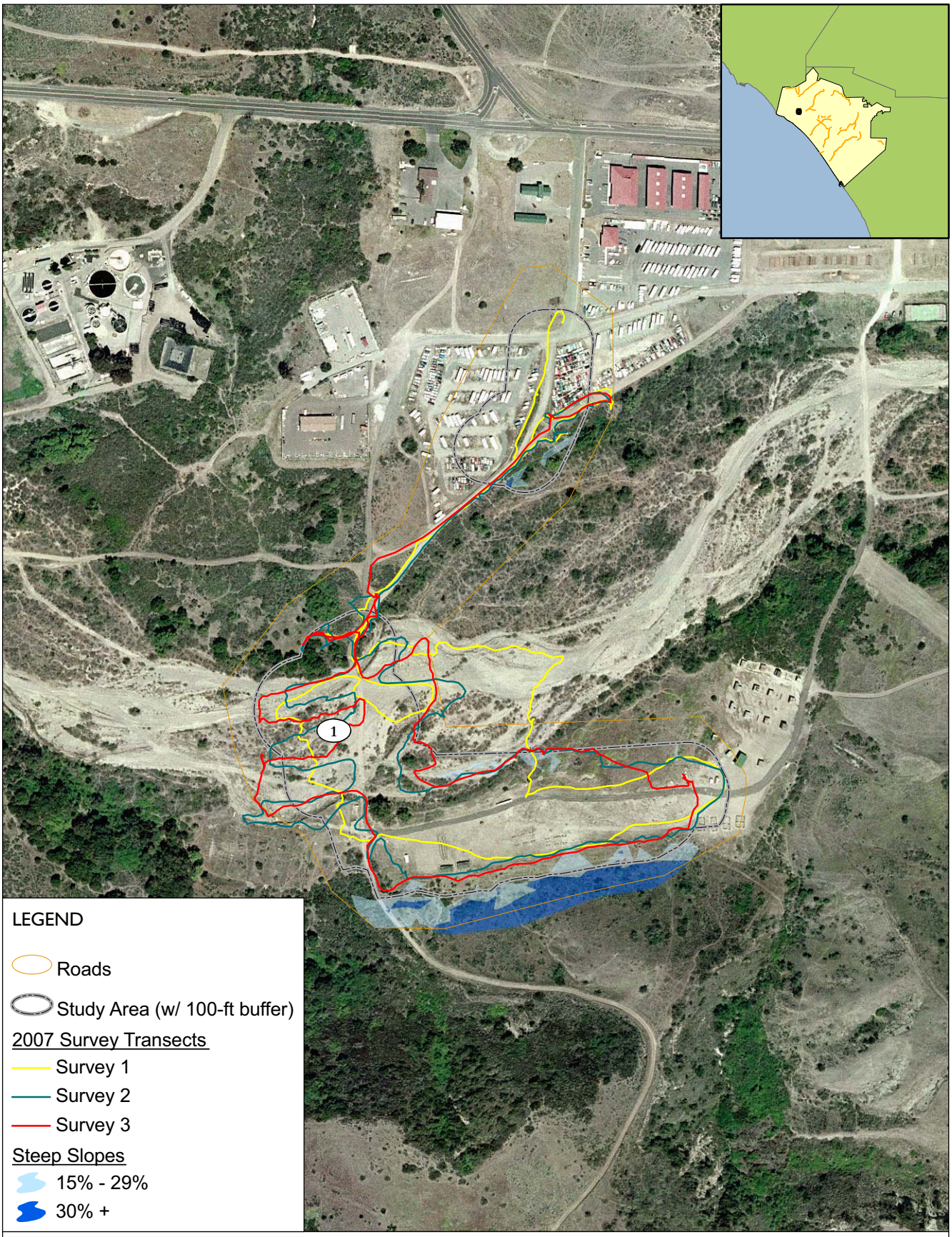

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Figure 1-0
Road 1; Overview
Rare Plant Survey Transects

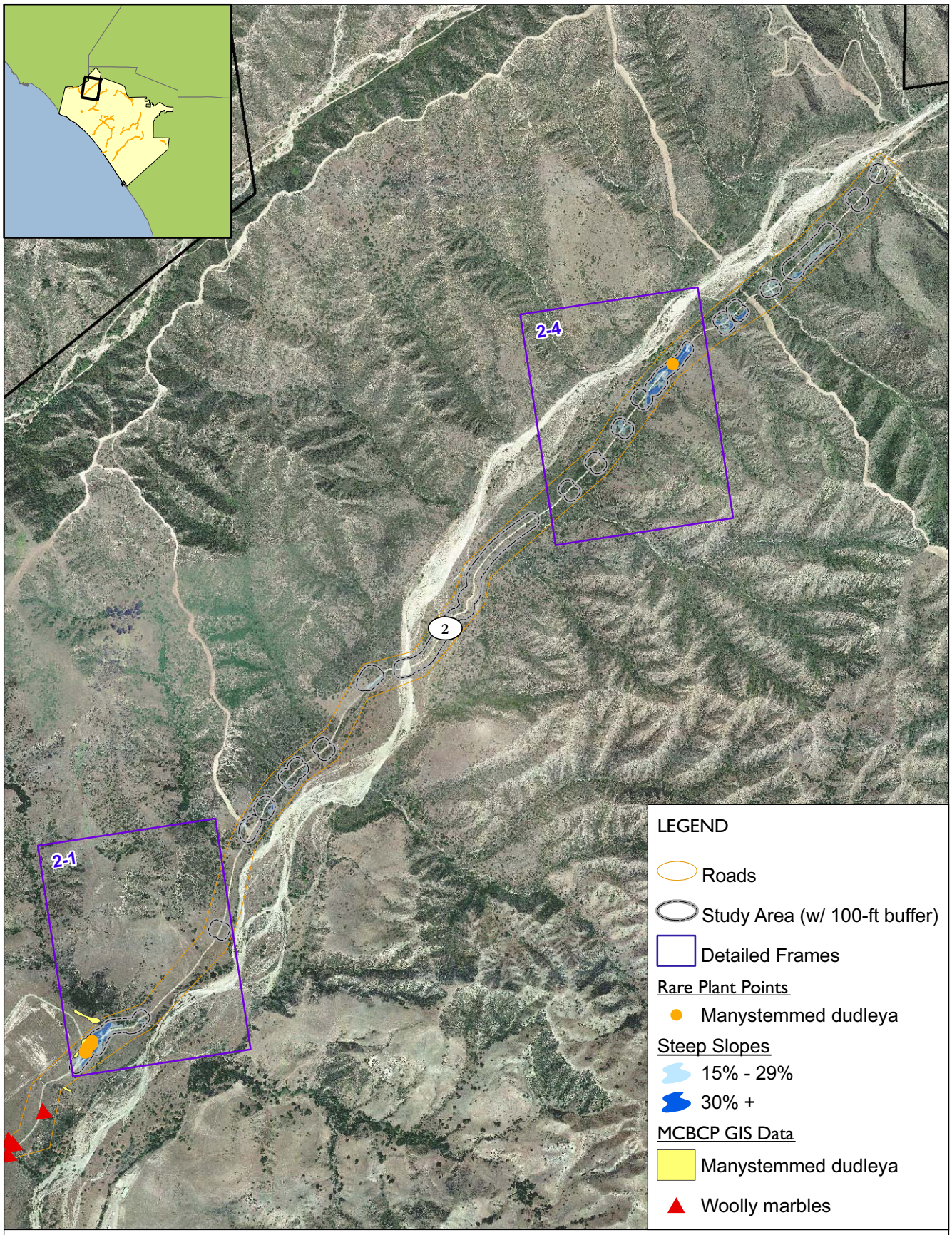

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Figure 2-0
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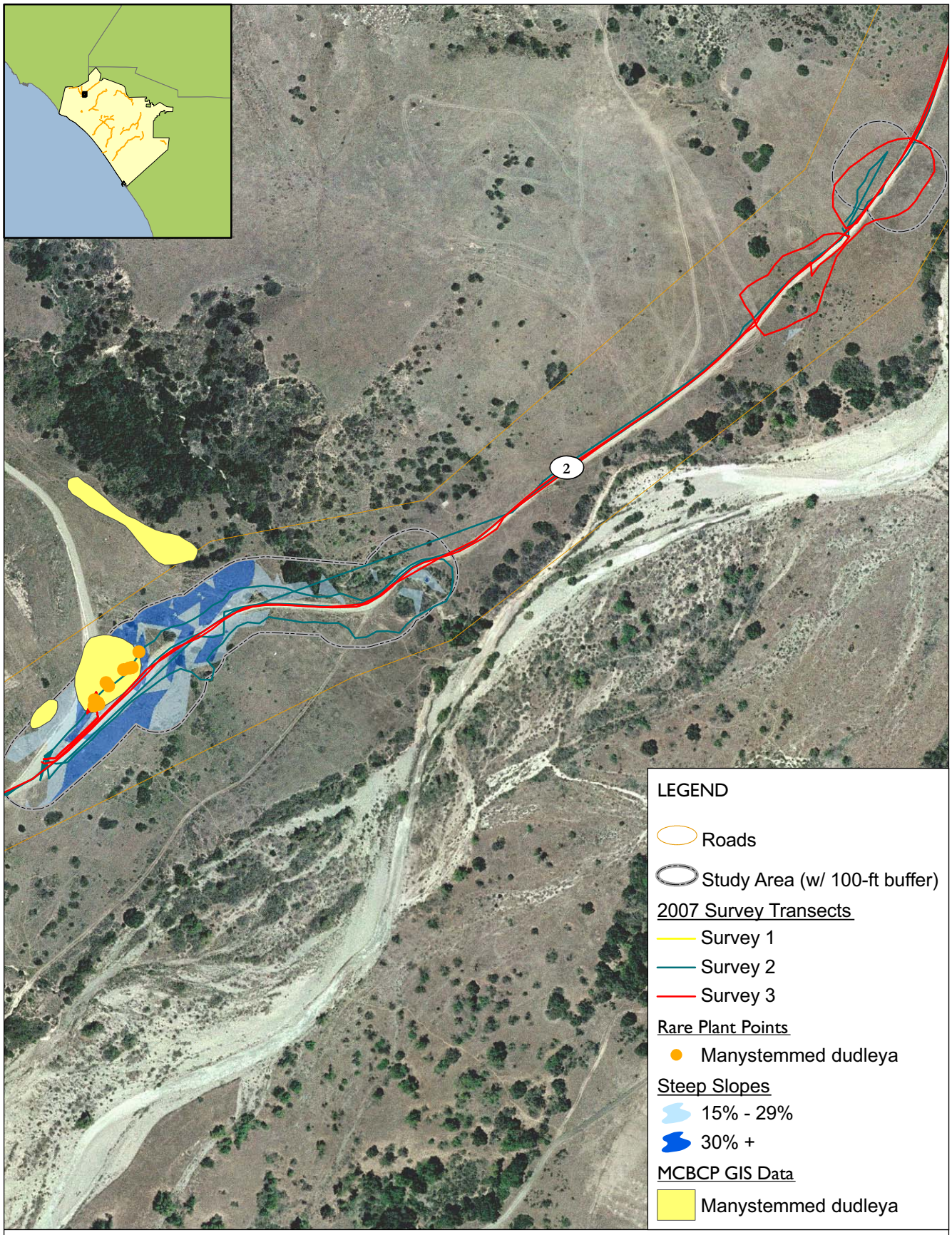

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Figure 2-1
Road 2; Southwest Inset
Rare Plant Survey Transects

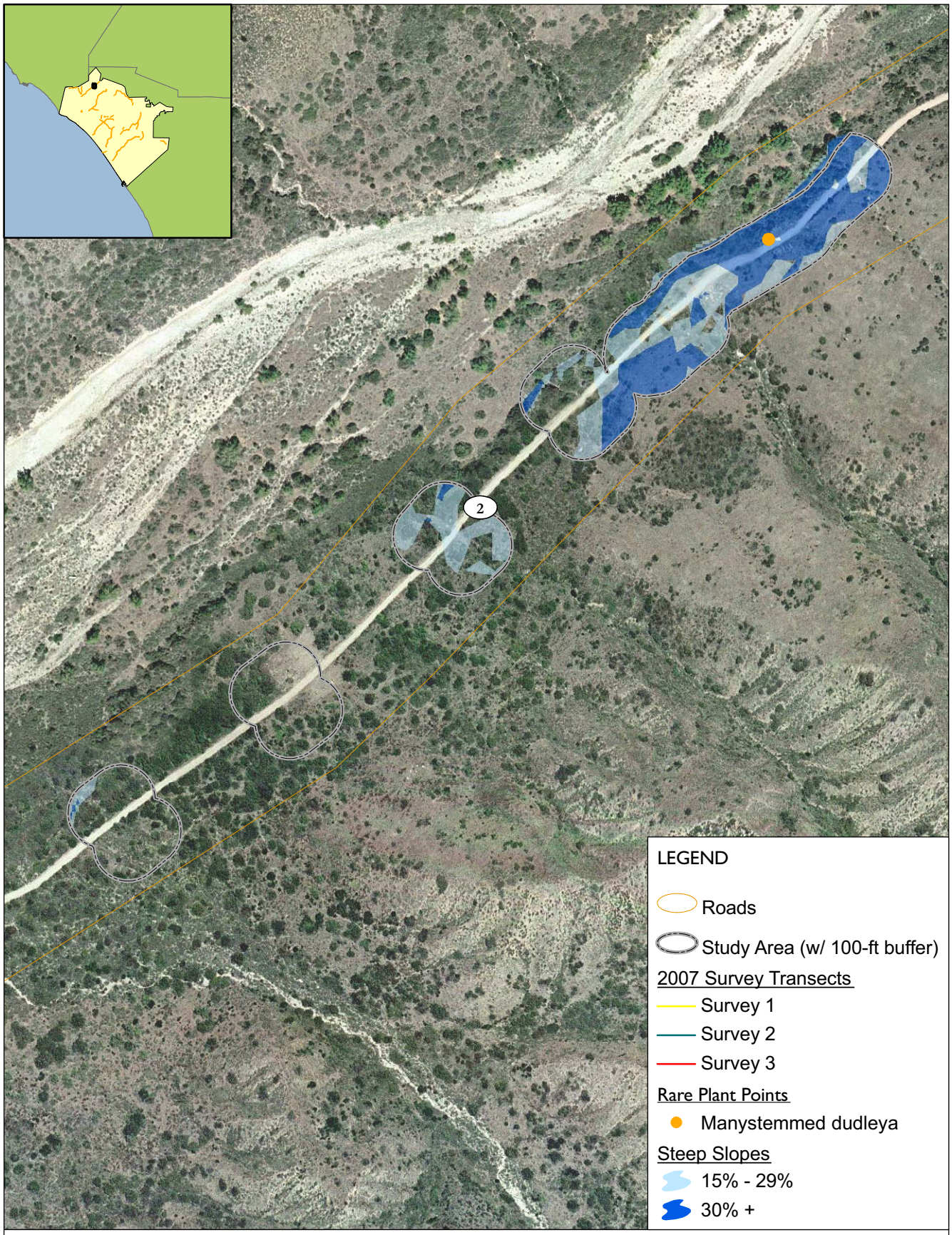

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Figure 2-4
Road 2; Northeast Inset
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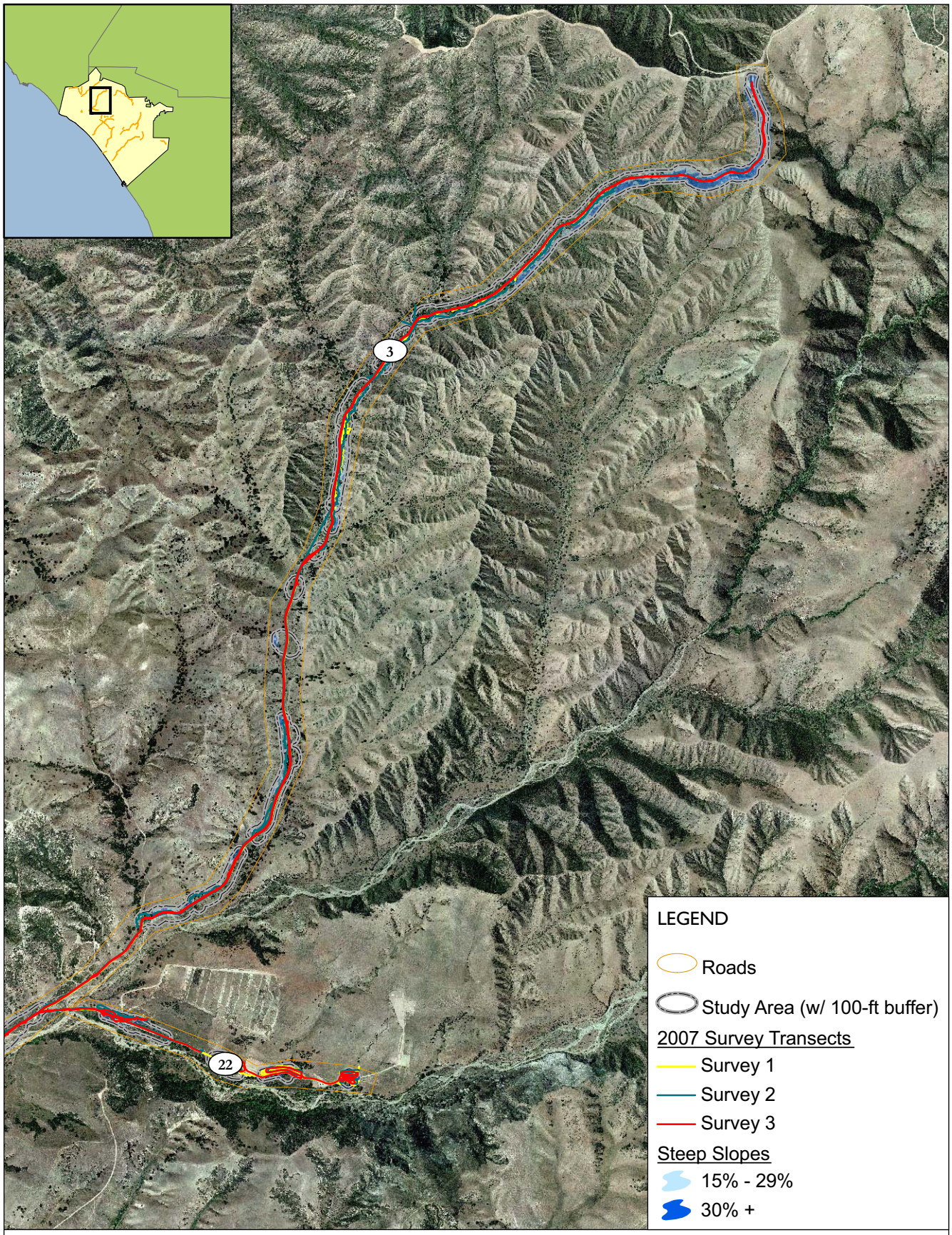

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Road 3; Overview
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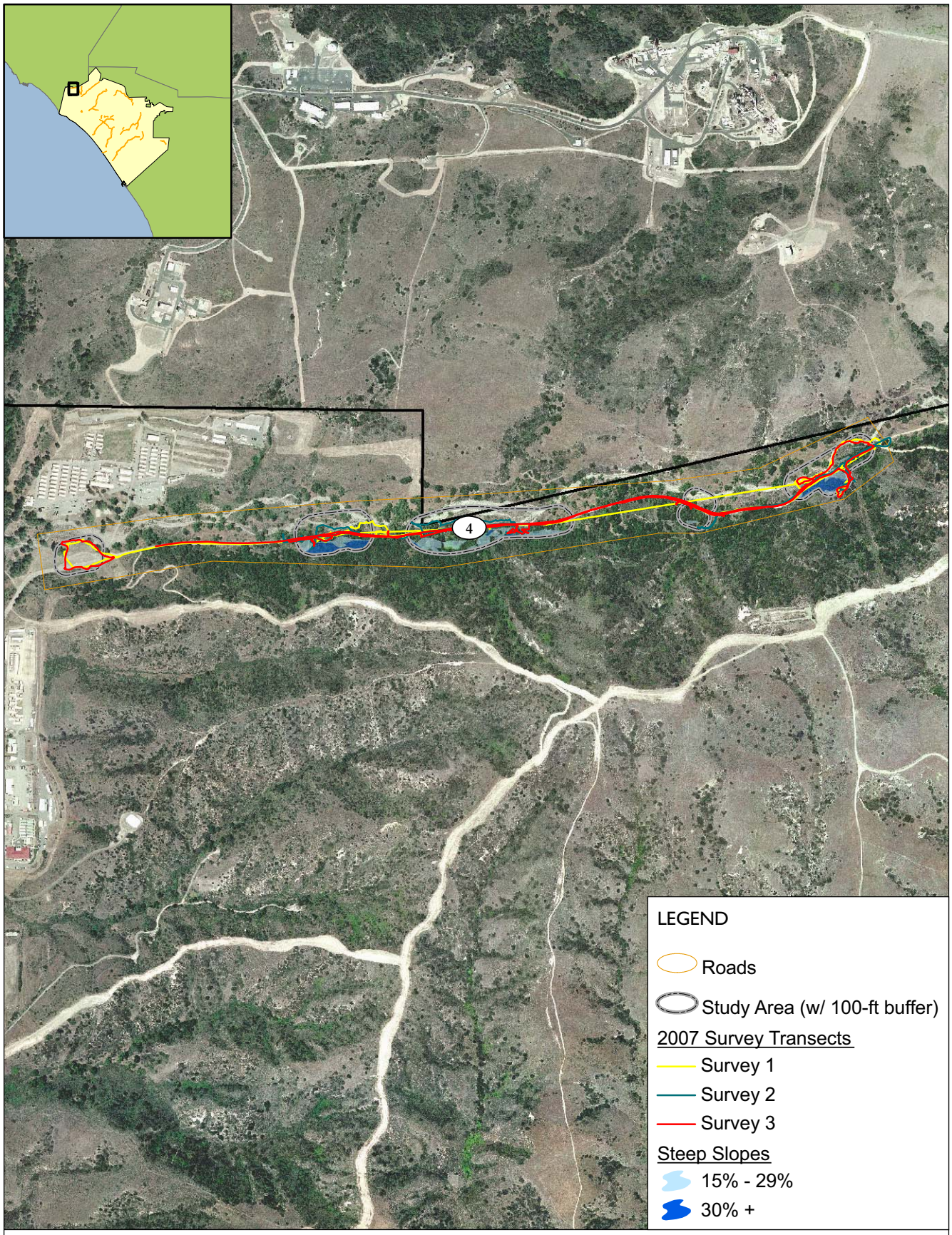

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Road 4; Overview
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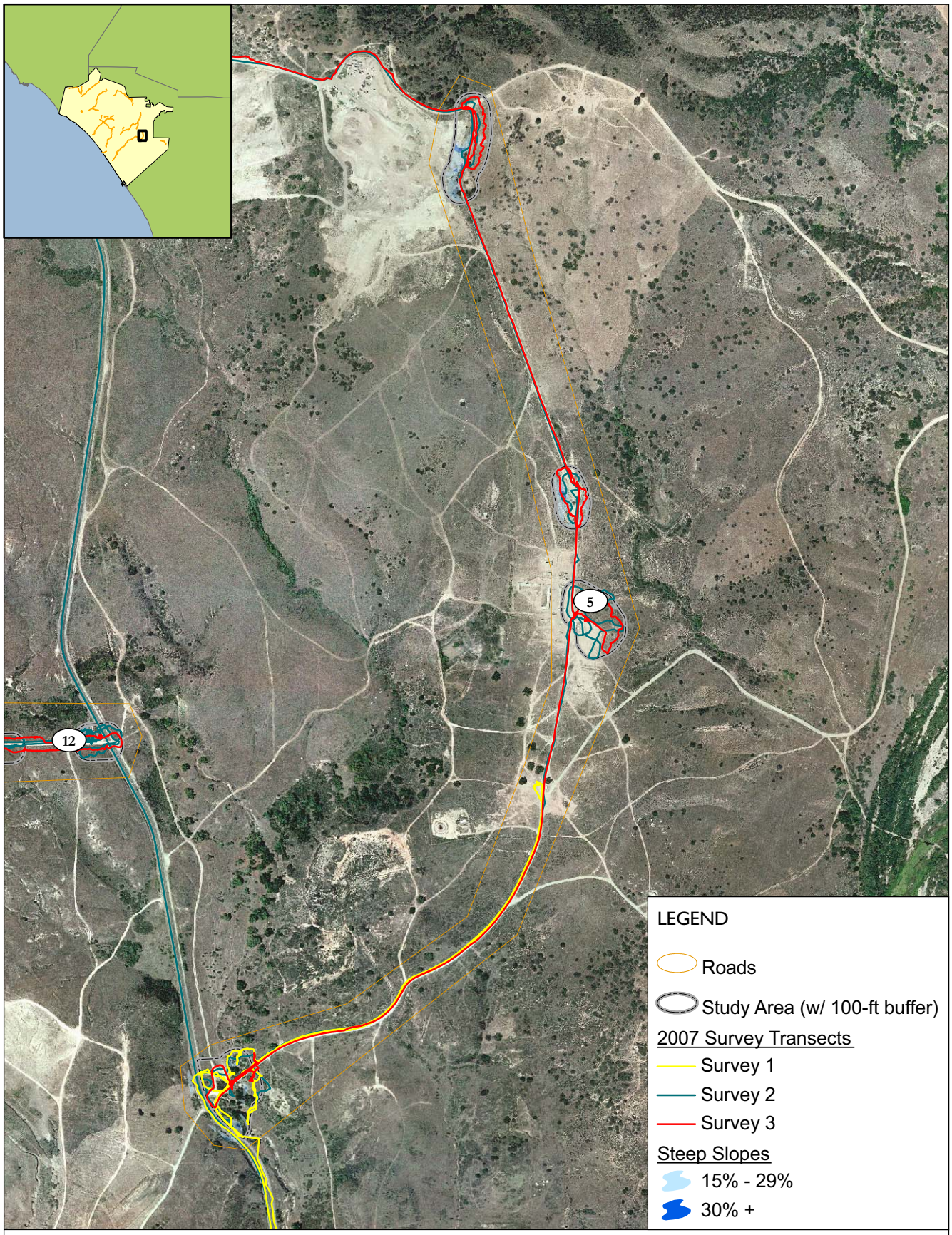

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Road 5; Overview
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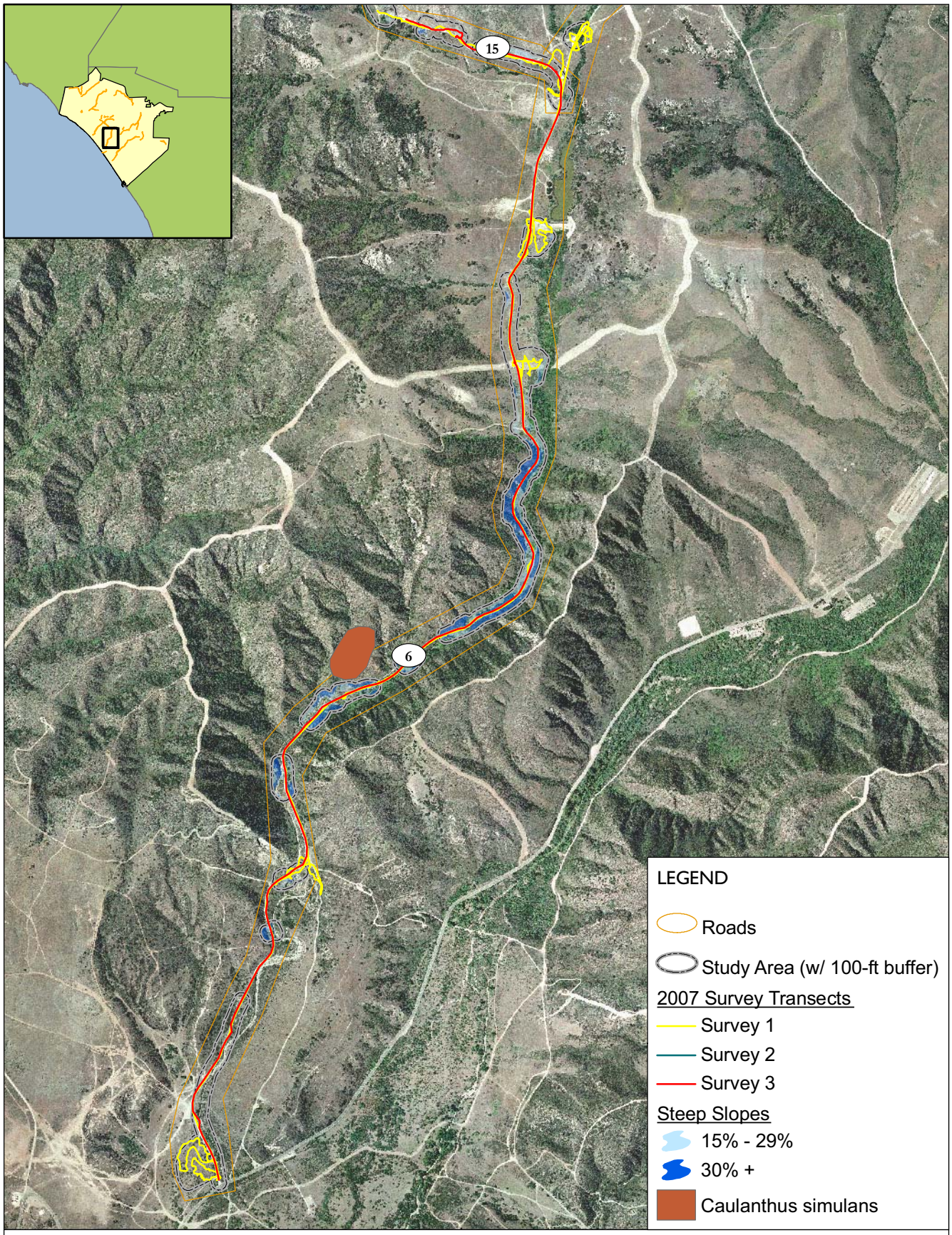

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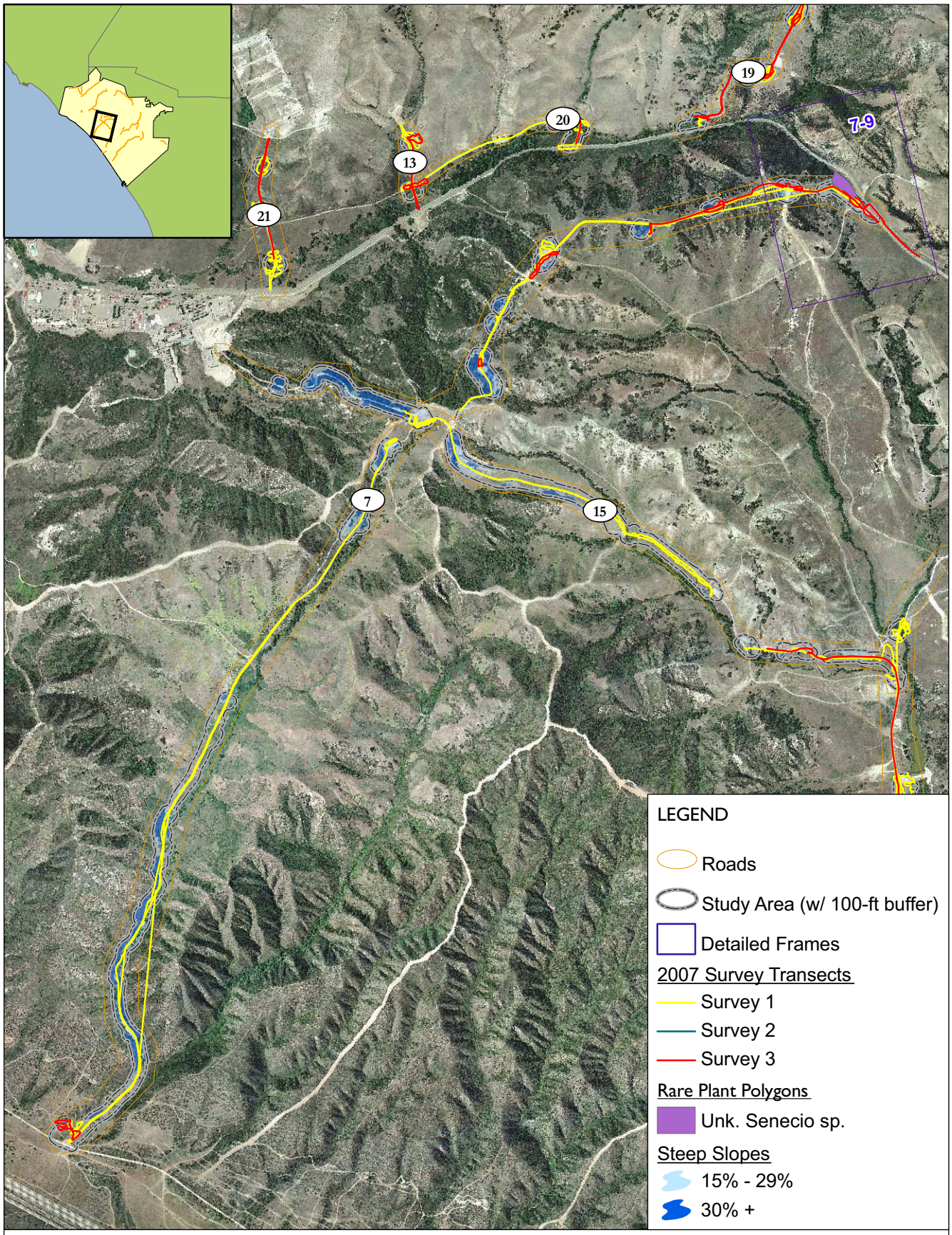

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Figure 7-0
Road 7; Overview
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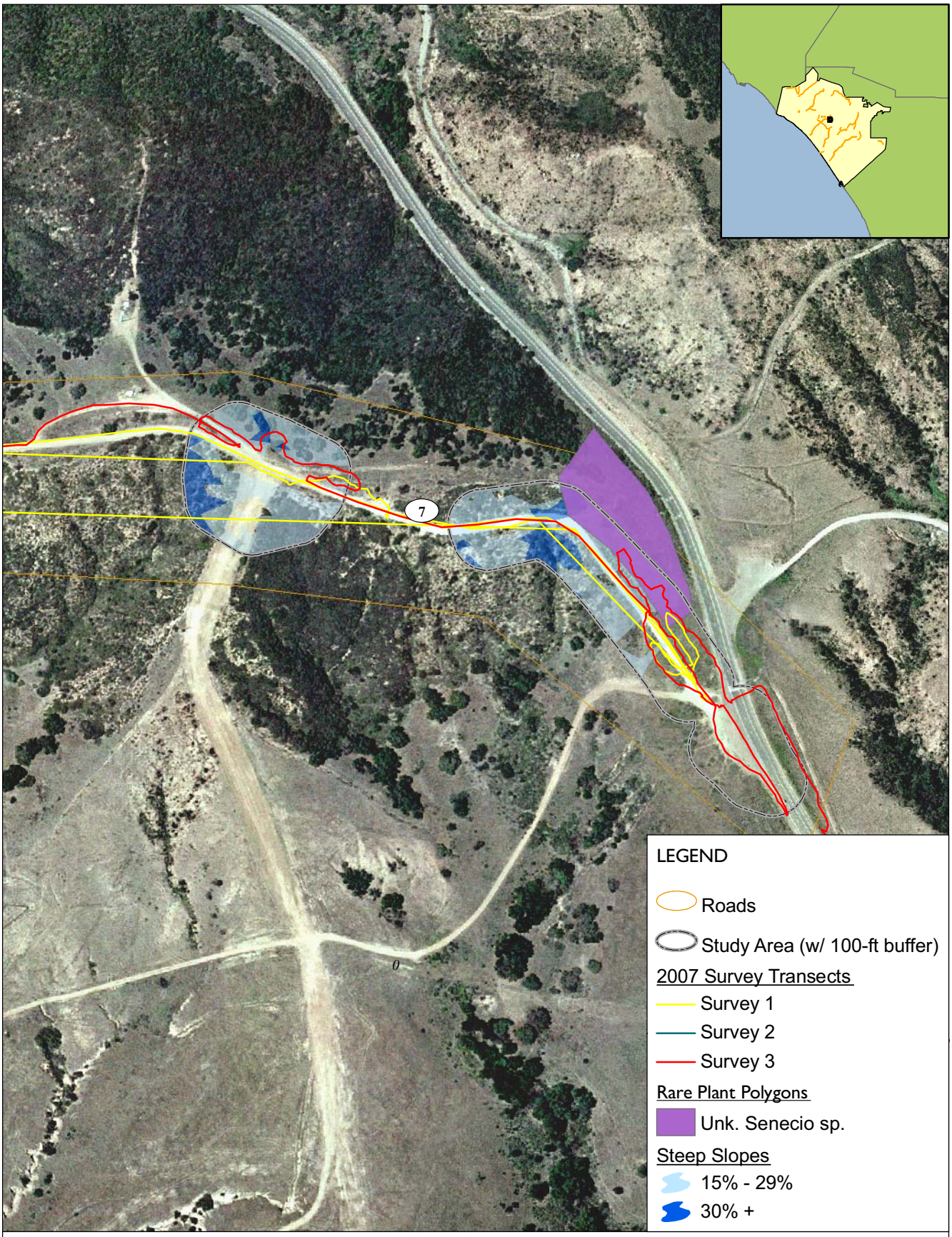

Figure 7-9
Road 7; Inset
Rare Plant Survey Transects

Meters
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Feet

Figure 8-0
Road 8; Overview
Rare Plant Survey Transects

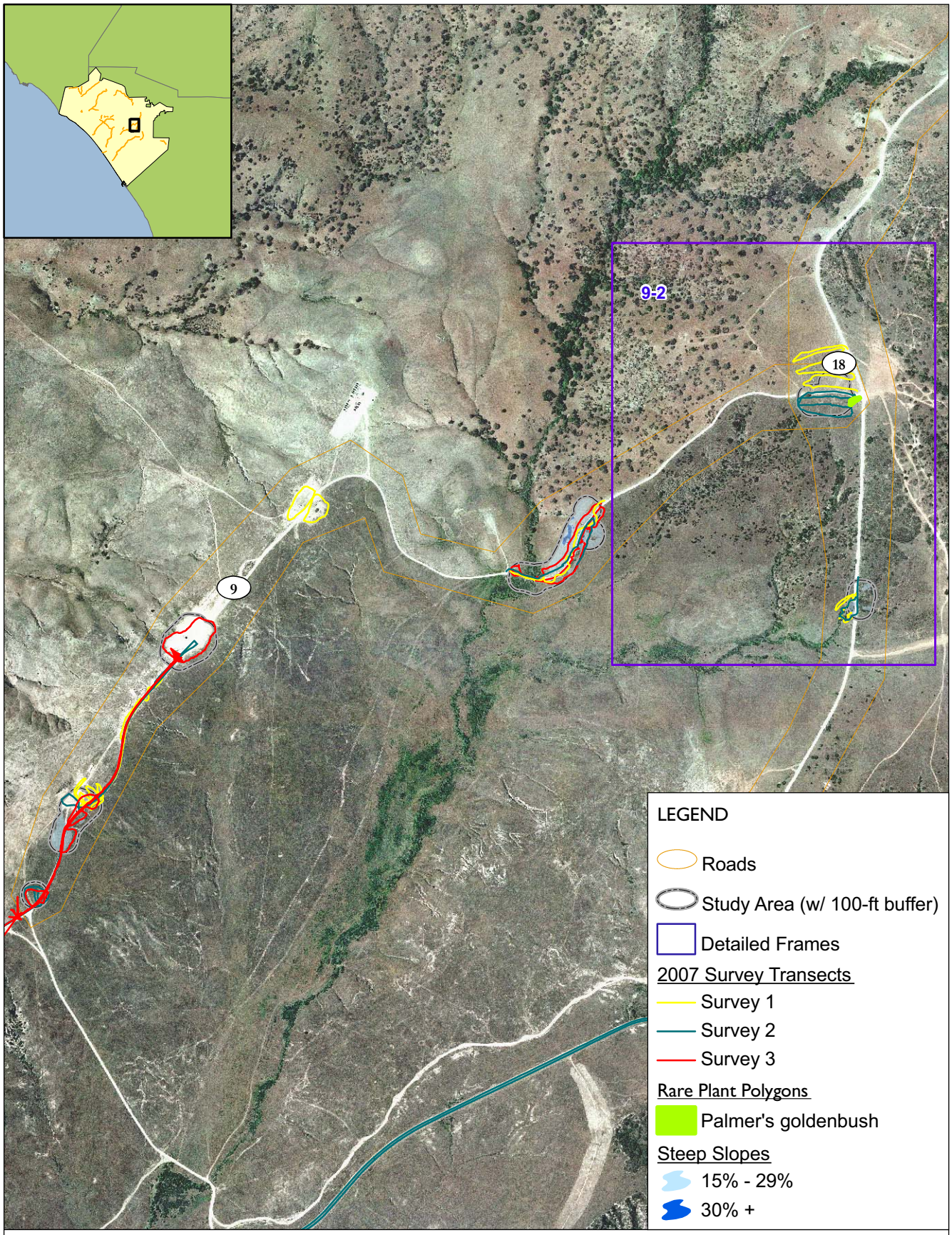

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Figure 9-0
Road 9; Overview
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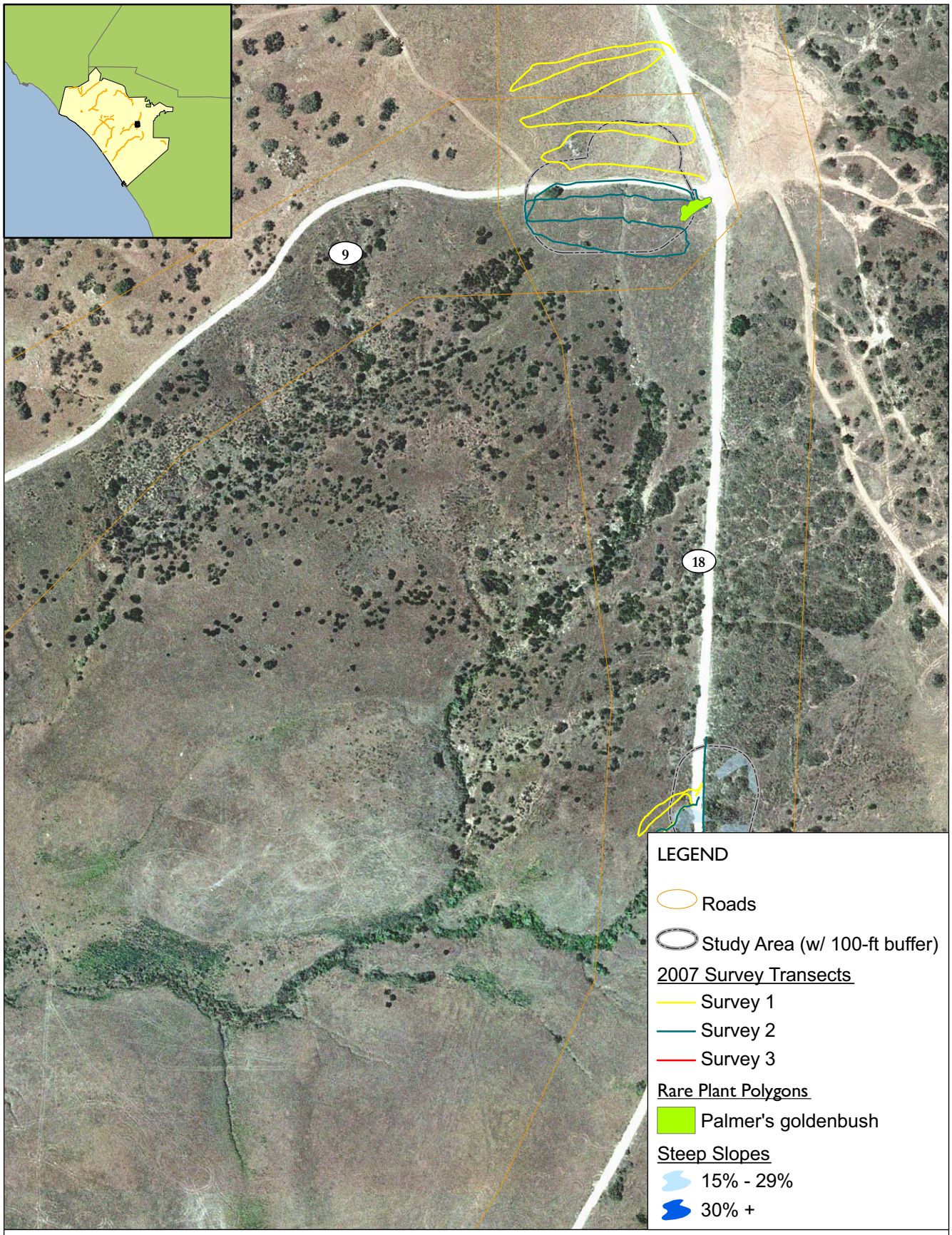

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Figure 9-2
Road 9; Inset
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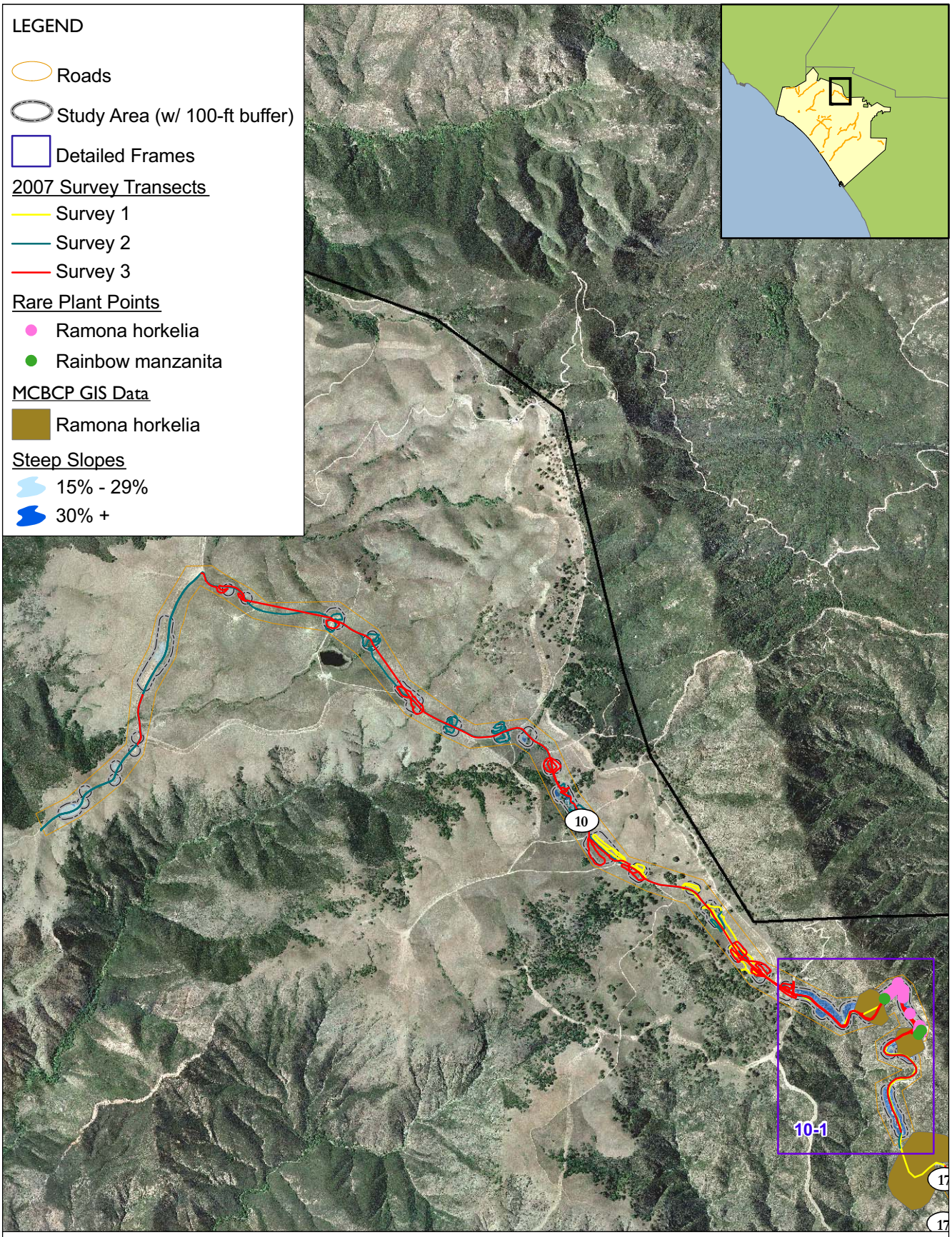

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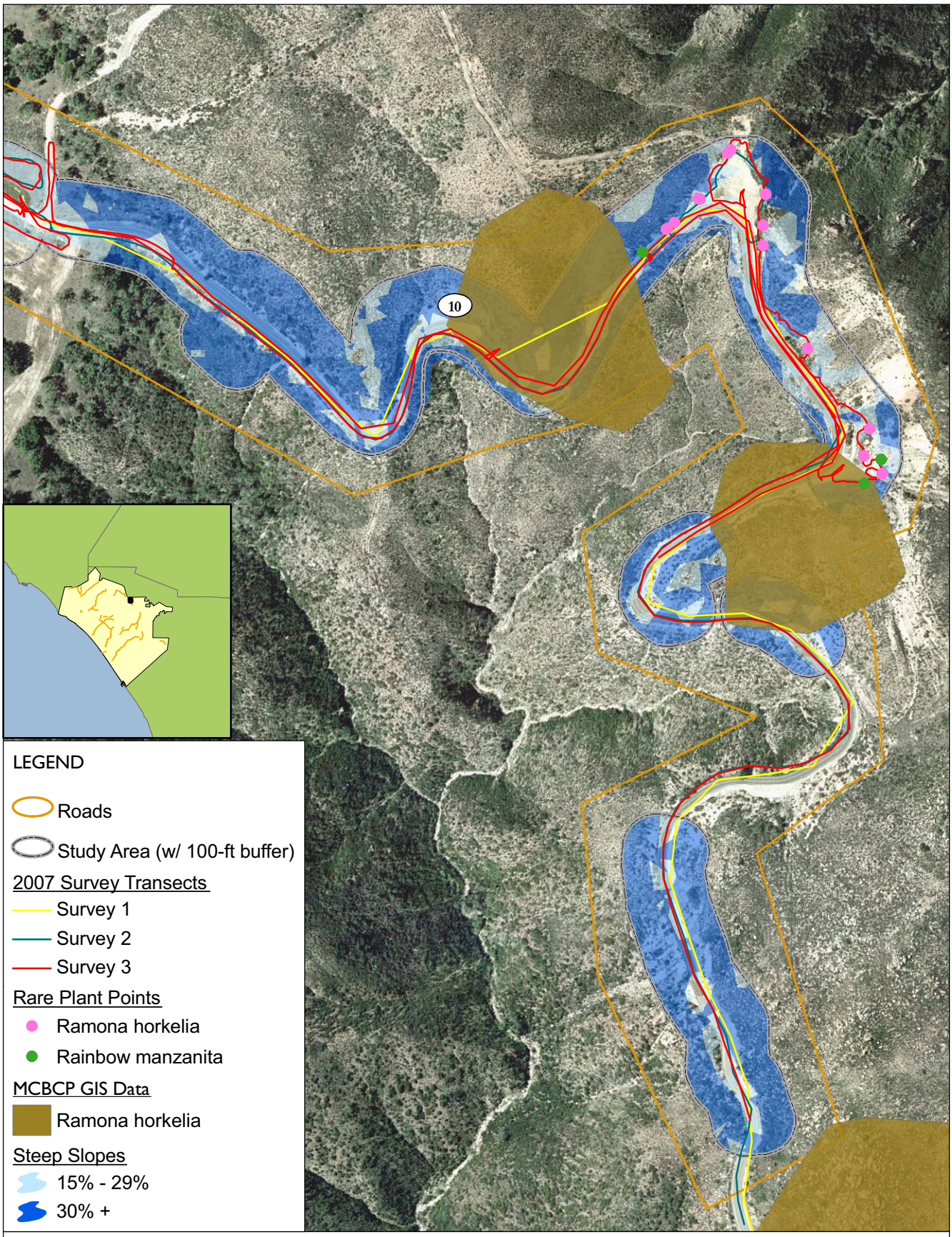

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Figure 10-1
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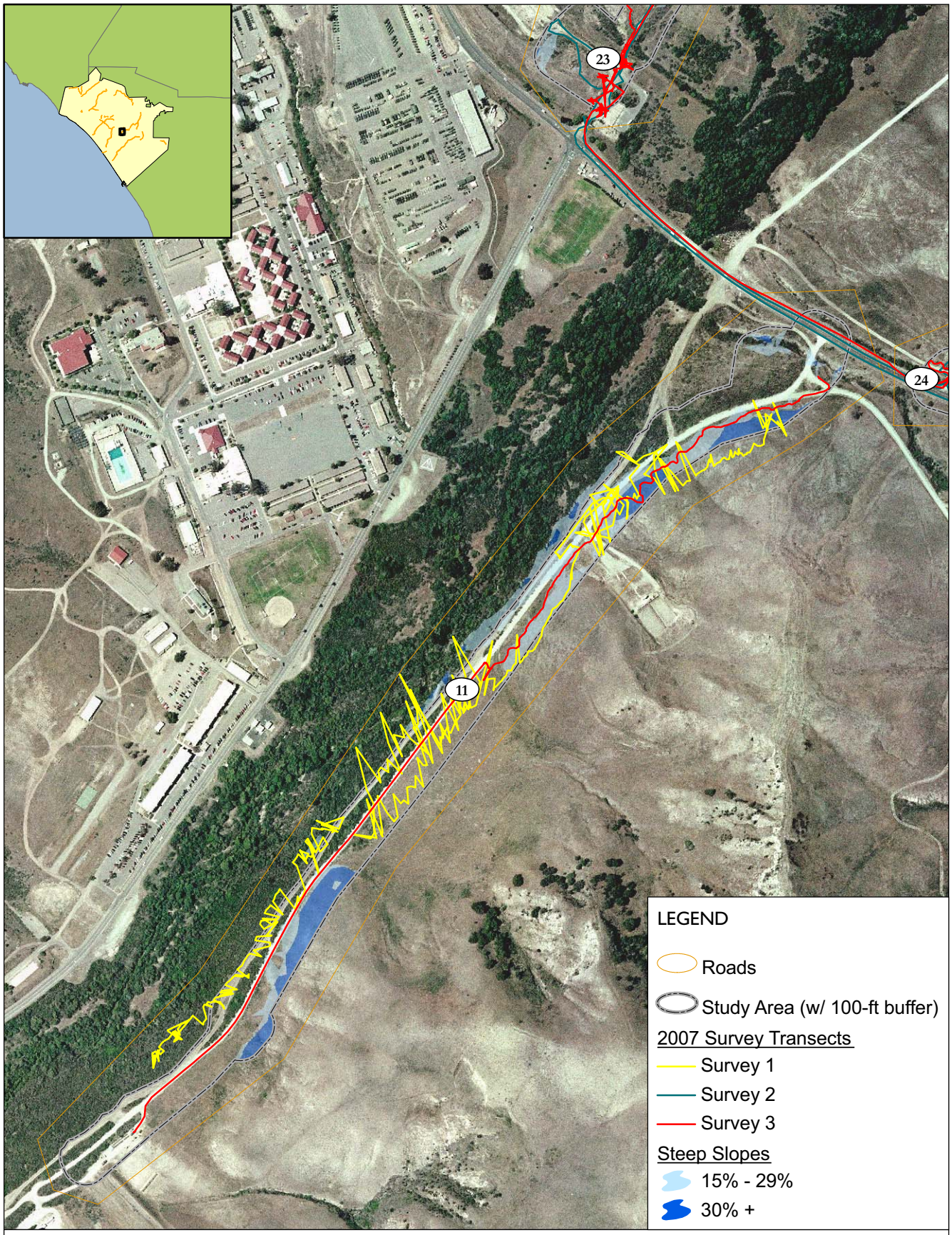

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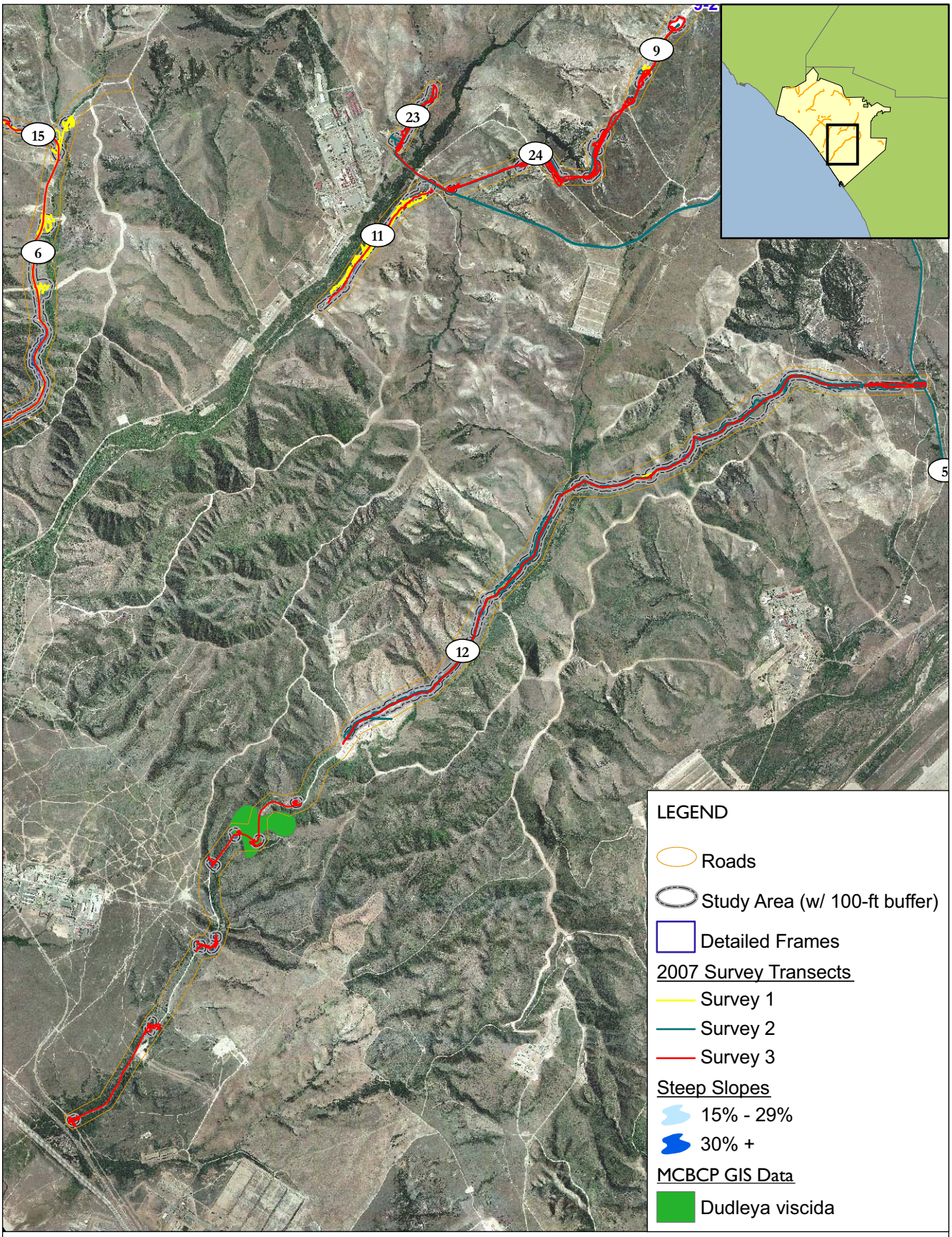

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Rare Plant Survey Transects

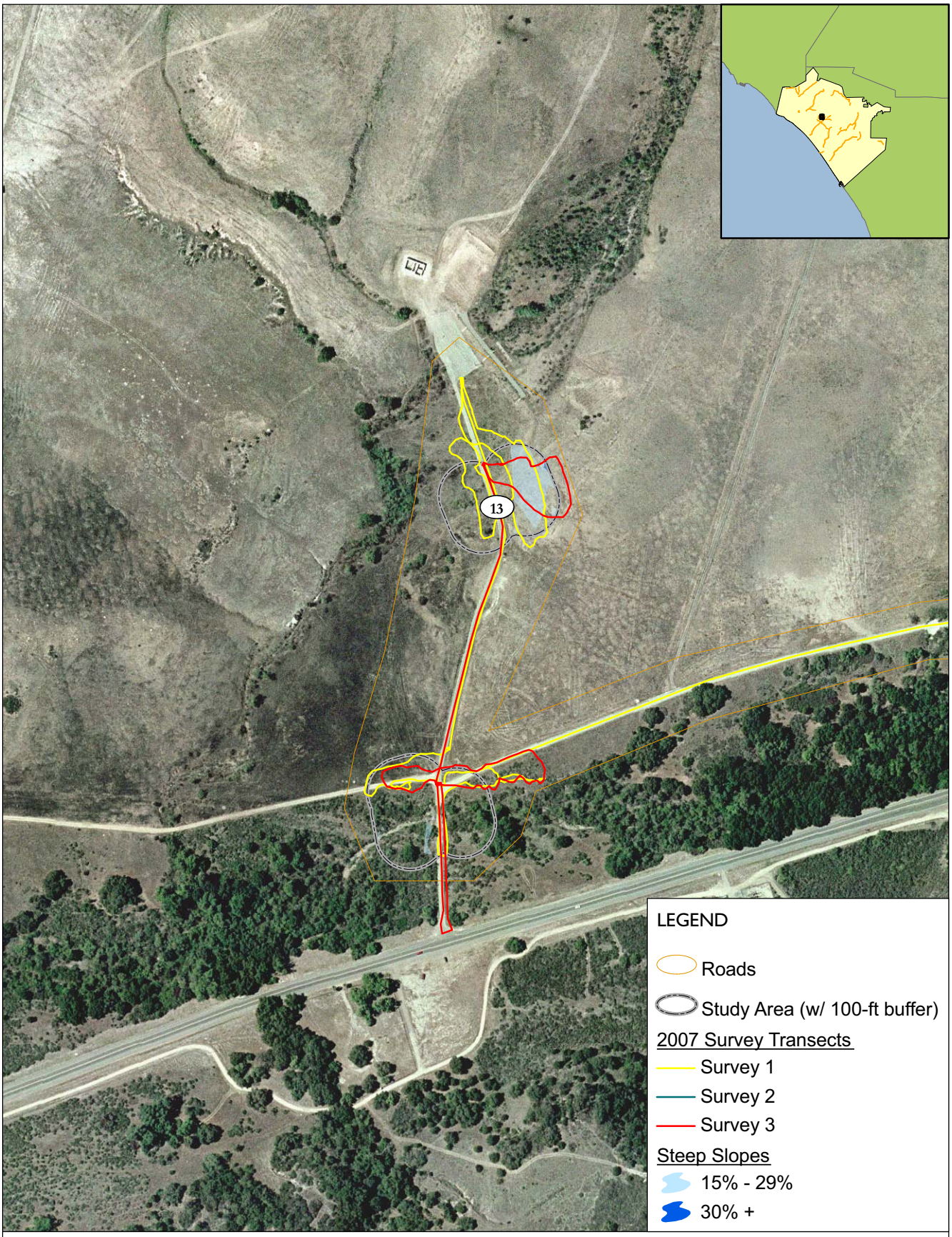

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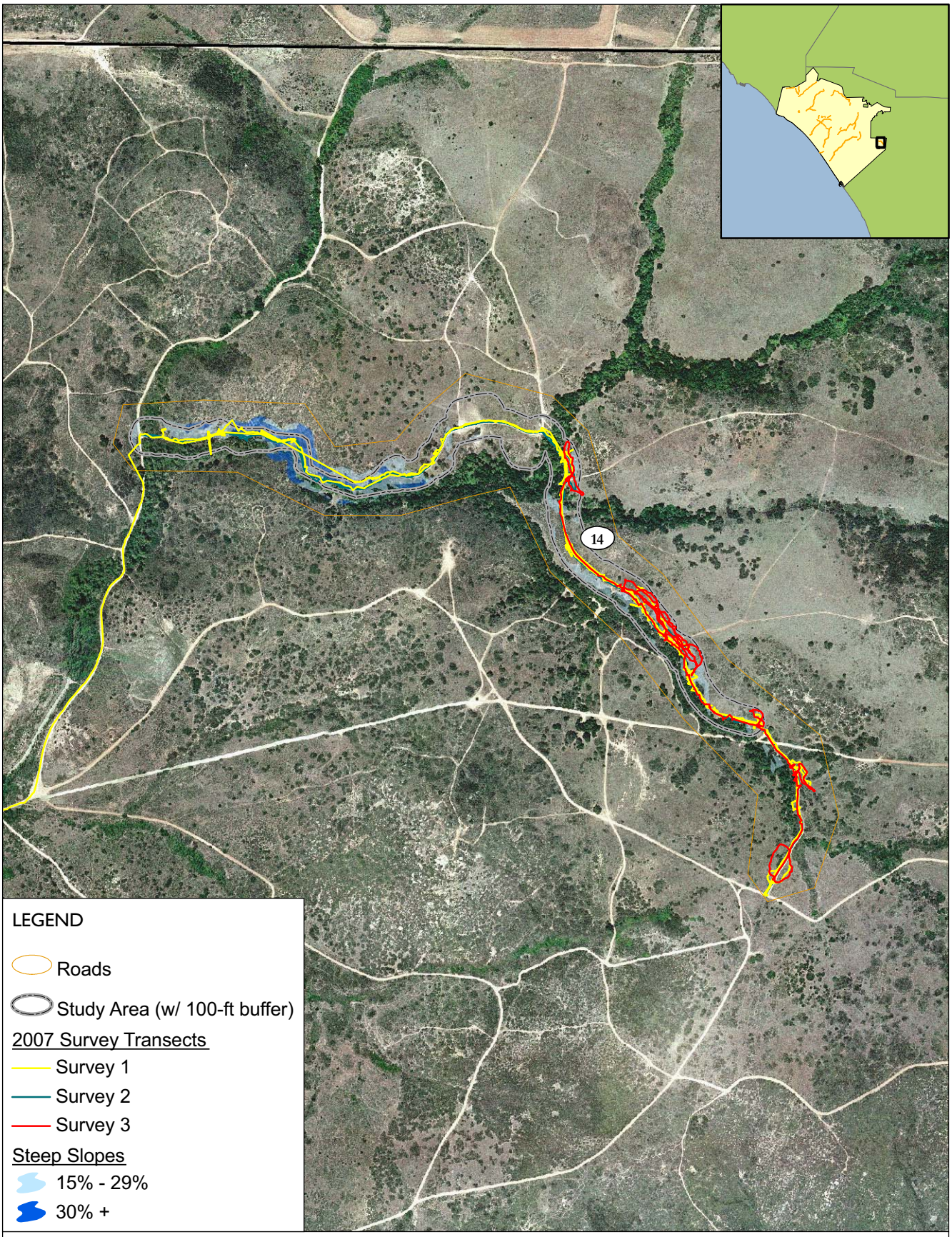
Figure 13-0
Road 13; Overview
Rare Plant Survey Transects



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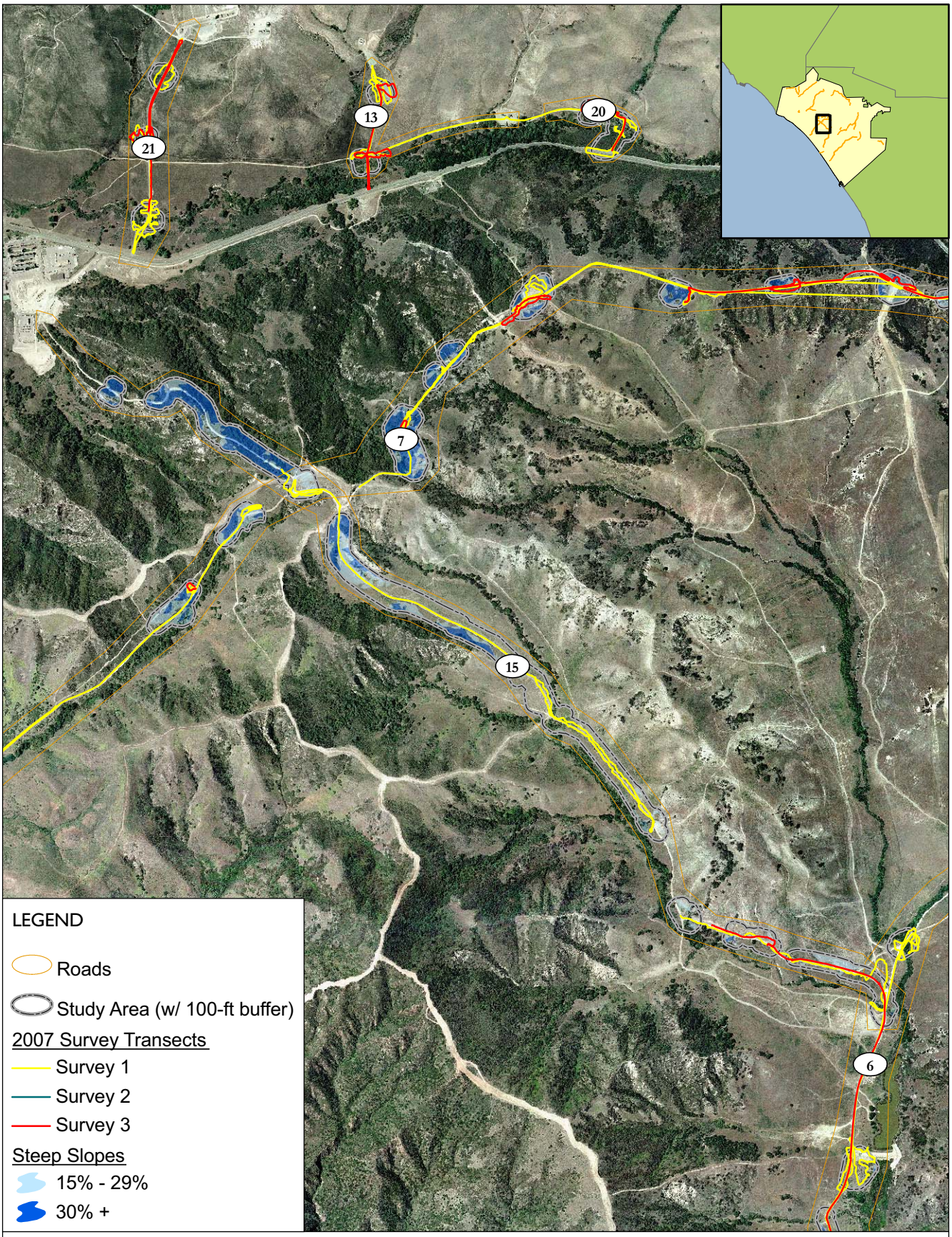

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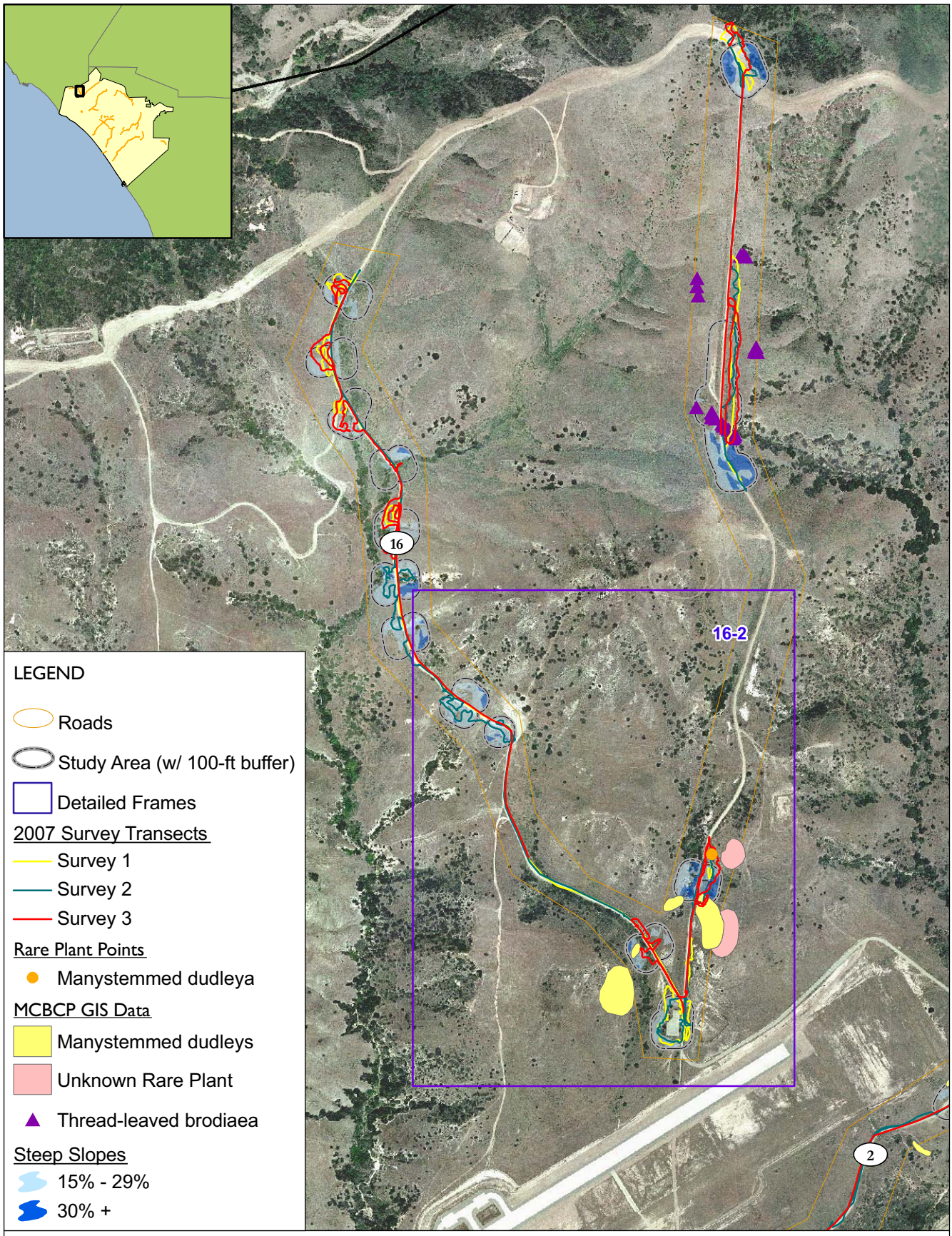

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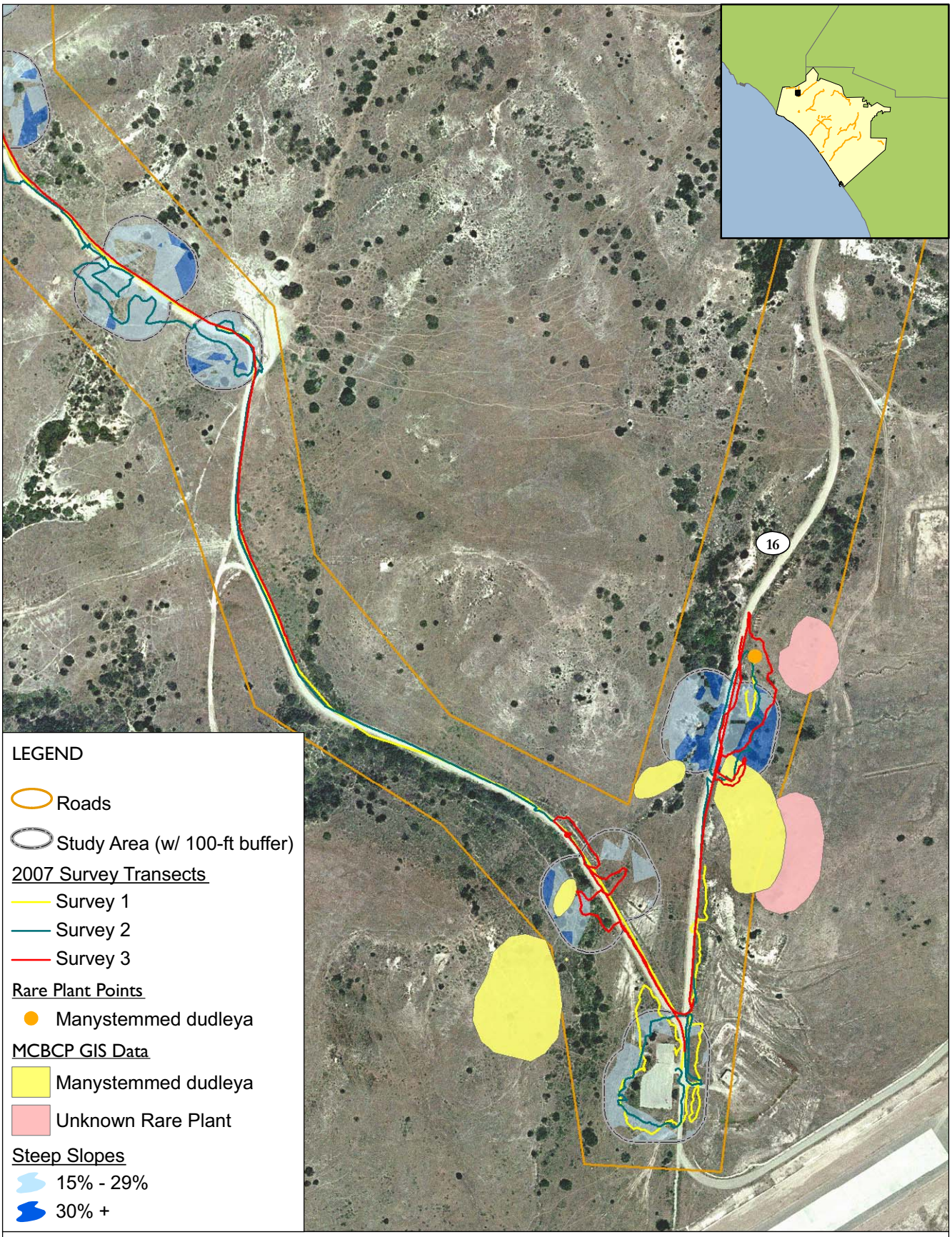

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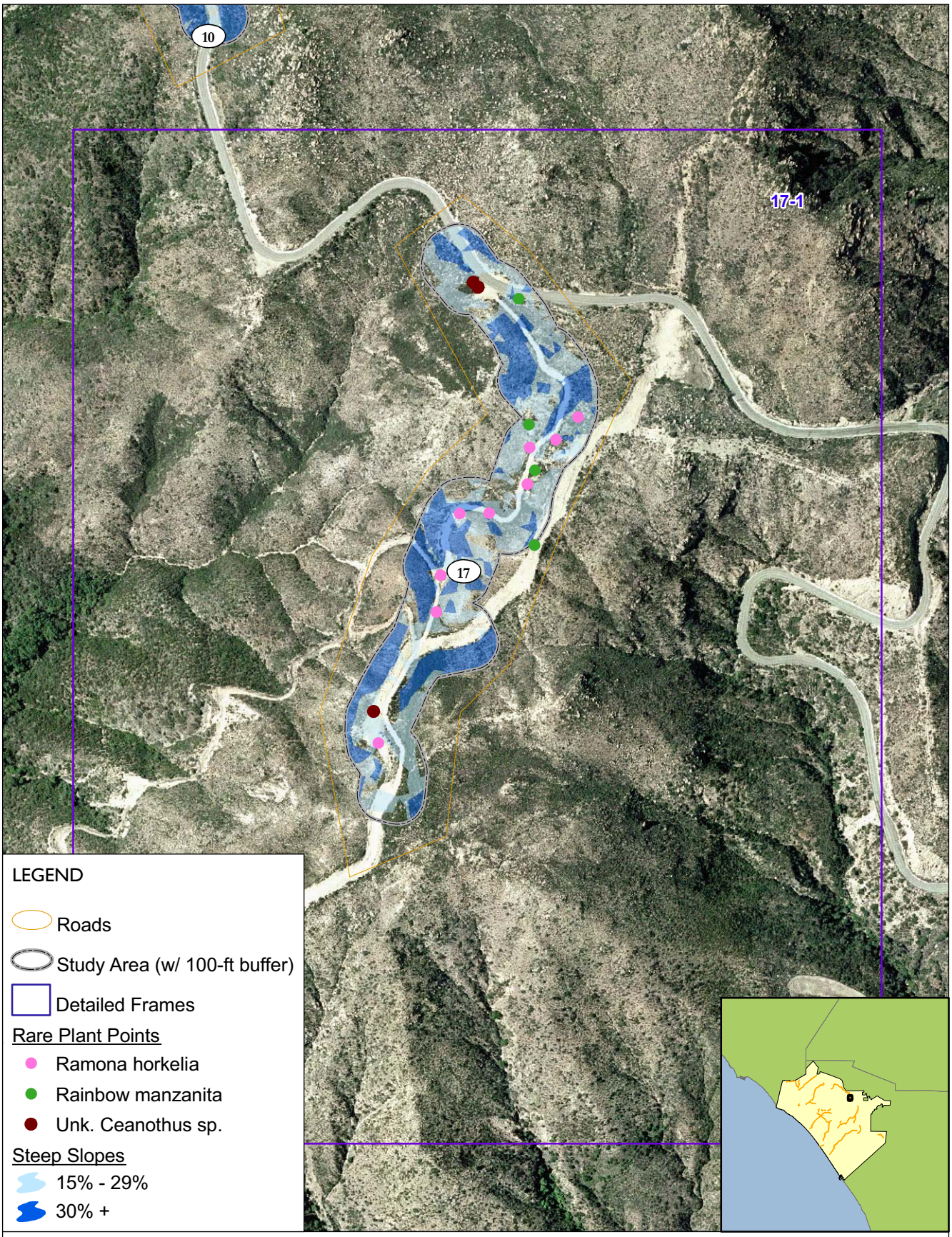

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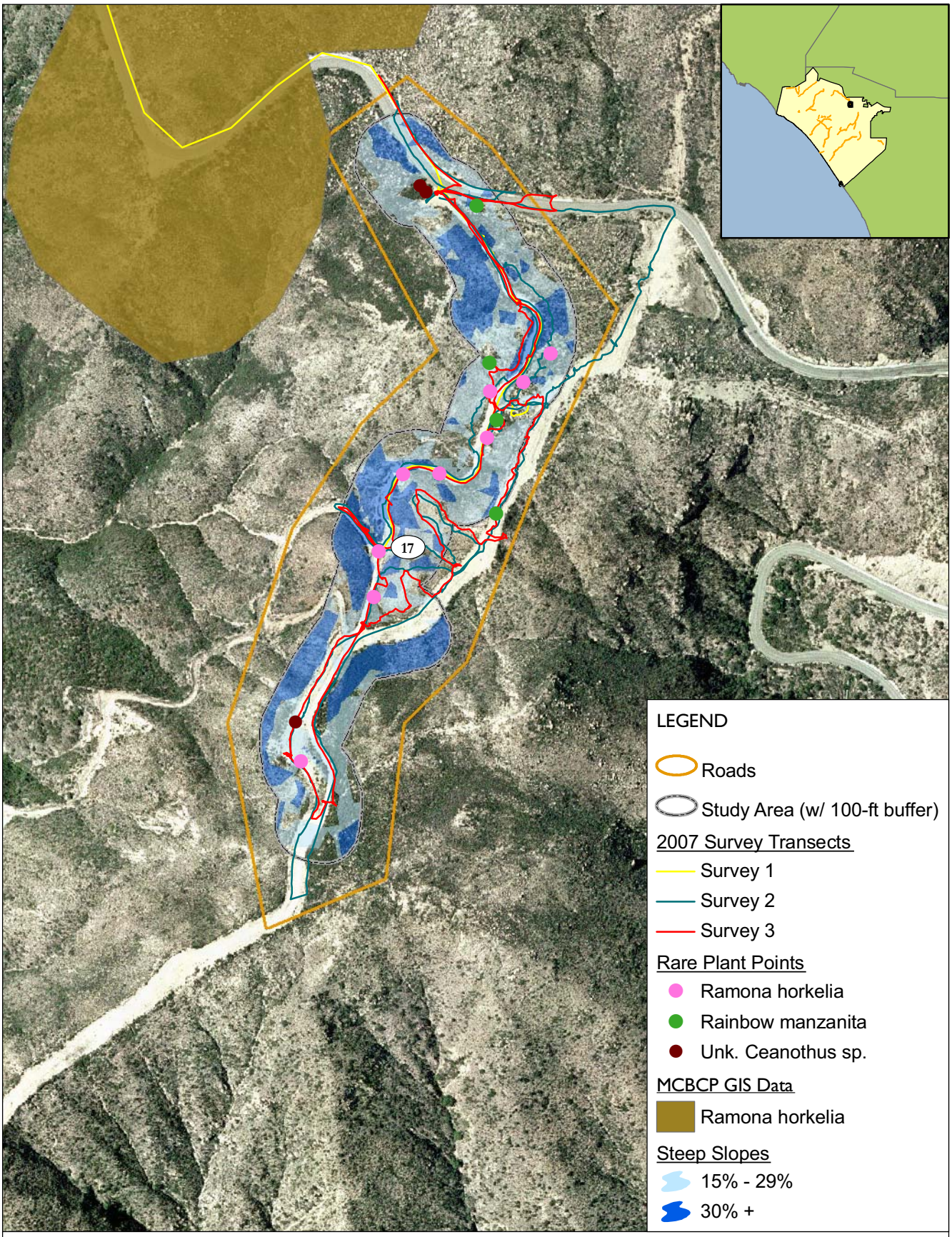
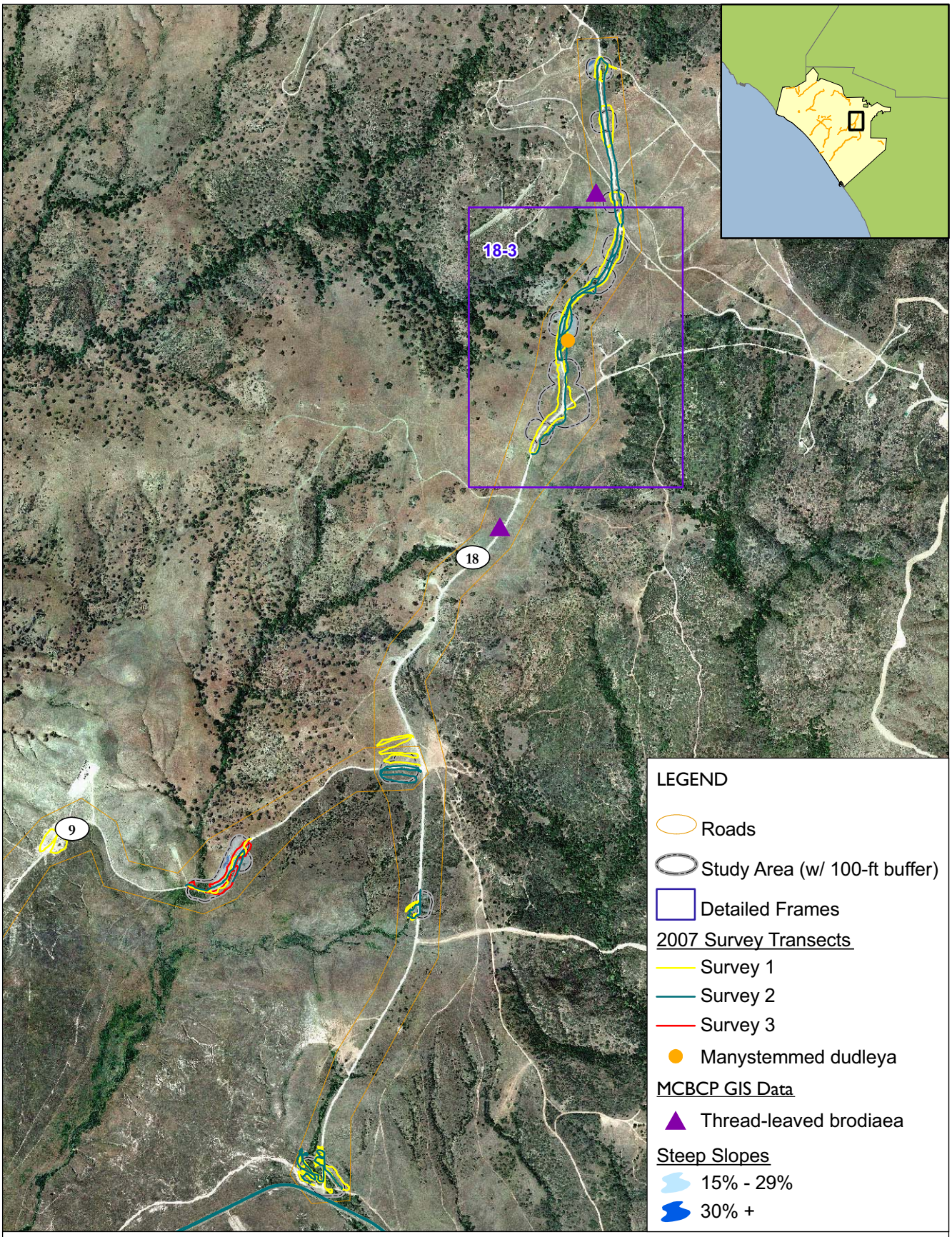
Figure 17-0
Road 17; Overview
Rare Plant Survey Transects



0 Meters 80

0 220 Feet

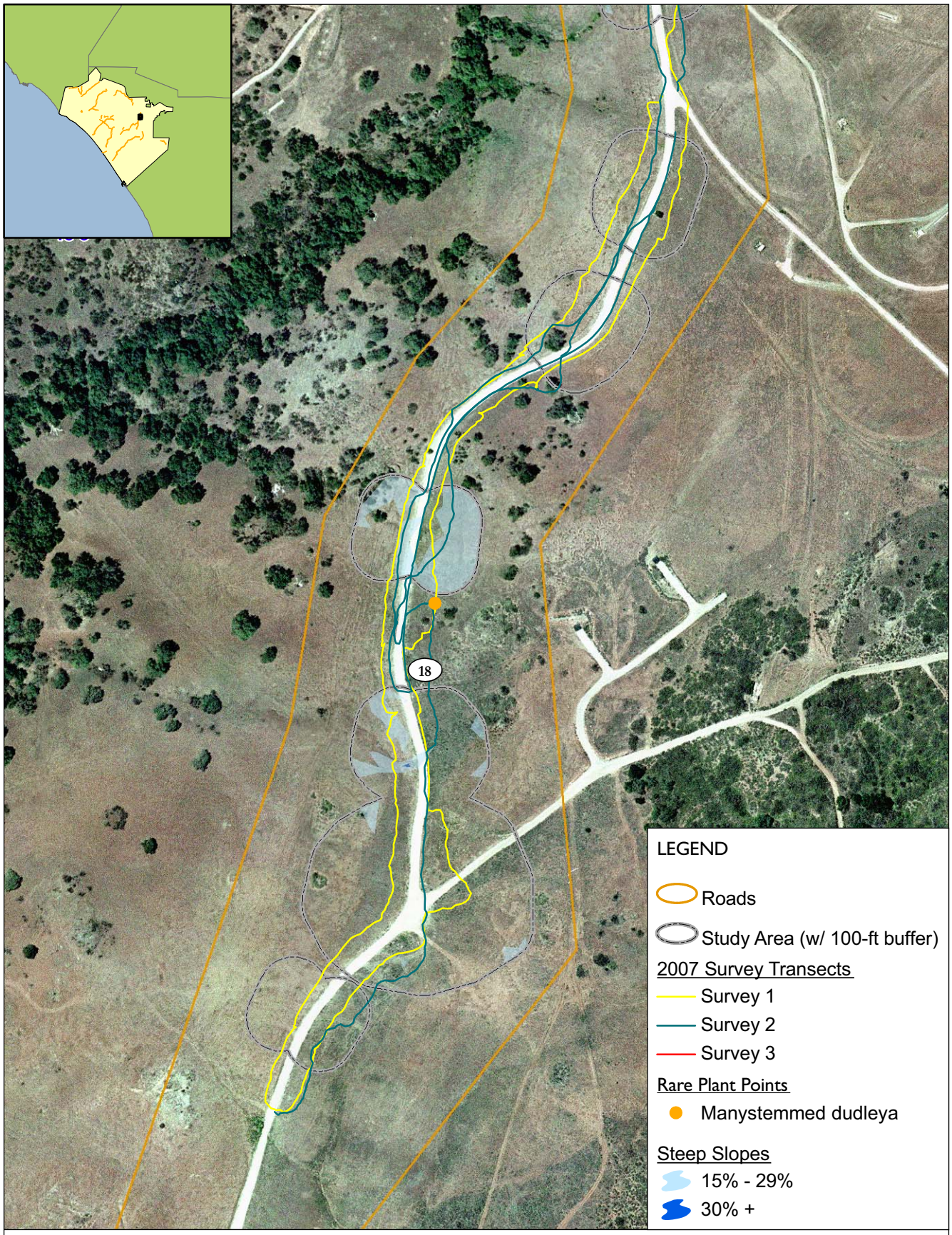
Figure 17-1
Road 17; Inset
Rare Plant Survey Transects



0 Meters 180

0 620 Feet

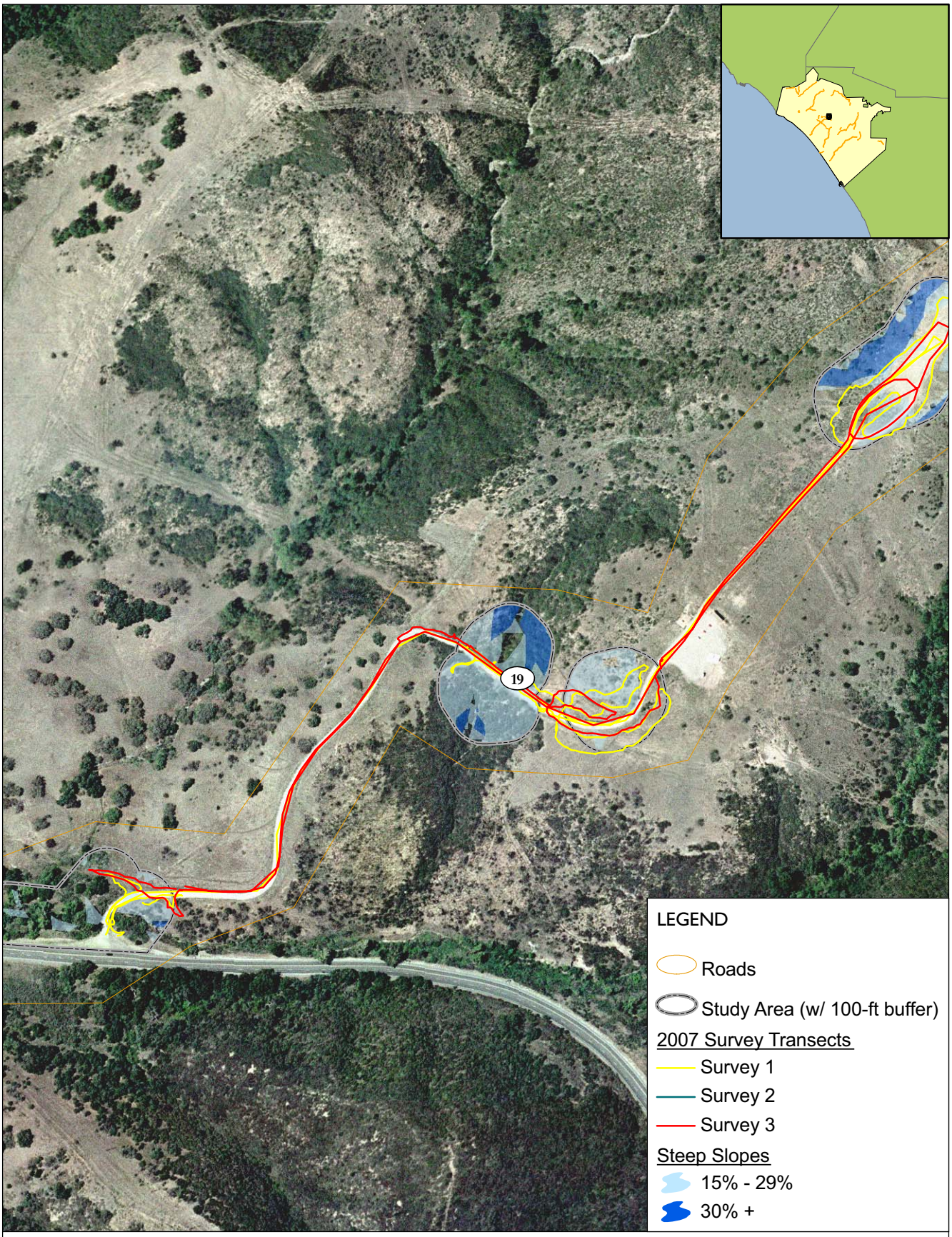
Figure 18-0
Road 18; Overview
Rare Plant Survey Transects



0 Meters 40

0 140 Feet

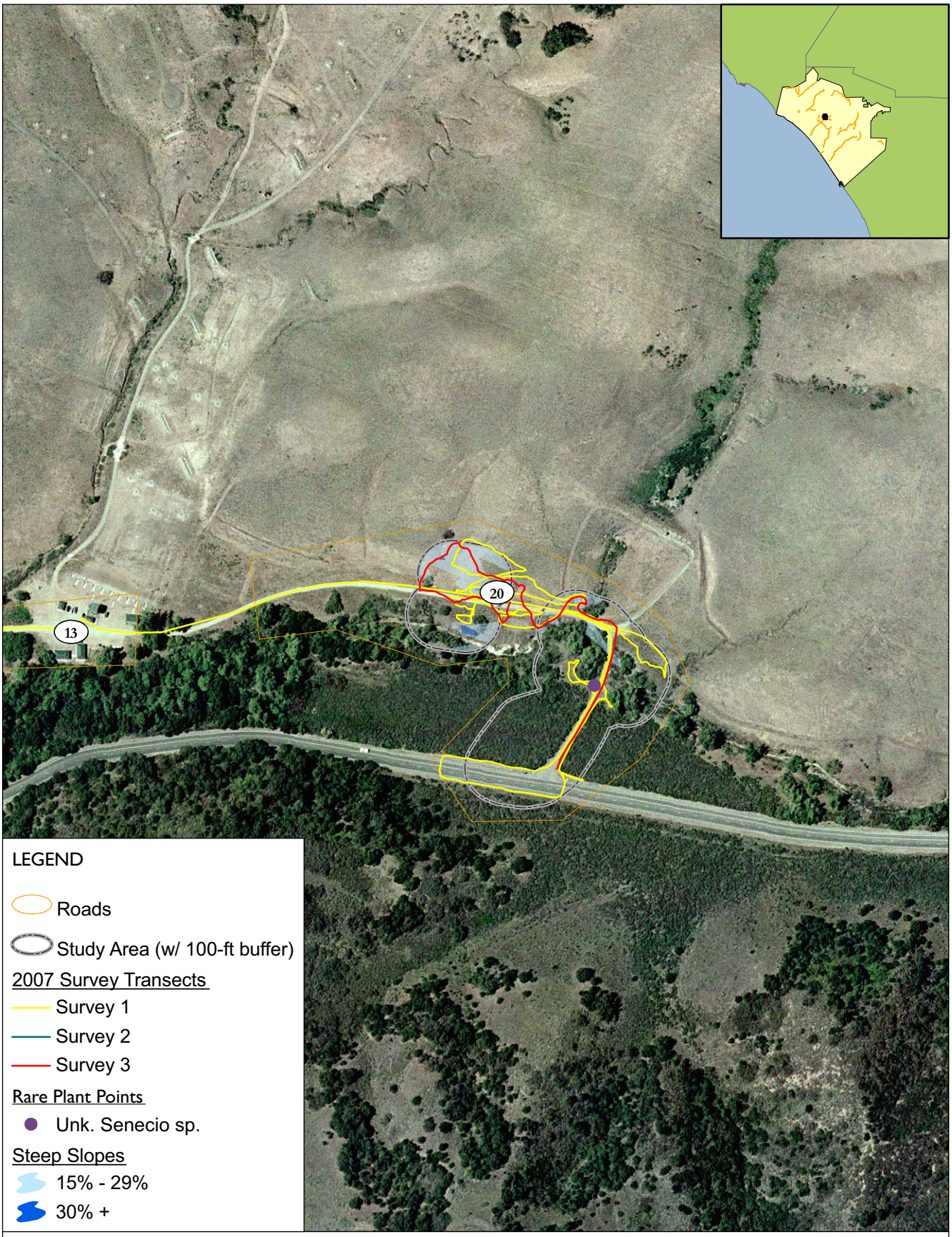
Figure 18-3
Road 18; Inset
Rare Plant Survey Transects



0 Meters 40

0 150 Feet

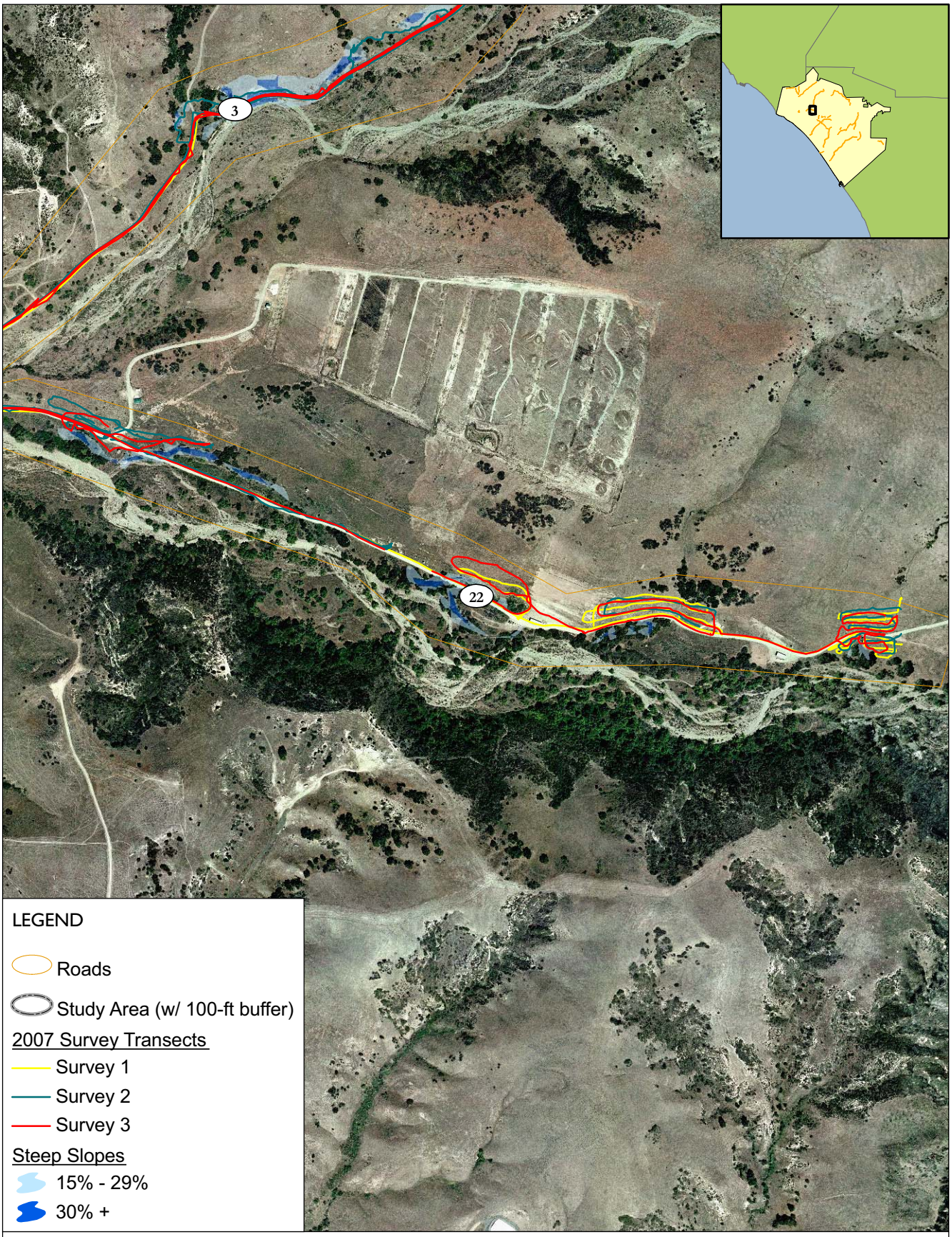
Figure 19-0
Road 19; Overview
Rare Plant Survey Transects



0 Meters 40

0 150 Feet

Figure 20-0
Road 20; Overview
Rare Plant Survey Transects



0 Meters 80

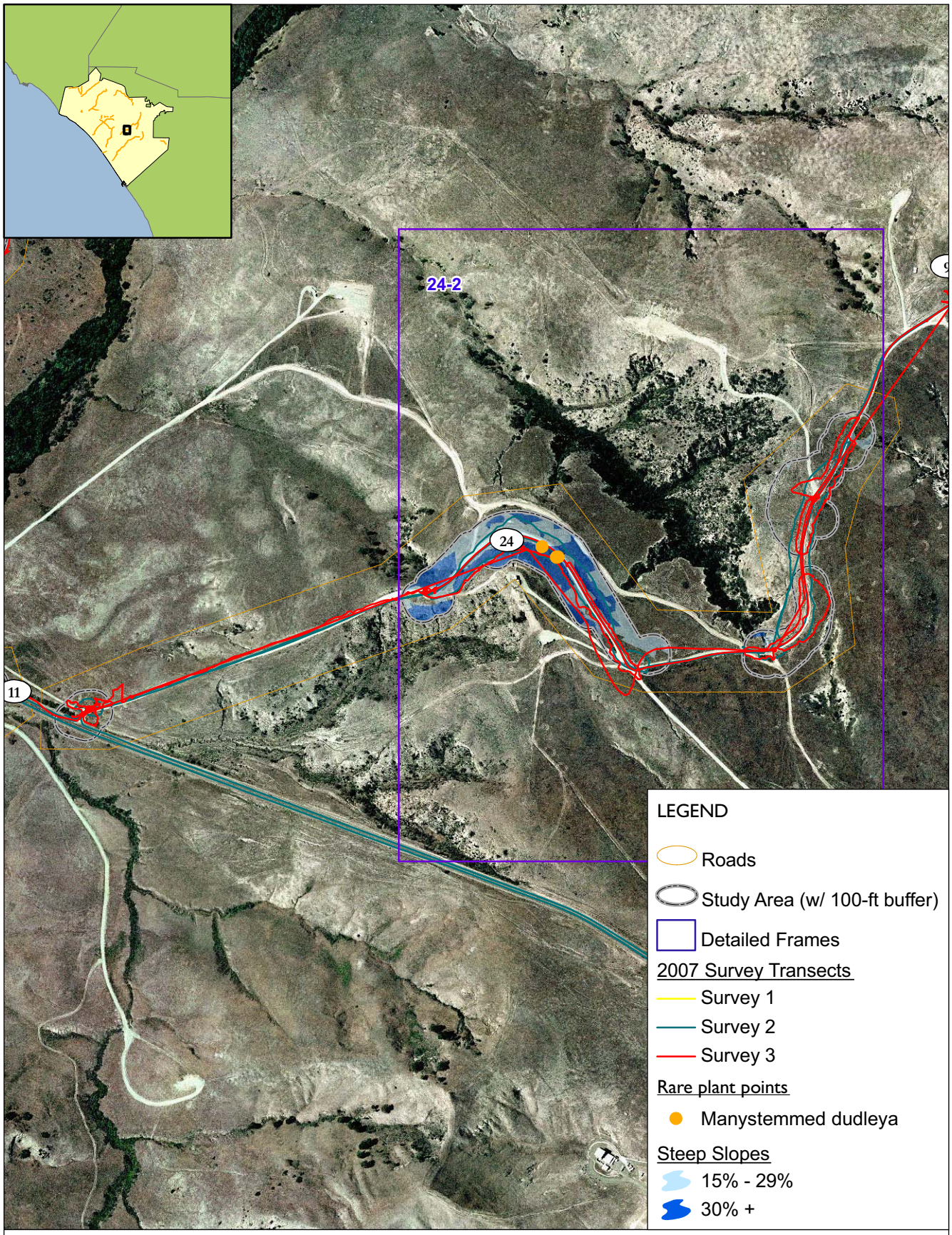
0 300 Feet

Figure 22-0
Road 22; Overview
Rare Plant Survey Transects

0 Meters 40

0 150 Feet

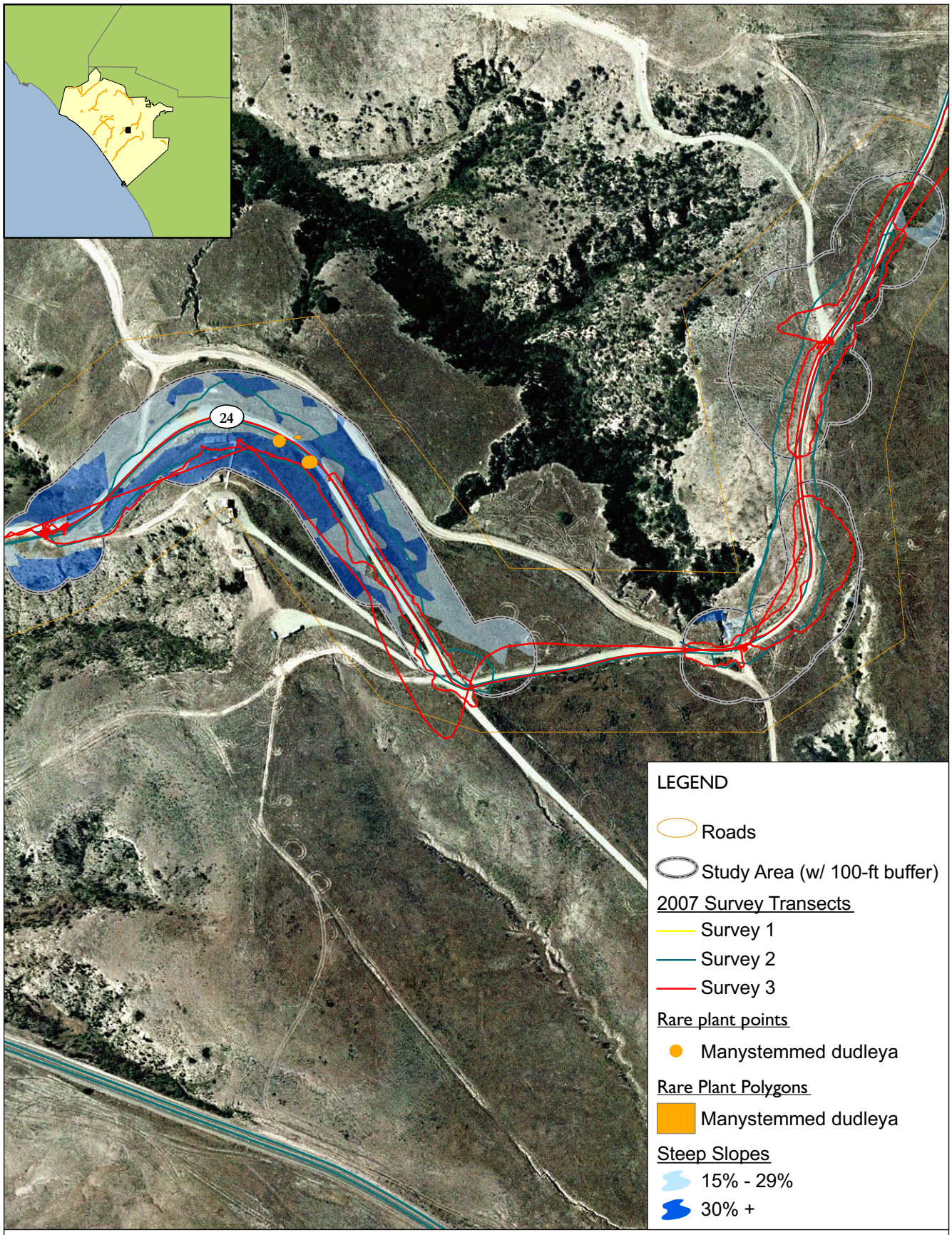
Figure 23-0
Road 23; Overview
Rare Plant Survey Transects



0 Meters 80

0 280 Feet

Figure 24-0
Road 24; Overview
Rare Plant Survey Transects



0 Meters 40

0 140 Feet

Figure 24-2
Road 24; Inset
Rare Plant Survey Transects

APPENDIX B

SPECIAL STATUS PLANT SPECIES KNOWN TO OCCUR OR POTENTIALLY OCCURING ON CAMP PENDLETON

Appendix B. Special Status Plant Species Known to Occur or Potentially Occuring on Camp Pendleton

(Page 1 of 7)

(**Bold** indicates known occurrence on Camp Pendleton)

I. Federally-Listed or Candidate Threatened or Endangered Species				
Species Name	**Common Name**	**Status Fed/CA/CNPS**	**Habitat**	**Life Form, Blooming Period**
Acanthomintha ilicifolia	San Diego thorn-mint	T/E/1B.1	chaparral, coastal scrub, grassland, vernal pools; clay	annual herb, Apr-Jun
Ambrosia pumila	San Diego ambrosia	E/-/1B.1	chaparral, coastal scrub, grassland, vernal pools; often in disturbed areas	perennial herb (rhizomatous), Apr-Oct
Arctostaphylos glandulosa ssp. *crassifolia*	Del Mar manzanita	E/-/1B.1	maritime chaparral; sandy	evergreen shrub, Dec-Apr
Baccharis vanessae	Encinitas baccharis	T/E/1B.1	maritime chaparral; sandstone	deciduous shrub, Aug-Nov
Brodiaea filifolia	**thread-leaved brodiaea**	**T/E/1B.1**	**chaparral (openings), cismontane woodland, coastal scrub, playas, grassland, vernal pools; often clay**	**bulbiferous herb, Mar-Jun**
Eryngium aristulatum* var. *parishii	**San Diego button-celery**	**E/E/1B.1**	**coastal scrub, grassland, vernal pools; mesic**	**annual/perennial herb, Apr-Jun**
Navarretia fossalis	**spreading navarretia**	**T/-/1B.1**	**chenopod scrub, marshes and swamps (assorted shallow freshwater), playas, vernal pools**	**annual herb, Apr-Jun**
Phacelia stellaris	**Brand's phacelia**	**C/-/1B.1**	**coastal dunes, coastal scrub**	**annual herb, Mar-Jun**

Special Status Plant Species Known to Occur or Potentially Occurring on Camp Pendleton
(Page 2 of 7)
(**Bold** indicates known occurrence on Camp Pendleton)

CA-listed and Species included on CNPS Lists 1B and 2				
Species Name	**Common Name**	**Status Fed/CA/CNPS**	**Habitat**	**Life Form, Blooming Period**
Adolphia californica	California adolphia	-/-/2.1	chaparral, coastal scrub, grassland	deciduous shrub, Dec-May
Aphanisma blitoides	Aphanisma	-/-/1B.1	coastal bluffs, coastal dunes, coastal scrub (sandy)	annual herb, Mar-Jun
Arctostaphylos rainbowensis	**Rainbow manzanita**	**-/-/1B.1**	**chaparral**	**evergreen shrub, Jan-Feb**
Atragalus tener var. *titi*	coastal dunes milk-vetch	-/-/1B.1	coastal bluff scrub, coastal dunes, coastal prairie	perennial herb, Mar-May
Atriplex coulteri	**Coulter's saltbush**	**-/-/1B.1**	**coastal bluff scrub, coastal dunes, coastal scrub, grassland (clay)**	**perennial herb, Mar-Oct**
Atriplex pacifica	South Coast saltscale	-/-/1B.1	coastal bluff scrub, coastal dunes, coastal scrub, playas	annual herb, Mar-Oct
Atriplex serenana var. *davidsonii*	Davidson's saltscale	-/-/1B.2	coastal bluff scrub, coastal scrub; alkaline	annual herb, Apr-Oct
Brodiaea orcuttii	**Orcutt's brodiaea**	**-/-/1B.1**	**chaparral, woodland, meadows/seeps, grassland, vernal pools; clay, serpentinite**	**bulbiferous herb, May-Jul**
Ceanothus verrucosus	wart-stemmed ceanothus	-/-/ 2.2	chaparral	evergreen shrub, Dec-May
Centromadia parryi ssp. *australis*	southern tarplant	-/-/1B.1	marshes and swamps (margins), grassland (mesic), vernal pools	annual herb, May-Nov
Centromadia pungens ssp. *laevis*	smooth tarplant	-/-/1B.1	chenopod scrub, meadows and seeps, playas, riparian woodland, grassland; alkaline	annual herb, Apr-Sep
Chaenactis glabriuscula var. *orcuttiana*	Orcutt's pincushion	-/-/1B.1	coastal bluff scrub (sandy), coastal dunes	annual herb, Jan-Aug
Chorizanthe polygonoides var. *longispina*	long-spined spineflower	-/-/1B.2	chaparral, coastal scrub, meadows and seeps, grassland; often clay	annual herb, Apr-Jul
Comarostaphylis diversifolia* ssp. *diversifolia	**summer holly**	**-/-/1B.2**	**chaparral**	**evergreen shrub, Apr-Jun**
Coreopsis maritima	**sea dahlia**	**-/-/2.2**	**coastal bluff scrub, coastal scrub**	**perennial herb, Mar-May**
Dudleya blochmaniae* ssp. *blochmaniae	**Blochman's dudleya**	**-/-/1B.1**	**coastal bluff scrub, chaparral, coastal scrub, grassland; rocky, often clay or serpentinite**	**perennial herb, Apr-Jun**

Special Status Plant Species Known to Occur or Potentially Occurring on Camp Pendleton (Page 3 of 7)

(**Bold** indicates known occurrence on Camp Pendleton)

CA-listed and Species included on CNPS Lists 1B and 2				
Species Name	**Common Name**	**Status Fed/CA/CNPS**	**Habitat**	**Life Form, Blooming Period**
Dudleya multicaulis	**many-stemmed dudleya**	**-/-/1B.2**	**chaparral, coastal scrub, grassland; often clay**	**perennial herb, Apr-Jul**
Dudleya variegata	variegated dudleya	-/-/1B.2	chaparral, cismontane woodland, coastal scrub, grassland, vernal pools/clay	perennial herb, May-Jun
Dudleya viscida	**sticky dudleya**	**-/-/1B.2**	**coastal bluff scrub, chaparral, coastal scrub; rocky**	**perennial herb, May-Jun**
Eryngium pendletonense	**Pendleton button-celery**	**-/-/1B.1**	**coastal bluff scrub, grassland, vernal pools; clay, vernally mesic**	**perennial herb, Apr-Jun**
Euphorbia misera	cliff spurge	-/-/2.2	coastal bluff scrub, coastal scrub; rocky	shrub, Dec-Aug
Horkelia cuneata ssp. *puberula*	mesa horkelia	-/-/1B	chaparral, cismontane woodland, coastal scrub; sandy or gravelly. Believed extirpated from San Diego County.	perennial herb, Feb-Sep
Horkelia truncata	**Ramona horkelia**	**-/-/1B.3**	**chaparral, cismontane woodland; clay**	**perennial herb, May-Jun**
Lasthenia glabrata ssp. *coulteri*	Coulter's goldfields	-/-/1B.1	marshes and swamps (coastal salt), playas, vernal pools	annual herb, Feb-Jun
Lotus nuttallianus	**Nuttall's lotus**	**-/-/1B.1**	**coastal dunes, coastal scrub; sandy**	**annual herb, Mar-Jun**
Monardella hypoleuca* ssp. *lanata	**felt-leaved monardella**	**-/-/1B.2**	**chaparral, cismontane woodland**	**perennial herb (rhizomatous), Jun-Aug**
Nama stenocarpum	mud nama	-/-/2.2	marshes and swamps; lake margins, riverbanks	annual/perennial herb, Jan-Jul
Navarretia prostrata	prostrate navarretia	-/-/1B.1	coastal scrub, meadows, grassland, vernal pools	annual herb, Apr-Jul
Nemacaulis denudata* var. *denudata	**coastal wooly heads**	**-/-/1B.2**	**coastal dunes**	**annual herb, Apr-Sep**
Nemacaulis denudata var. *gracilis*	slender wooly heads	-/-/2.2	coastal dunes	annual herb, Mar-May
Quercus dumosa	**Nuttall's scrub oak**	**-/-/1B.1**	**closed-cone forest, chaparral, coastal scrub/sandy, clay loam**	**evergreen shrub, Feb-Apr**

Special Status Plant Species Known to Occur or Potentially Occurring on Camp Pendleton
(Page 4 of 7)
(**Bold** indicates known occurrence on Camp Pendleton)

CA-listed and Species included on CNPS Lists 1B and 2				
Species Name	**Common Name**	**Status Fed/CA/CNPS**	**Habitat**	**Life Form, Blooming Period**
Satureja chandleri	**San Miguel savory**	**-/-/1B.2**	**chaparral, cismontane woodland, coastal scrub, riparian woodland, grassland; rocky, gabbroic or metavolcanic**	**perennial herb, Mar-Jul**
Suaeda esteroa	estuary seablite	-/-/1B.2	marshes and swamps (coastal salt)	perennial herb, May-Jan
Tetracoccus dioicus	Parry's tetracoccus	-/-/1B.2	chaparral, coastal scrub	deciduous shrub, Apr-May

Special Status Plant Species Known to Occur or Potentially Occurring on Camp Pendleton
(Page 5 of 7)
(**Bold** indicates known occurrence on Camp Pendleton)

Species Included on CNPS Lists 3 and 4				
Species Name	**Common Name**	**Status Fed/CA/CNPS**	**Habitat**	**Life Form, Blooming Period**
Abronia maritima	**red sand-verbena**	**-/-/4.2**	**coastal Dunes**	**perennial herb Feb-Nov**
Artemisia palmeri	San Diego sagewort	-/-/4.2	chaparral, coastal scrub riparian scrub, riparian woodland; sandy, mesic	deciduous shrub, May-Sep
Asplenium vespertinum	western spleenwort	-/-/4.2	chaparral, cismontane woodland, coastal scrub; rocky	perennial herb (rhizomatous), fertile Feb-Jun.
Azolla mexicana	Mexican mosquito fern	-/-/4.2	marshes and swamps (ponds, slow water)	annual/perennial herb, fertile Aug
Calandrinia breweri	Brewer's calandrinia	-/-/4.2	chaparral, coastal scrub; sandy or loamy; disturbed sites and burns	annual herb, Mar-Jun
Calandrinia maritima	**seaside calandrinia**	**-/-/4.2**	**coastal bluff scrub, coastal scrub, grassland; sandy**	**annual herb, Feb-Aug**
Camissonia lewisii	Lewis's evening primrose	-/-/3	coastal bluff scrub, cismontane woodland, coastal dunes, coastal scrub, grassland; sandy or clay	annual herb, Mar-Jun
Caulanthus simulans	**Payson's jewel-flower**	**-/-/4.2**	**chaparral, coastal scrub; sandy, granitic**	**annual herb, Feb-Jun**
Chamaebatia australis	**southern mountain misery**	**-/-/4.2**	**chaparral (gabbroic or metavolcanic)**	**evergreen shrub, Nov-May**
Convolvulus simulans	small-flowered morning-glory	-/-/4.2	chaparral (openings) coastal scrub, grassland; clay, serpentine seeps	annual herb, Mar-Jun
Deinandra paniculata	**paniculate tarplant**	**-/-/4.2**	**coastal scrub, grassland; usually vernally mesic**	**annual herb, Apr-Nov**
Dichondra occidentalis	**western dichondra**	**-/-/4.2**	**chaparral, cismontane woodland, coastal scrub, grassland**	**perennial herb (rhizomatous), Mar-Jun**
Harpagonella palmeri	**Palmer's grapplinghook**	**-/-/4.2**	**chaparral, coastal scrub, grassland,**	**annual herb, Mar-May**
Hordeum intercedens	**vernal barley**	**-/-/3.2**	**coastal dunes, coastal scrub, saline flats and depressions in grassland, vernal pools**	**annual herb, Mar-Jun**

Special Status Plant Species Known to Occur or Potentially Occurring on Camp Pendleton
(Page 6 of 7)
(**Bold** indicates known occurrence on Camp Pendleton)

CNPS List 3 and List 4 Species				
Species Name	**Common Name**	**Status Fed/CA/CNPS**	**Habitat**	**Life Form, Blooming Period**
Juglans californica	Southern California black walnut	-/-/4.2	chaparral, cismontane woodland, coastal scrub; alluvial	deciduous tree, Mar-Aug
Juncus acutus* ssp. *leopoldii	**southwestern spiny rush**	**-/-/4.2**	**coastal dunes (mesic), meadows and seeps (alkaline seeps), marshes and swamps (coastal salt)**	**perennial herb (rhizomatous), May-Jun**
Lilium humboldtii* ssp. *ocellatum	**ocellated Humboldt lily**	**-/-/4.2**	**chaparral, cismontane woodland, coastal scrub, lower montane coniferous forest, riparian woodland; openings**	**perennial herb (bulbiferous), Mar-Jul**
Lycium californicum	California box-thorn	-/-/4.2	coastal bluff scrub, coastal scrub	shrub, Mar-Aug
Microseris douglasii var. *platycarpha*	small-flowered microseris	-/-/4.2	cismontane woodland, coastal scrub, grassland, vernal pools; clay	annual herb, Mar-May
Mucronea californica	California spineflower	-/-/4.2	chaparral, cismontane woodland, coastal dunes, coastal scrub, grassland; sandy	annual herb, Mar-Aug
Myosurus minimus* ssp. *apus	**little mouse tail**	**-/-/3.1**	**grassland, vernal pools (alkaline)**	**annual herb, Mar-Jun**
Ophioglossum californicum	California adder's-tongue	-/-/4.2	chaparral, grassland, margins of vernal pools; mesic	perennial herb (rhizomatous), fertile Dec-Jun
Orobanche parishii ssp. *brachyloba*	short-lobed broomrape	-/-/4.2	coastal bluff scrub, coastal dunes, coastal scrub; sandy	parasitic perennial herb, Apr-Oct
Pentachaeta aurea	golden-rayed pentachaeta	-/-/4.2	cismontane woodland, coastal scrub, lower montane coniferous forest, grassland	annual herb, Mar-Jul
Piperia cooperi	chaparral rein orchid	-/-/4.2	chaparral, cismontane woodland, grassland	perennial herb, Mar-Jun
Polygala cornuta* var. *fishiae	**Fish's milkwort**	**-/-/4.3**	**chaparral, cismontane woodland, riparian woodland**	**deciduous shrub, May-Aug**
Quercus engelmannii	**Engelmann oak**	**-/-/4.2**	**chaparral, cismontane woodland, riparian woodland, grassland,**	**deciduous tree, Mar-Jun**
Romneya coulteri	**Coulter's matilija poppy**	**-/-/4.2**	**chaparral, coastal scrub; often in burns**	**perennial herb (rhizomatous), Mar-Jul**

Special Status Plant Species Known to Occur or Potentially Occurring on Camp Pendleton
(Page 7 of 7)

(**Bold** indicates known occurrence on Camp Pendleton)

CNPS Lists 3 and 4 Species

Species Name	Common Name	Status Fed/CA/CNPS	Habitat	Life Form, Blooming Period
Suaeda taxifolia	**woolly seablite**	**-/-/4.2**	**coastal bluff scrub, coastal dunes, marshes and swamps; margins of coastal salt marshes**	**evergreen shrub, Jan-Dec**
Viguiera laciniata	**San Diego County viguiera**	**-/-/4.2**	**chaparral, coastal scrub**	**shrub, Feb-Jun**

Status:

Federal Status (determined by U. S. Fish and Wildlife Service):

E - Endangered. In danger of extinction throughout all or a significant portion of its range.
T - Threatened. Likely-become an endangered species within the foreseeable future throughout all or a significant portion of its range.
C – Candidate for listing as threatened or endangered.

CA Status (determined by California Department of Fish and Game):

E - CA listed as Endangered
T - CA listed as Threatened

California Native Plant Society List (CNPS) List:

1B - Plants considered rare or endangered in California and elsewhere
2 - Plants considered rare or endangered in California but more common elsewhere.
3 - Plants for which more information is needed.
4 - Plants of limited distribution – a watch list.

CNPS Threat Codes

.1 - Seriously endangered in California (over 80% of occurrences threatened / high degree and immediacy of threat)
.2 – Fairly endangered in California (20-80% occurrences threatened)
.3 – Not very endangered in California (<20% of occurrences threatened or no current threats known)

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APPENDIX C
PLANT LIST

Appendix C. Plant List

Group	Family	Spp	Common	Roads 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Equisetophytes																											
	Equisetaceae	*Equisetum telmateia ssp. braunii*	Giant Horsetail								X																
Eudicots																											
	Adoxaceae	*Sambucus mexicana*	Blue Elderberry	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Aizoaceae	*Carpobrotus chilensis*	Sea-fig			X		X			X															X	X
		Mesembryanthemum nodiflorum	Slender-Leaf Iceplant								X																
	Amaranthaceae	*Atriplex leucophylla*	Seascale, Beach Saltbush								X																
		Atriplex semibaccata	Australian Saltbush		X		X	X	X	X									X						X	X	X
		Chenopodium californicum	California Goosefoot				X	X	X																	X	X
		Chenopodium murale	Nettle-Leaf Goosefoot								X																
		Salsola tragus	Prickly Russian-thistle	X	X	X		X	X	X	X				X	X		X	X		X	X	X	X	X	X	X
	Anacardiaceae	*Lomatium dasycarpum ssp. dasycarpum*	Woolly-Fruit Lomatium										X							X							
		Lomatium lucidum	Shiny Lomatium			X										X						X	X	X			
		Malosma laurina	Laurel Sumac	X	X	X		X	X	X			X		X	X	X	X	X	X	X	X	X	X	X	X	X
		Rhus integrifolia	Lemonadeberry		X	X	X	X	X	X	X				X	X	X	X	X			X	X	X		X	X
		Rhus ovata	Sugar Bush										X							X							
		Schinus molle	Peruvian Pepper Tree					X	X																	X	X
		Toxicodendron diversilobum	Western Poison-oak	X	X		X	X	X	X	X				X		X	X	X							X	X
	Apiacaeae	*Conium maculatum*	Poison Hemlock	X		X	X	X	X		X	X			X	X		X			X	X	X	X		X	X
		Daucus pusillus	Rattlesnake Weed			X	X	X	X	X	X				X	X		X				X	X	X		X	X
		Foeniculum vulgare	Sweet Fennel	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X		X	X	X	X	X	X	X
	Apiaceae	*Apium graveolens*	Common Celery								X																

Group	Family	Spp	Common	Roads 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Eudicots																											
	Apiaceae	*Sanicula arguta*	Sharp-Tooth Sanicle				X														X						
	Apocynaceae	*Asclepias californica*	California/Round-Hood Milkweed										X							X							
		Asclepias fascicularis	Narrow-leaf Milkweed					X	X			X									X				X	X	X
	Asteraceae	*Achillea millefolium*	Yarrow, Milfoil				X																				
		Ambrosia confertiflora	Weak-Leaf Bur-Sage				X	X	X																	X	X
		Ambrosia psilostachya	Western Ragweed	X	X	X	X	X	X	X	X	X		X	X	X			X		X	X	X	X	X	X	X
		Artemisia californica	Coastal Sagebrush	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		Artemisia douglasiana	Mugwort	X			X	X	X		X	X			X		X									X	X
		Artemisia dracunculus	Tarragon, Dragon Sagewort												X												
		Baccharis pilularis	Coyote Brush		X		X	X	X	X	X			X	X		X	X	X		X				X	X	X
		Baccharis salicifolia	Mule-fat			X	X	X	X	X	X	X	X	X	X	X	X	X		X		X	X	X	X	X	X
		Baccharis sarothroides	Broom Baccharis																		X						
		Brickellia californica	California Brickellbush					X	X																X	X	X
		Carduus pycnocephalus	Italian Thistle			X	X	X							X	X		X				X	X	X		X	X
		Centaurea melitensis	Tecalote	X	X		X	X	X	X		X	X	X	X			X	X	X	X					X	X
		Chaenactis artemisiifolia	White Pincushion	X																							
		Chaenactis glabriuscula var. glabriuscula	Yellow Pincushion	X																							
		Chrysanthemum coronarium	Garland Chrysanthemum					X	X									X								X	X
		Cirsium occidentale	California Thistle			X										X						X	X				
		Conyza canadensis	Horseweed				X	X	X																	X	X

Group	Family	Spp	Common	Roads 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Eudicots																											
	Asteraceae	*Corethrogyne filaginifolia var. filaginifolia*	Common Sand-Aster	X	X	X	X	X	X	X		X	X	X	X	X		X		X	X	X	X	X	X	X	X
		Cotula australis	Australian Brass-Buttons										X							X							
		Cotula coronopifolia	African Brass-Buttons	X							X																
		Cynara cardunculus	Artichoke Thistle											X													
		Deinandra fasciculata	Fascicled Tarweed	X	X	X	X	X	X			X	X	X	X	X			X	X	X	X	X	X	X	X	X
		Encelia californica	Bush Sunflower					X	X																	X	X
		Ericameria palmeri var. pachylepis	Palmer's Goldenbush																		X						
		Erigeron foliosus var. foliosus	Leafy Daisy																		X						
		Eriophyllum confertiflorum var. confertiflorum	Long-Stem Golden-Yarrow	X		X	X	X	X				X		X	X		X		X	X	X	X	X		X	X
		Filago gallica	Narrow-Leaf Filago	X			X						X							X	X						
		Gnaphalium californicum	California Everlasting	X	X		X	X	X			X	X						X	X	X					X	X
		Gnaphalium luteo-album	Everlasting Cudweed										X							X							
		Gnaphalium stramineum	Cotton-Batting Plant				X																				
		Grindelia camporum var. bracteosa	Rayless Gumplant		X	X		X	X			X	X	X	X	X			X	X	X	X	X	X	X	X	X
		Hazardia squarrosa var. grindelioides	Southern Sawtooth Goldenbush		X	X							X		X	X		X	X	X	X	X	X	X			
		Hedypnois cretica	Crete Hedypnois	X	X	X	X	X	X		X	X	X			X			X	X	X	X	X	X		X	X
		Helianthus gracilentus	Slender Sunflower			X				X			X			X				X		X	X				
		Heterotheca grandiflora	Telegraph Weed	X	X		X	X	X	X		X	X		X			X	X	X	X				X	X	X

Group	Family	Spp	Common	Roads 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Eudicots																											
	Asteraceae	*Hypochaeris glabra*	Smooth Cat's Ear				X	X	X				X							X	X					X	X
		Isocoma menziesii	Goldenbush	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X
		Jaumea carnosa	Salty Susan, Fleshy Jaumea								X																
		Lactuca serriola	Prickly Lettuce	X		X	X	X	X							X					X	X	X	X		X	X
		Lasthenia gracilis	Common Goldfields																		X						
		Lepidospartum squamatum	Scale-Broom	X			X																				
		Matricaria matricarioides	Common Pineapple-Weed	X			X	X	X																	X	X
		Osmadenia tenella	Osmadenia	X		X										X					X	X	X	X			
		Osteospermum fruticosum	Trailing African Daisy		X														X								
		Picris echioides	Bristly Ox-Tongue	X	X						X		X	X					X	X							
		Pluchea sericea	Arrow Weed								X																
		Pseudognaphalium biolettii	Bicolor Cudweed	X			X																				
		Pseudognaphalium canescens	Everlasting Cudweed										X							X							
		Pseudognaphalium spp.	Everlasting			X										X						X	X	X			
		Senecio sp.	Unknown Senecio			X				X						X						X	X	X			
		Senecio vulgaris	Common Groundsel	X			X																				
		Solidago californica	California Goldenrod			X										X		X				X	X	X			
		Sonchus asper ssp. asper	Prickly Sow-Thistle	X				X	X				X	X				X		X	X					X	X
		Sonchus oleraceus	Common Sow-thistle		X		X	X	X		X		X		X			X	X	X	X					X	X
		Venegasia carpesioides	Jesuit Flower					X	X				X							X						X	X

Group	Family	Spp	Common	Roads 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Eudicots																											
	Asteraceae	*Xanthium strumarium*	Cockebur				X	X	X		X							X								X	X
	Boraginaceae	*Amsinckia menziesii*	Fiddleneck					X	X								X									X	
		Cryptantha muricata	Prickly Cryptantha										X							X							
		Plagiobothrys collinus var. fulvescens	Rough Popcornflower										X							X							
		Plagiobothrys nothofulvus	Rusty Popcornflower										X							X							
	Brassicaceae	*Brassica nigra*	Black Mustard	X	X		X			X		X		X	X				X								
		Cakile maritima	European Sea Rocket								X																
		Hirschfeldia incana	Short-pod Mustard	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		Raphanus sativus	Wild Radish	X				X	X		X				X						X					X	X
		Rorippa nasturtium-aquaticum	Water-Cress								X																
		Sisymbrium orientale	Hare's-Ear Cabbage								X																
	Cactaceae	*Cylindropuntia prolifera*	Coast Cholla					X	X																	X	X
		Opuntia littoralis	Coast Prickly-pear			X		X	X	X		X			X	X			X			X	X	X	X	X	X
		Opuntia oriocola	Chaparral Prickly-Pear			X										X						X	X	X			
	Caprifoliaceae	*Lonicera subspicata*	Honeysuckle							X																	
		Lonicera subspicata var. denudata	Johnston's Honeysuckle				X	X	X		X															X	X
		Lonicera subspicata var. subspicata	Southern Honeysuckle				X																				
	Caryophyllaceae	*Silene gallica*	Common Catchfly					X	X																	X	X
		Spergularia bocconi	Boccone's Sand-Spurry	X								X													X		

Group	Family	Spp	Common	Roads 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Eudiots																											
	Citaceae	*Helianthemum scoparium*	Peak Rush-Rose										X							X							
	Convolvulaceae	*Calystegia macrostegia ssp. arida*	Southern California Morning-Glory		X	X	X	X	X	X		X	X	X	X	X			X	X	X	X	X	X	X	X	X
		Calystegia macrostegia ssp. tenuifolia	San Diego Morning-Glory				X							X	X												
		Convolvulus arvensis	Field Bindweed					X	X		X	X		X												X	X
		Cuscuta californica var. breviflora	Short-Flower Chaparral Dodder					X	X																	X	X
	Crassulaceae	*Dudleya edulis*	Ladies' Fingers							X																	
		Dudleya lanceolata	Lance-Leaf Dudleya					X	X																	X	X
		Dudleya multicaulis	Many-Stem Dudleya		X														X		X						
		Dudleya pulverulenta	Chalk Dudleya							X																	
	Cucurbitaceae	*Cucurbita foetidissima*	Calabazilla			X		X	X	X					X	X		X				X	X	X		X	X
		Marah macrocarpus var. macrocarpus	Manroot, Wild-Cucumber				X	X	X	X					X											X	X
	Datiscaceae	*Datisca glomerata*	Durango Root			X	X	X	X	X	X		X		X	X		X		X		X	X	X		X	X
	Ericaceae	*Arctostaphylos glandulosa ssp. zacaensis*	Zaca Lake Manzanita										X							X							
		Arctostaphylos rainbowensis	Rainbow Manzanita										X							X							
	Euphorbiaceae	*Chamaesyce albomarginata*	White-Margin Sandmat							X																	
		Chamaesyce maculata	Spotted Spurge	X		X							X			X				X		X	X	X			
		Chamaesyce polycarpa	Small-Seed Sandmat					X	X																	X	X
		Croton setigerus	Doveweed			X				X		X	X			X				X	X	X	X	X	X		

Group	Family	Spp	Common	Roads 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Eudicots																											
	Euphorbiaceae	*Euphorbia lathyris*	Caper Spurge, Gopher Plant				X																				
		Ricinus communis	Castor Bean	X		X		X	X		X					X		X				X	X	X		X	X
	Fabaceae	*Astragalus trichopodus var. lonchus*	Ocean Locoweed					X	X	X					X											X	X
		Gleditsia triacanthos1	Honey-locust								X																
		Lathyrus sp.	Pea															X									
		Lathyrus vestitus var. alefeldii	San Diego Sweet Pea							X																	
		Lotus hamatus	Grab Lotus		X			X	X					X					X							X	X
		Lotus heermannii var. heermannii	Heermann's Lotus									X															
		Lotus purshianus	Spanish Clover	X	X	X	X	X	X		X	X	X		X	X			X	X	X	X	X	X	X	X	X
		Lotus scoparius var. scoparius	Coastal Deerweed	X	X	X	X	X	X	X		X	X			X	X	X	X	X	X	X	X	X		X	X
		Lupinus bicolor	Miniature Lupine				X																				
		Lupinus concinnus	Bajada Lupine										X							X							
		Lupinus excubitus var. austromontanus	Grape Soda Lupine							X			X					X		X	X						
		Lupinus hirsutissimus	Stinging Lupine				X																				
		Medicago polymorpha	California Burclover					X	X				X							X					X	X	X
		Medicago sativa	Alfalfa			X										X						X	X	X			
		Melilotus albus	White Sweetclover	X			X	X	X		X			X	X											X	X
		Melilotus indicus	Indian Sweetclover	X		X	X	X	X		X	X	X	X	X	X		X		X	X	X	X	X		X	X
		Pickeringia montana var. tomentosa	Hairy Chaparral-Pea										X							X							
	Fagaceae	*Quercus agrifolia var. agrifolia*	Coast Live Oak, Encina	X			X	X	X	X		X	X	X			X	X		X					X	X	X

Group	Family	Spp	Common	Roads 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Eudicots																											
	Fagaceae	*Quercus engelmanni*	Engelmann's Oak			X							X			X		X		X		X	X	X			
		Quercus wislizeni var. frutescens	Interior Live Oak										X							X							
		Quercus xacutidens	a hybrid Oak			X										X						X	X	X			
	Gentianaceae	*Swertia parryi*	Deer's Ears										X							X							
		Centaurium venustum	Canchalagua														X										
	Geraniaceae	*Erodium botrys*	Long-Beak Filaree	X	X	X	X			X		X	X	X		X	X	X	X	X	X	X	X	X	X		
		Erodium brachycarpum	Short-beak Filaree					X	X				X					X		X	X				X	X	X
		Erodium cicutarium	Red-stem Filaree		X	X	X	X	X	X			X	X	X	X	X	X	X	X	X	X	X	X		X	X
		Erodium moschatum	White-stem Filaree	X	X		X	X	X									X	X							X	X
		Geranium dissectum	Cut-leaf Geranium					X	X				X							X						X	X
	Grossulariaceae	*Ribes speciosum*	Fucshia-Flower Gooseberry				X	X	X	X																X	X
	Heliotropaceae	*Heliotropium curassavicum*	Salt Heliotrope			X					X					X						X	X	X			
	Hydrophyllaceae	*Emmenanthe penduliflora var. penduliflora*	Whispering Bells												X												
		Phacelia minor	Wild Canterbury-Bell										X							X							
	Hypericaceae	*Hypericum formosum var. scouleri*	Scouler's St. John's Wort										X							X							
	Lamiaceae	*Marrubium vulgare*	Horehound	X	X		X	X	X	X			X		X			X	X	X	X					X	X
		Salvia apiana	White Sage	X		X	X					X	X		X	X	X	X		X	X	X	X	X			
		Salvia clevelandii	Fragrant Sage										X							X							
		Salvia mellifera	Black Sage				X			X																	
		Salvia spathacea	Hummingbird Sage				X																				

Group	Family	Spp	Common	Roads 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Eudicots																											
	Lamiaceae	*Savia mellifera*	Black Sage					X	X																	X	X
		Stachys ajugoides var. rigida	Hedge-Nettle										X							X	X						
	Lythraceae	*Lythrum hyssopifolia*	Grass Poly	X																							
	Malvaceae	*Malacothamnus fasciculatus*	Bush Mallow	X	X			X	X																	X	X
		Malva parviflora	Cheeseweed		X			X	X						X				X							X	X
	Nyctaginaceae	*Mirabilis laevis var. crassifolia*	Coastal Wishbone Plant					X	X			X									X					X	X
		Sidalcea malviflora ssp. sparsifolia	Checker-Bloom				X						X	X						X	X				X		
	Onagraceae	*Camissonia hirtella*	Field Sun Cup										X							X							
		Clarkia bottae	Punchbowl Godetia				X																				
		Clarkia purpurea	Large Clarkia			X										X	X					X	X	X			
		Clarkia purpurea ssp. quadrivulnera	Four-Spot Clarkia				X						X					X		X							
		Epilobium canum ssp. canum	California Fuchsia									X													X		
		Epilobium ciliatum ssp. ciliatum	Willow Herb								X														X		
		Oenothera elata	Great Marsh Evening-Primrose										X							X							
	Orobanchaceae	*Castilleja affinis ssp. affinis*	Coast Paintbrush				X	X	X																	X	X
	Oxalidaceae	*Oxalis albicans ssp. californica*	California Wood-Sorrel				X	X	X																	X	X
	Papavaraceae	*Eschscholzia californica*	California Poppy	X				X	X	X							X									X	X
	Phrymacae	*Mimulus aurantiacus*	Monkey Flower			X	X	X	X				X		X	X	X	X		X	X	X	X	X		X	X
	Phrymaceae	*Mimulus cardinalis*	Scarlet Monkey Flower										X							X							

Group	Family	Spp	Common	Roads																							
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
		Mimulus guttatus	Seep Monkey Flower								X																
Eudicots																											
	Plantaginaceae	*Keckiella cordifolia*	Climbing Bush Penstemon				X	X	X						X											X	X
		Plantago coronopus	Cut-leaf Plantain				X	X	X			X	X							X						X	X
		Collinsia heterophylla	Chinese Houses				X																				
		Plantago erecta	Dot-Seed Plantain																		X						
		Plantago lanceolata	English Plaintain			X	X	X	X				X			X				X	X	X	X	X		X	X
	Platanaceae	*Platanus racemosa*	Western Sycamore	X		X	X	X	X	X	X		X		X	X				X		X	X	X		X	X
	Plumbaginaceae	*Limonium sinuatum*	Notch-leaf Marsh-rosemary					X	X																	X	X
	Polemoniaceae	*Navarretia hamata ssp. hamata*	Hooked Skunkweed										X							X							
	Polygonaceae	*Chorizanthe fimbriata var. fimbriata*	Fringed Spineflower	X								X															
		Eriogonum fasciculatum var. fasciculatum	Coast California Buckwheat	X		X	X	X	X	X		X	X		X	X		X		X	X	X	X	X		X	X
		Eriogonum fasciculatum var. foliolosum	Inland California Buckwheat					X	X																	X	X
		Eriogonum parvifolium	Bluff Buckwheat								X																
		Rumex crispus	Curly Dock	X		X	X	X	X	X	X	X		X		X		X			X	X	X	X	X	X	X
		Rumex salicifolius var. denticulatus	Toothed Willow Dock				X																				
	Portulacaceae	*Calandrinia ciliata*	Red Maids										X							X							
	Primulaceae	*Samolus parviflorus*	Water-Pimpernel								X																
	Priumlaceae	*Anagallis arvensis*	Scarlet Pimpernel	X				X	X	X		X	X		X			X		X	X					X	X
	Ranunculaceae	*Clematis pauciflora*	Ropevine Clematis					X	X																	X	X
		Delphinium parryi ssp. parryi	Parry's Larkspur				X						X							X							

Group	Family	Spp	Common	Roads 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Eudicots																											
	Ranunculaceae	*Thalictrum fendleri var. polycarpum*	Smooth-Leaf Meadow-Rue				X	X	X																	X	X
	Rhamnaceae	*Ceanothus aff. leucodermi s*	Chaparral Whitethorn										X							X							
		Ceanothus foliosus	Wavy-Leaf Lilac			X										X						X	X	X			
		Ceanothus spinosus	Green-Bark-Lilac					X	X																	X	X
		Ceanothus tomentosus	Ramona-Lilac			X										X						X	X	X			
		Rhamnus californica ssp. californica	California Coffeeberry										X							X	X						
		Rhamnus ilicifolia	Holly-Leaf Redberry										X							X							
	Rosaceae	*Heteromeles arbutifolia*	Toyon			X	X	X	X						X	X		X				X	X	X	X	X	X
		Rosa californica	California Rose			X	X	X	X							X						X	X	X		X	X
		Adenostoma fasciculatum	Chamise			X				X			X			X		X		X		X	X	X			
		Cercocarpus betuloides var. betuloides	Birch-Leaf Mountain-Mahogany										X							X							
		Horkelia truncata	Ramona Horkelia										X							X							
		Prunus ilicifolia ssp. ilicifolia	Islay, Holly-Leaf Cherry										X							X							
		Rubus ursinus	California Blackberry			X	X			X	X					X						X	X	X			
	Rubiaceae	*Galium angustifolium ssp. angustifolium*	Narrow-leaf Bedstraw					X	X				X							X						X	X
		Galium porrigens var. porrigens	Climbing/Oval-Leaf Bedstraw					X	X																	X	X
	Salicaceae	*Salix exigua*	Narrow-Leaf Willow								X										X						
		Salix gooddingii	Black Willow					X	X		X										X					X	X
		Salix laevigata	Red Willow	X				X	X			X			X						X					X	X

Group	Family	Spp	Common	Roads																							
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Eudicots																											
	Salicaceae	*Salix lasiolepis*	Arroyo Willow	X	X		X				X	X			X		X		X		X						
		Salix spp.	Willow				X																				
	Scrophulariaceae	*Myoporum laetum*	Ngaio, Mousehole Tree															X									
		Scrophularia californica	California Bee Plant					X	X																	X	X
	Solanaceae	*Datura wrightii*	Western Jimson Weed				X	X	X																	X	X
		Nicotiana glauca	Tree Tobacco		X	X	X	X	X	X	X				X	X		X	X		X	X	X	X		X	X
		Solanum americanum	White Nightshade					X	X		X	X			X											X	X
		Solanum douglasii	Douglas's Nightshade	X			X																				
	Styracaceae	*Styrax redivivus*	Snowdrop Bush										X							X							
	Tamaricaceae	*Tamarix ramosissima*	Tamarisk, Salt-Cedar		X						X								X								
	Urticaceae	*Urtica dioica ssp. holosericea*	Hoary Nettle							X	X				X												
		Urtica urens	Dwarf Nettle					X	X																	X	X
	Verbenaceae	*Verbena lasiostachys var. lasiostachys*	Western Vervain	X		X	X	X	X				X		X	X		X		X	X	X	X	X		X	X
		Verbena lasiostachys var. scabrida	Robust Vervain					X	X																	X	X
	Viscaceae	*Phoradendron macrophyllum*	Big-Leaf Mistletoe			X		X	X							X						X	X	X		X	X
		Phoradendron villosum	Oak Mistletoe				X																				
	Vitaceae	*Vitis girdiana*	Desert Wild Grape					X	X				X		X					X						X	X
	Zygophyllaceae	*Tribulus terrestris*	Puncture Vine				X																				

Group	Family	Spp	Common	Roads 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Leptosporaginate Ferns																											
	Blechnaceae	*Woodwardia fimbriata*	Giant Chain Fern					X	X																	X	X
	Dennstaedtiaceae	*Pteridium aquilinum var. pubescens*	Western Bracken							X					X												
	Dryopteridaceae	*Dryopteris arguta*	Coastal Wood Fern					X	X				X							X						X	X
	Pteridaceae	*Adiantum jordanii*	California Maidenhair												X												
	Pteridaceae	*Pellaea mucronata var. mucronata*	Bird's Foot Cliff-Brake										X							X							
Magolids-Piperales																											
	Saururaceae	*Anemopsis californica*	Yerba Mansa								X			X	X												
Monocots																											
	Agavaceae	*Agave americana*	American Century Plant	X																							
		Hesperoyucca whipplei	Chaparral Candle					X	X				X				X	X		X						X	X
	Araceae	*Lemna spp.*	Duckweed								X																
	Asphodelaceae	*Asphodelus fistulosus*	Hollow-Stem Asphodel												X												
	Cyperaceae	*Carex sp.*	Sedge							X																	
		Cyperus eragrostis	Tall Flatsedge	X				X	X		X															X	X
		Cyperus involucratus	African Umbrella Plant	X																							
		Eleocharis montevidensis	Dombey's Spike-rush					X	X		X		X							X						X	X
		Schoenoplectus americanus	Olney's Bulrush								X																
		Schoenoplectus californicus	California Bulrush								X																
	Hyacinthaceae	*Chlorogalum parviflorum*	Small-Flower Soap-Plant																		X				X		
	Iridaceae	*Sisyrinchium bellum*	Blue-eyed-grass		X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X
	Juncaceae	*Juncus macrophyllus*	Long-Leaf Rush				X																				

Group	Family	Spp	Common	Roads 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
		Juncus oxymeris	Pointed Rush					X	X				X							X						X	X
Monocots																											
	Juncaceae	*Juncus sp. 1*	Rush																		X						
		Juncus xiphioides	Iris-Leaf Rush								X																
	Liliaceae	*Calochortus splendens*	Mariposa Lily		X		X			X				X					X		X						
	Poaceae	*Achnatherum coronatum*	Giant Stipa										X							X							
		Agrostis viridis	Water Bent								X																
		Avena barbata	Slender Wild Oat	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		Avena fatua	Wild Oat			X		X	X	X			X			X	X	X		X		X	X	X		X	X
		Bothriochloa barbinodis	Cane Bluestem		X	X				X						X		X	X		X	X	X	X	X		
		Brachypodium distachyon	Purple Falsebrome				X			X																	
		Bromus carinatus var. carinatus	California Brome				X																				
		Bromus diandrus	Ripcut Grass	X	X		X	X	X		X	X	X	X	X		X		X	X	X				X	X	X
		Bromus hordeaceus	Soft Chess	X	X	X	X	X	X	X	X	X	X	X		X		X	X	X	X	X	X	X	X	X	X
		Bromus madritensis ssp. madritensis	Compact Brome				X					X	X	X						X	X						
		Bromus madritensis ssp. rubens	Red Brome	X	X	X	X	X			X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X
		Cortaderia selloana	Selloa Pampas Grass		X		X												X								
		Cynodon dactylon	Bermuda Grass	X	X	X	X	X	X		X	X		X	X	X		X	X		X	X	X	X	X	X	X
		Distichlis spicata	Saltgrass	X			X	X	X		X				X			X			X					X	X
		Elymus multisetus	Big Squirreltail										X							X							
		Hordeum murinum	Barley			X				X						X		X				X	X	X			
		Hordeum murinum ssp. glaucum	Glaucous Barley	X	X		X					X			X				X						X		
		Lamarckia aurea	Golden-Top	X		X	X	X	X							X						X	X	X		X	X
		Leymus condensatus	Giant Wild-rye	X	X		X	X	X						X				X		X					X	X

Group	Family	Spp	Common	Roads 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
		Leymus triticoides	Beardless Wild-Rye					X	X				X							X						X	X
Monocots																											
	Poaceae	*Lolium multiflorum*	Italian Ryegrass	X			X	X	X			X	X	X	X			X		X	X				X	X	X
		Lolium perenne	Perennial Ryegrass															X									
		Melica imperfecta	Coast Range Melic					X	X						X											X	X
		Melinis repens ssp. repens	Natal Grass										X							X							
		Muhlenbergia rigens	Deergrass		X														X		X						
		Nasella cernua	Nodding Needlegrass			X						X	X	X				X		X	X	X	X	X			
		Nassella lepida	Foothill Needlegrass												X												
		Nassella pulchra	Purple Needlegrass	X	X	X	X	X	X	X		X	X	X	X	X		X	X	X	X	X	X	X	X	X	X
		Pennisetum setaceum	African Fountain Grass								X																
		Piptatherum miliaceum	Smilo Grass										X							X							
		Polypogon monspeliensis	Annual Beard Grass	X				X	X		X				X						X					X	X
		Schismus barbatus	Mediterranean Schismus					X	X																	X	X
		Vulpia myuros	Hairy Rat-Tail Fescue										X							X							
		Vulpia myuros1	Rat-Tail Fescue				X																				
	Themidaceae	*Bloomeria crocea var. crocea*	Common Goldenstar		X	X	X	X	X	X				X		X		X	X		X	X	X	X	X	X	X
		Brodiaeria terrestris ssp. kernensis	Dwarf Brodiaea																		X						
		Dichelostemma capitatum ssp. capitatum	Blue Dicks		X		X					X	X	X			X		X	X	X				X		
	Typhaceae	*Typha domingensis*	Southern Cattail	X						X	X																

APPENDIX D
CNDDB FORMS

Mail to:
California Natural Diversity Database
Department of Fish and Game
1807 13th Street, Suite 202
Sacramento, CA 95811
Fax: (916) 324-0475 email: CNDDB@dfg.ca.gov

Date of Field Work (mm/dd/yyyy): 04/17/2007

For Office Use Only

Source Code _____ Quad Code _____
Elm Code _____ Occ. No. _____
EO Index No. _____ Map Index No. _____

Reset

California Native Species Field Survey Form

Send Form

Scientific Name: *Horkelia truncata*

Common Name: Ramona Horkelia

Species Found? ☑ Yes ☐ No _____ If not, why?

Total No. Individuals 200+ Subsequent Visit? ☑ yes ☐ no

Is this an existing NDDB occurrence? _____ Yes, Occ. # ☑ no ☐ unk.

Collection? If yes: mrm#1946 Number SD Herbarium Museum / Herbarium

Reporter: Margie Mulligan
Address: San Diego Natural History Museum
P.O. Box 121390, San Diego CA 92112
E-mail Address: mmulligan@sdnhm.org
Phone: (619) 255-0302

Plant Information

Phenology: _____% vegetative 100 % flowering _____% fruiting

Animal Information

_____ # adults _____ # juveniles _____ # larvae _____ # egg masses _____ # unknown

☐ breeding ☐ wintering ☐ burrow site ☐ rookery ☐ nesting ☐ other

Location Description ***(please attach map AND/OR fill out your choice of coordinates, below)***

Marine Corps Base Camp Pendleton, Echo Training Area, just east of Artillery Firing Range 40 along Roblar Road. Additional populations in Zulu Impact Area, on road and firebreak to No Firing Area and India Artillery Observation Point.

County: San Diego County Landowner / Mgr.: Marine Corps Base Camp Pendleton

Quad Name: _____ Elevation: 774 m

T____ R____ Sec ____, ____ ¼ of _____¼, Meridian: H☐ M☐ S☐ Source of Coordinates (GPS, topo. map & type): GPS

T____ R____ Sec ____, ____ ¼ of _____¼, Meridian: H☐ M☐ S☐ GPS Make & Model Garmin Rino 130

DATUM: **NAD27** ☐ **NAD83** ☐ **WGS84** ☑ Horizontal Accuracy 10 ft meters/feet

Coordinate System: UTM Zone 10 ☐ UTM Zone 11 ☐ ***OR*** Geographic (Latitude & Longitude) ☑

Coordinates: 33.4255 -117.3802

Habitat Description *(plant communities, dominants, associates, substrates/soils, aspects/slope):*

Mixed Chaparral (burned two years prior?) dominated by Adenostoma fasciculatum, Arctostaphylos glandulosa, Lotus scoparius, Ceanothus sp. (nov.), Styrax officinalis, and Salvia clevelandii. Arctostaphylos rainbowensis throughout area. Soils were decomposed granite with some clay.

Other rare taxa seen at THIS site on THIS date: Arctostaphylos rainbowensis
(separate form preferred)

Site Information Overall site/occurrence quality/viability (site + population): ☑ Excellent ☐ Good ☐ Fair ☐ Poor

Immediate AND surrounding land use: Marine Corps Base Operations and access roads to impact areas.

Visible disturbances: Heavy road use.

Threats: Road expansion and military operations.

Comments: This mixed chaparral is a very unusual habitat type on Camp Pendleton. A few rare plants have been found here and one of the dominant shrubs, Ceanothus sp., could not be identified using the Jepson Manual (Hickman, 1993) or Flora of North America keys (FNA 1993). This area should be further explored for additional rare and unusual plants.

Determination: *(check one or more, and fill in blanks)*

☑ Keyed (cite reference): Jepson
☐ Compared with specimen housed at: _____
☐ Compared with photo / drawing in: _____
☑ By another person (name): Dr. Jon Rebman, SD Herbarium Curator
☐ Other: _____

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	☐	☐	☐
Habitat	☐	☐	☐
Diagnostic feature	☐	☐	☐

May we obtain duplicates at our expense? yes ☐ no ☐

Mail to:
California Natural Diversity Database
Department of Fish and Game
1807 13th Street, Suite 202
Sacramento, CA 95811
Fax: (916) 324-0475 email: CNDDB@dfg.ca.gov

Date of Field Work (mm/dd/yyyy): 04/17/2007

For Office Use Only

Source Code _____ Quad Code _____
Elm Code _____ Occ. No. _____
EO Index No. _____ Map Index No. _____

Reset

California Native Species Field Survey Form

Send Form

Scientific Name: *Horkelia truncata*

Common Name: Ramona Horkelia

Species Found? ☑ Yes ☐ No _____ If not, why?

Total No. Individuals 200+ Subsequent Visit? ☑ yes ☐ no

Is this an existing NDDB occurrence? _____ Yes, Occ. # ☑ no ☐ unk.

Collection? If yes: mrm#1946 Number SD Herbarium Museum / Herbarium

Reporter: Margie Mulligan
Address: San Diego Natural History Museum
P.O. Box 121390, San Diego CA 92112
E-mail Address: mmulligan@sdnhm.org
Phone: 619.255.0302

Plant Information

Phenology: _____% vegetative 100 % flowering _____% fruiting

Animal Information

_____ # adults _____ # juveniles _____ # larvae _____ # egg masses _____ # unknown

☐ breeding ☐ wintering ☐ burrow site ☐ rookery ☐ nesting ☐ other

Location Description ***(please attach map AND/OR fill out your choice of coordinates, below)***

Marine Corps Base Camp Pendleton, Echo Training Area, just east of Artillery Firing Range 40 along Roblar Road. Additional populations in Zulu Impact Area, on road and firebreak to No Firing Area and India Artillery Observation Point.

County: San Diego County Landowner / Mgr.: Marine Corps Base Camp Pendleton

Quad Name: _____ Elevation: 774 m

T____ R____ Sec ____, ____ ¼ of _____¼, Meridian: H☐ M☐ S☐ Source of Coordinates (GPS, topo. map & type): GPS

T____ R____ Sec ____, ____ ¼ of _____¼, Meridian: H☐ M☐ S☐ GPS Make & Model Garmin Rino 130

DATUM: **NAD27** ☐ **NAD83** ☐ **WGS84** ☑ Horizontal Accuracy 10 ft meters/feet

Coordinate System: UTM Zone 10 ☐ UTM Zone 11 ☐ ***OR*** Geographic (Latitude & Longitude) ☑

Coordinates: 33.4255 -117.3802

Habitat Description *(plant communities, dominants, associates, substrates/soils, aspects/slope):*

Mixed Chaparral (burned two years prior?) dominated by Adenostoma fasciculatum, Arctostaphylos glandulosa, Lotus scoparius, Ceanothus sp. (nov.), Styrax officinalis, and Salvia clevelandii. Arctostaphylos rainbowensis throughout area. Soils were decomposed granite with some clay.

Other rare taxa seen at THIS site on THIS date: Arctostaphylos rainbowensis
(separate form preferred)

Site Information Overall site/occurrence quality/viability (site + population): ☑ Excellent ☐ Good ☐ Fair ☐ Poor

Immediate AND surrounding land use: Marine Corps Base Operations and access roads to impact areas.

Visible disturbances: Heavy road use.

Threats: Road expansion and military operations.

Comments: This mixed chaparral is a very unusual habitat type on Camp Pendleton. A few rare plants have been found here and one of the dominant shrubs, Ceanothus sp., could not be identified using the Jepson Manual (Hickman, 1993) or Flora of North America keys (FNA 1993). This area should be further explored for additional rare and unusual plants.

Determination: *(check one or more, and fill in blanks)*

☑ Keyed (cite reference): Jepson
☐ Compared with specimen housed at: _____
☐ Compared with photo / drawing in: _____
☑ By another person (name): Dr. Jon Rebman, SD Herbarium Curator
☐ Other: _____

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	☐	☐	☐
Habitat	☐	☐	☐
Diagnostic feature	☐	☐	☐

May we obtain duplicates at our expense? yes ☐ no ☐

Mail to:
California Natural Diversity Database
Department of Fish and Game
1807 13th Street, Suite 202
Sacramento, CA 95811
Fax: (916) 324-0475 email: CNDDB@dfg.ca.gov

Date of Field Work (mm/dd/yyyy): 04/17/2007

For Office Use Only

Source Code _____ Quad Code _____
Elm Code _____ Occ. No. _____
EO Index No. _____ Map Index No. _____

Reset

California Native Species Field Survey Form

Send Form

Scientific Name: *Horkelia truncata*

Common Name: Ramona Horkelia

Species Found? ☑ Yes ☐ No _____ If not, why?

Total No. Individuals 200+ Subsequent Visit? ☑ yes ☐ no

Is this an existing NDDB occurrence? _____ Yes, Occ. # ☑ no ☐ unk.

Collection? If yes: mrm#1946 Number SD Herbarium Museum / Herbarium

Reporter: Margie Mulligan
Address: San Diego Natural History Museum
P.O. Box 121390, San Diego CA 92112
E-mail Address: mmulligan@sdnhm.org
Phone: 619.255.0302

Plant Information

Phenology: _____% vegetative 100 % flowering _____% fruiting

Animal Information

_____ # adults _____ # juveniles _____ # larvae _____ # egg masses _____ # unknown

☐ breeding ☐ wintering ☐ burrow site ☐ rookery ☐ nesting ☐ other

Location Description ***(please attach map AND/OR fill out your choice of coordinates, below)***

Marine Corps Base Camp Pendleton, Echo Training Area, just east of Artillery Firing Range 40 along Roblar Road. Additional populations in Zulu Impact Area, on road and firebreak to No Firing Area and India Artillery Observation Point.

County: San Diego County Landowner / Mgr.: Marine Corps Base Camp Pendleton

Quad Name: _____ Elevation: 774 m

T____ R____ Sec ____, ____ ¼ of _____¼, Meridian: H☐ M☐ S☐ Source of Coordinates (GPS, topo. map & type): GPS

T____ R____ Sec ____, ____ ¼ of _____¼, Meridian: H☐ M☐ S☐ GPS Make & Model Garmin Rino 130

DATUM: **NAD27** ☐ **NAD83** ☐ **WGS84** ☑ Horizontal Accuracy 10 ft meters/feet

Coordinate System: UTM Zone 10 ☐ UTM Zone 11 ☐ ***OR*** Geographic (Latitude & Longitude) ☑

Coordinates: 33.4255 -117.3802

Habitat Description *(plant communities, dominants, associates, substrates/soils, aspects/slope):*

Mixed Chaparral (burned two years prior?) dominated by Adenostoma fasciculatum, Arctostaphylos glandulosa, Lotus scoparius, Ceanothus sp. (nov.), Styrax officinalis, and Salvia clevelandii. Arctostaphylos rainbowensis throughout area. Soils were decomposed granite with some clay.

Other rare taxa seen at THIS site on THIS date: Arctostaphylos rainbowensis
(separate form preferred)

Site Information Overall site/occurrence quality/viability (site + population): ☑ Excellent ☐ Good ☐ Fair ☐ Poor

Immediate AND surrounding land use: Marine Corps Base Operations and access roads to impact areas.

Visible disturbances: Heavy road use.

Threats: Road expansion and military operations.

Comments: This mixed chaparral is a very unusual habitat type on Camp Pendleton. A few rare plants have been found here and one of the dominant shrubs, Ceanothus sp., could not be identified using the Jepson Manual (Hickman, 1993) or Flora of North America keys (FNA 1993). This area should be further explored for additional rare and unusual plants.

Determination: *(check one or more, and fill in blanks)*

☑ Keyed (cite reference): Jepson
☐ Compared with specimen housed at: _____
☐ Compared with photo / drawing in: _____
☑ By another person (name): Dr. Jon Rebman, SD Herbarium Curator
☐ Other: _____

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	☐	☐	☐
Habitat	☐	☐	☐
Diagnostic feature	☐	☐	☐

May we obtain duplicates at our expense? yes ☐ no ☐

Mail to:
California Natural Diversity Database
Department of Fish and Game
1807 13th Street, Suite 202
Sacramento, CA 95811
Fax: (916) 324-0475 email: CNDDB@dfg.ca.gov

Date of Field Work (mm/dd/yyyy): 04/17/2007

For Office Use Only

Source Code _____ Quad Code _____
Elm Code _____ Occ. No. _____
EO Index No. _____ Map Index No. _____

Reset

California Native Species Field Survey Form

Send Form

Scientific Name: *Horkelia truncata*

Common Name: Ramona Horkelia

Species Found? ☑ Yes ☐ No _____ If not, why?

Total No. Individuals 200+ Subsequent Visit? ☑ yes ☐ no

Is this an existing NDDB occurrence? _____ Yes, Occ. # ☑ no ☐ unk.

Collection? If yes: mrm#1946 Number SD Herbarium Museum / Herbarium

Reporter: Margie Mulligan
Address: San Diego Natural History Museum
P.O. Box 121390, San Diego CA 92112
E-mail Address: mmulligan@sdnhm.org
Phone: 619.255.0302

Plant Information

Phenology: _____% vegetative 100 % flowering _____% fruiting

Animal Information

_____ # adults _____ # juveniles _____ # larvae _____ # egg masses _____ # unknown

☐ breeding ☐ wintering ☐ burrow site ☐ rookery ☐ nesting ☐ other

Location Description ***(please attach map AND/OR fill out your choice of coordinates, below)***

Marine Corps Base Camp Pendleton, Echo Training Area, just east of Artillery Firing Range 40 along Roblar Road. Additional populations in Zulu Impact Area, on road and firebreak to No Firing Area and India Artillery Observation Point.

County: San Diego County Landowner / Mgr.: Marine Corps Base Camp Pendleton

Quad Name: _____ Elevation: 774 m

T____ R____ Sec ____, ____ ¼ of _____¼, Meridian: H☐ M☐ S☐ Source of Coordinates (GPS, topo. map & type): GPS

T____ R____ Sec ____, ____ ¼ of _____¼, Meridian: H☐ M☐ S☐ GPS Make & Model Garmin Rino 130

DATUM: **NAD27** ☐ **NAD83** ☐ **WGS84** ☑ Horizontal Accuracy 10 ft meters/feet

Coordinate System: UTM Zone 10 ☐ UTM Zone 11 ☐ ***OR*** Geographic (Latitude & Longitude) ☑

Coordinates: 33.4255 -117.3802

Habitat Description *(plant communities, dominants, associates, substrates/soils, aspects/slope):*

Mixed Chaparral (burned two years prior?) dominated by Adenostoma fasciculatum, Arctostaphylos glandulosa, Lotus scoparius, Ceanothus sp. (nov.), Styrax officinalis, and Salvia clevelandii. Arctostaphylos rainbowensis throughout area. Soils were decomposed granite with some clay.

Other rare taxa seen at THIS site on THIS date: Arctostaphylos rainbowensis
(separate form preferred)

Site Information Overall site/occurrence quality/viability (site + population): ☑ Excellent ☐ Good ☐ Fair ☐ Poor

Immediate AND surrounding land use: Marine Corps Base Operations and access roads to impact areas.

Visible disturbances: Heavy road use.

Threats: Road expansion and military operations.

Comments: This mixed chaparral is a very unusual habitat type on Camp Pendleton. A few rare plants have been found here and one of the dominant shrubs, Ceanothus sp., could not be identified using the Jepson Manual (Hickman, 1993) or Flora of North America keys (FNA 1993). This area should be further explored for additional rare and unusual plants.

Determination: *(check one or more, and fill in blanks)*

☑ Keyed (cite reference): Jepson
☐ Compared with specimen housed at: _____
☐ Compared with photo / drawing in: _____
☑ By another person (name): Dr. Jon Rebman, SD Herbarium Curator
☐ Other: _____

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	☐	☐	☐
Habitat	☐	☐	☐
Diagnostic feature	☐	☐	☐

May we obtain duplicates at our expense? yes ☐ no ☐

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APPENDIX E
RARE PLANT SURVEY REPORT

Rare Plant Survey Report

Repair of 24 Access Roads to Training Ranges
Marine Corps Base Camp Pendleton, California

Prepared by:
TEC Inc.
514 Via de la Valle, Suite 308
Solana Beach, CA 92075

November 2008

INTRODUCTION

Surveys for rare plants were conducted within the areas that could be affected by the proposed repair of 24 Access Roads to training ranges on MCB Camp Pendleton. Sixteen roads were completely surveyed in 2007. Roads 9 and 12 were partially surveyed in 2007 and completed in 2008. The remaining six roads were surveyed in 2008. The survey area included the road segment proposed for repair, construction staging areas, plus an approximate 100-foot buffer or margin extending from project construction areas into adjacent habitat. The 100-ft buffer was included to identify rare plants and other environmental resources that could be subject to incidental effects, and to accommodate future modifications that may be required as the project is designed and implemented. The actual limits of construction disturbance would generally be much smaller based on the relative ease of construction in most locations, and on the topography, geology, hydrologic conditions, and vegetation surrounding the project sites. The 100-ft buffer survey area was reduced in a small number of cases where steep slopes, incised drainages, or large paved roads provided a distinct boundary that limited the extent of potential disturbance around the project footprint.

Surveys were conducted from May through June 2007 and April through June 2008, which is the appropriate season for the detection of rare plants with a reasonable likelihood of occurrence. The survey area is illustrated in Figures 0-1 through 24-2 (Appendix A).

The scope of the rare plant surveys was to search for all potentially occurring federally and state-listed and proposed species and California Native Plant Society (CNPS) list 1B through 4 species (Appendix B) within all potential areas of ground disturbance, including buffer areas around areas of potential construction. Sites were also searched for unusual occurrences of plant species that could represent new (previously undescribed) taxa, range extensions or new introductions to the region. An emphasis was placed on searching for the federally listed threatened thread-leaved brodiaea (TLB, *Brodiaea filifolia*) according to the MCB Camp Pendleton protocol. TLB occurs in grassland and coastal sage scrub (CSS) vegetation, with most occurrences in loamy to clayey soil, usually on slopes less than 10 percent.

METHODOLOGY

AutoCAD drawings of construction plans were prepared by MCB Camp Pendleton. Based on field reviews conducted by MCB Camp Pendleton and NAVFAC SW personnel, site-specific changes were identified and incorporated into the plans, which were provided to TEC Inc. (TEC). From the plans and instructions, TEC created Geographic information systems (GIS) maps of the proposed construction sites and added the corresponding buffers.

Three rare plant survey sessions were conducted along the access roads on MCB Camp Pendleton in 2007 and 2008. All potentially occurring federally and state-listed and proposed species and CNPS list 1B through 4 species were censused. Surveys were conducted by subcontractors Carolyn Martus and Margie Mulligan (San Diego Natural History Museum); and Melissa Tu, Deanna Meier, Andrew Raaf, and Emily Althoen of TEC. Margie Mulligan and Carolyn Martus conducted all of the rare plant surveys in 2007 and Carolyn Martus conducted the majority of the rare plant surveys in 2008. Surveys were conducted from April 26-June 14 (Table 1). Roads 1, 4, 6-13, 15-22 were surveyed in 2007 and Roads 2, 3, 5, 9, 12, 14, 23, and 24 were surveyed in 2008. A Geographic Positioning System (GPS) was used to identify survey routes in the field.

Field surveys were initiated as soon as possible following observations of TLB in flower on MCB Camp Pendleton. Access to all Training Areas was coordinated with MCB Camp Pendleton. Biologists

surveyed areas of potential TLB habitat by walking transects approximately 20 feet apart, repeated at approximate two-week intervals, consistent with MCB Camp Pendleton's survey protocol for TLB. The dates of surveys conducted are located in Table 1. Highly disturbed areas determined on the basis of the first survey to have no potential to contain rare plants were not surveyed again.

Table 1. 2007 & 2008 Rare Plant Survey Dates

Road	1st Visit	2nd Visit	3rd Visit
1	May 23, 2007	June 5, 2007	June 18, 2007
2	April 30, 2008	May 15, 2008	May 28, 2008
3	April 26, 2008	May 10, 2008	May 24, 2008
4	May 23, 2007	June 5, 2007	June 20, 2007
5	May 9 and 15 , 2008	May 23, 2008	June 6, 2008
6	May 15, 2007	May 30, 2007	June 15, 2007
7	May 15, 2007	May 29 and 30, 2007	June 13 and 15, 2007
8	May 22, 2007	June 4, 2007	June 18, 2007
9 (southwest)	May 25, 2007	June 15, 2007	June 25, 2007
9 (northeast)	May 9, 2008	May 23, 2008	June 6, 2008
10	May 25, 2007	June 8, 2007	June 22, 2007
11	May 22, 2007	June 4, 2007	June 18, 2007
12 (northeast)	May 22, 2007	June 4, 2007	June 20, 2007
12 (southwest)	May 15, 2008	May 25, 2008	June 12 and 14, 2008
13	May 18, 2007	May 30, 2007	June 18, 2007
14	May 2, 2008	May 16, 2008	June 6, 2008
15	May 15, 2007	May 30, 2007	June 15, 2007
16	May 23, 2007	June 5, 2007	June 20, 2007
17	May 25, 2007	June 8, 2007	June 22, 2007
18	May 9, 2007	May 25 and 28, 2007	June 8 and 15, 2007
19	May 18, 2007	May 30, 2007	June 18, 2007
20	May 18, 2007	May 30, 2007	June 18, 2007
21	May 18, 2007	May 30, 2007	June 18, 2007
22	May 13, 2007	May 28, 2007	June 18, 2007
23	May 9, 2008	May 23, 2008	June 6, 2008
24	May 9, 2008	May 23, 2008	June 6, 2008

MAPPING

A Trimble sub-meter GPS was used in 2007 and a Thales Mobile Mapper GPS was used in 2008 to document survey transects and rare plant locations. One botanist carried the GPS unit while the other botanist(s) walked in parallel. When rare plants were detected, a GPS point was collected. Individual plants of the same species less than 7 m apart were mapped in a combined polygon, consistent with the MCB Camp Pendleton TLB survey guidelines.

The survey transects recorded with the GPS units are included in Appendix A. The figures include an overview of each road. Detailed insets are provided for locations in which rare plants were detected. No detailed insets are provided for map sections in which no rare plants were detected. For visual simplicity,

previous rare plant detections from the MCB Camp Pendleton GIS database are included only for points and polygons that fall within the road corridors under review.

For consistency with existing documents for the Access Roads project, the field maps and section numbers were taken from the Plant Community Mapping Report and Wetland Delineation provided by TEC Inc. in 2007 (TEC 2007a, 2007b). As such, the figure numbers in Appendix A are not always sequential, but can be cross-referenced with the other environmental documentation in the Plant Community Mapping Report and Wetland Delineation.

RESULTS

A summary of all rare plants encountered by road number is provided in Table 2. Appendix C contains a plant species list for the proposed project areas.

Table 2. Rare Plants Found Within the Proposed Project Area.

Road	Common Name	Scientific Name	Status* Fed/CA/CNPS	Year	Estimated Number
2	**many-stemmed dudleya**	*Dudleya multicaulis*	**-/-/1B.2**	2008	228
10	**Rainbow manzanita**	*Arctostaphylos rainbowensis*	**-/-/1B.1**	2007	50
10	**Ramona horkelia**	*Horkelia truncata*	**-/-/1B.3**	2007	150
16	**many-stemmed dudleya**	*Dudleya multicaulis*	**-/-/1B.2**	2007	25
17	**Rainbow manzanita**	*Arctostaphylos rainbowensis*	**-/-/1B.1**	2007	50
17	**Ramona horkelia**	*Horkelia truncata*	**-/-/1B.3**	2007	150
18	**many-stemmed dudleya**	*Dudleya multicaulis*	**-/-/1B.2**	2007	50
19	**Engelmann oak**	*Quercus engelmannii*	**-/-/4.2**	2007	10
24	**many-stemmed dudleya**	*Dudleya multicaulis*	**-/-/1B.2**	2008	491

* See Appendix B for explanation of categories.

No TLB were found during 2007 and 2008 rare plant surveys within the proposed project areas. The more common dwarf brodiaea *(Brodiaea terrestris* ssp. k*ernensis)* was found along Roads 10 and 22. Many-stemmed dudleya, a CNPS list 1B species, was found on slopes along four of the training roads see details below. Rainbow manzanita, a CNPS list 1B species which is only found in northeastern San Diego County and southwestern Riverside County, was found along Roads 10 and 17. Another CNPS 1B species, Romona horkelia, was found along Road 10. Ten Engelmann oaks, a CNPS list 4 species, were found along Road 19.

In addition to rare plant occurrences, several other noteworthy discoveries were made during the surveys. (*Ericameria palmeri* var. *pachylepis*) a species never before documented on MCB Camp Pendleton was found on the east edge of Road 9. A population of an unusual *Senecio* shrub was found in riparian habitat along Road 7 at the intersection of Horno Canyon Rd and Basilone Rd. and along Road 20. A portion of the shrub was collected sent to the San Diego Natural History Museum for identification (it remains unidentified as of August 2008). A possible new *Ceanothus*, differing from other members of the genus known to occur in San Diego County, was found along Road 10. It appears to have affinities to chaparral whitethorn (*Ceanothus leucodermis*) (Mulligan, pers. comm.). A specimen was collected and sent to an expert at the San Diego Natural History Museum for taxonomic analysis, which is still being conducted.

The years of 2006 and 2007 were marked by unusually low rainfall therefore habitat conditions were very dry, especially for annuals. These conditions could decrease the diversity of species, and therefore decrease the probability of finding rare plants during 2007 surveys.

Below is a summary for each road which includes overall habitat description, habitat quality, and rare plant species encountered during surveys, and analysis of MCB Camp Pendleton GIS layer data of rare plants for the area. MCB Camp Pendleton recently awarded a contract to perform TLB surveys in spring of 2009 along Roads 6, 11, 15, 18, 24 and adjacent areas. MCB Camp Pendleton will share the results from this survey with the Project Team as well as potential biologists assigned to monitor proposed repair activities in these areas (MCB Camp Pendleton 2008).

Road 1: San Onofre Creek Crossing and 52 Combat Town. Most habitats were highly disturbed and degraded, apart from the riparian area (mulefat scrub) which had no standing water and few annual species due to dry habitat conditions. No rare plants were encountered during protocol surveys. The MCB Camp Pendleton GIS layer data had no rare plant occurrences for this area.

Road 2: San Mateo Canyon. Habitats consisted of riparian woodland (mulefat scrub with some sycamores) bordered by coastal sage scrub and patches of grassland. Two populations of many-stemmed dudleya were found and recorded (Figure 2-1). The first population was found on a steep north facing slope on the northeast end of Road 2 and consisted of approximately 100 individuals (Appendix D, CNDDB forms). The second population was found on a south facing slope on the southwest end of Road 2 and consisted of 128 individuals. Existing GIS data from MCB Camp Pendleton showed previous records of many-stemmed dudleya at the southwest end of Road 2 near the HOLF. These records were from 1995.

Photos 1 and 2. Many-stemmed dudleya and habitat at Road 2.

Road 3: Jardine Canyon. This is an impact area and Longrifle instructed that the surveyors should walk only on the road. The habitats consisted of riparian woodland with stands of oak, sycamores, and mulfefat scrub bordered by coastal sage scrub, native grassland and non-native grassland. There is high potential for TLB to occur; however, most of the areas had burned during the year of the surveys or in previous years. There exists the potential for corns to remain dormant in the soil in this area. The MCB Camp Pendleton GIS layer data had no rare plant occurrences for this area.

Road 4: Talega Creek. Habitat consisted of mostly oak woodland and mulefat scrub with a few small patches of native grassland, potential TLB habitat. The native grasslands were very dry and consisted of mostly vegetative species. No rare plants were encountered during protocol surveys. However, two interesting finds on this road were *Salvia spathacea* and *Clarkia bottae*, both previously documented only

once in the County (Mulligan, pers. comm.). Both are unusual, but not listed as rare by Federal, State, or CNPS. The MCB Camp Pendleton GIS layer data had no rare plant occurrences for this area.

Road 5: **Combat Town Access Road**. Habitat consisted of riparian areas, coastal sage scrub, and disturbed areas that are used intensely for training. No rare plants were encountered during protocol surveys. The MCB Camp Pendleton GIS layer data had no rare plant occurrences for this area.

Road 6: Piedra de Lumbre. Habitat of the southern half of the road consisted of mostly dry coastal sage scrub. The northern half consisted of mostly degraded and dry grassland, with low to moderate potential for TLB. No rare plants were encountered during protocol surveys. The MCB Camp Pendleton GIS layer data provided showed a pre-1997 occurrence of unconfirmed *Caulanthus simulans* (a CNPS List 4 species). This species was not detected in the current surveys.

Photo 3. Unknown *Senecio* sp. at Road 7

Road 7: Horno Canyon. Habitat consisted of mostly steep ridges of dry coastal sage scrub with a few flat areas of dry, degraded mixed grasslands. No rare plants were encountered during protocol surveys. The MCB Camp Pendleton GIS layer data had no rare plant occurrences for this road; however, TLB was reported a half mile southeast on Basilone Rd from northern end of Horno Canyon Rd (well outside of the current project area).

A population of an unusual *Senecio* shrub was found on the intersection of Horno Canyon Rd and Basilone Rd. This same shrub was also found on Road 20: Range 218. A specimen was collected and sent to an expert at the San Diego Natural History Museum for identification and is under investigation (Martus, pers. comm.).

Road 8: Red Beach Road. Habitat consisted of mostly moderate-quality mulefat scrub and coyote brush with a wetland area under the I-5 Bridge. No rare plants were encountered during protocol surveys. On the path parallel to I-5 and the train tracks (perpendicular to and above Red Beach Road), *Atriplex coulteri* and *Eryngium pendletonense* were located by TEC in 2006, outside of the current project area (TEC 2006). According to the MCB Camp Pendleton GIS layer data, the west side of the I-5 Bridge is mapped for vernal pools but no evidence of them was found. This area under the bridge does consist of wetland hydrology (moving stream) and riparian vegetation but not vernal pool hydrology and vegetation.

Road 9: Range 407 Access. Habitat consisted of mostly highly disturbed (by fire and vehicles) mixed grassland. No rare plants were encountered during protocol surveys. However, *Ericameria palmeri* var. *pachylepis*, a new county record, was discovered near the southeast beginning of this road (Mulligan, pers. comm.). The MCB Camp Pendleton GIS layer data had no rare plant occurrences for this area.

Road 10: Observation Post J. Habitat for most of this road consisted of mainly native and mixed grasslands and with some riparian areas. Much of the grassland had been recently burned Approximately 300 individuals of dwarf Brodiaea *(Brodiaea terrestris* ssp. k*ernensis)* were found near the southeastern end of this section of the road.

At the very southeast end of the road, adjacent habitat consisted of good quality chamise chaparral recovering from a recent fire (approximately two years ago). Two rare plants, Ramona horkelia and Rainbow manzanita, were found intermingled throughout the chaparral (Figure 10-0). According to the MCB Camp Pendleton GIS layer data, Ramona horkelia had been previously documented in the area, however, this year's survey expanded its range. Another noteworthy find was the possible new *Ceanothus* species mentioned previously. This unusual shrub is common in the area of Road 10. GPS locations were mapped at two points along Road 17, where this species was first encountered (see Road 17 below). A specimen was collected and sent to an expert at the San Diego Natural History Museum for identification and taxonomic analysis. Preliminary taxonomy indicates that the specimen may have some affinities to chaparral whitethorn (*Ceanothus leucodermis*) (Mulligan, pers. comm.).

Road 11: Range 111. Habitat consisted of dense coyote brush on the southeast side of road and degraded mixed grassland on the northwest side of road. There were patches of good quality native grassland found but in very dry conditions with few flowering plants present. No rare plants were encountered during protocol surveys. The MCB Camp Pendleton GIS layer data had no rare plant occurrences for this area.

Road 12: Aliso Canyon. The western section of this road's habitat consisted of steep slopes of high quality coastal sage scrub with focus areas concentrated in riparian areas of willow and mixed sage scrub. According to the MCB Camp Pendleton GIS layer data, *Dudleya viscida* was found along the project area approximately 3 miles north of Stuart Mesa Road in pre-1997 surveys (Figure 12-0). *Dudleya viscida* was not found in any of the focus areas and no rare plants were encountered during 2007 protocol surveys. The central eastern section of this road was within the X-ray impact area; the area is burned repeatedly; and consisted mostly of dense patches of non-native grassland and exotic vegetation. Moderate size patches of native grassland occur near the eastern section of this road east of the X-ray impact area.

Road 13: Range 216 Access Road. Habitat consisted of moderate quality riparian vegetation of mule fat scrub and coyote brush to the south and mixed grassland highly degraded by fire to the north. No rare plants were encountered during protocol surveys. The MCB Camp Pendleton GIS layer data had no rare plant occurrences for this area. The data showed TLB occurring approximately one mile west on the frontage road parallel to Basilone Road, well outside of the project area.

Road 14: Juliet Training Area. Habitat consisted of high quality coast live oak woodland and riparian habitat and moderate quality coastal sage scrub with small patches of native grassland. No rare plants were encountered during protocol surveys. Steep slopes along much of the access road limited the project area and the extent of the survey. The MCB Camp Pendleton GIS layer data had no rare plant occurrences for this area.

Road 15: Papa 3 Road. Most of the habitat adjacent to this road consisted of highly degraded grasslands. Some had patches of native grassland with potential TLB habitat in very dry conditions. No rare plants were encountered during protocol surveys. The MCB Camp Pendleton GIS layer data had no rare plant occurrences for this area.

Road 16: Northern Ridge. Habitat between the western and eastern branch of this road consisted of bare ground due to a recent fire which had cleared all vegetation. The habitat of the west side of the western branch was mostly moderate quality riparian with some mixed grassland patches. The habitat of the east side of the eastern branch consisted of high-quality native grassland, with high potential for TLB. According to the MCB Camp Pendleton GIS layer data, in this area, but at two different locations, TLB was documented in 2005 and pre-1997. However, no plants were located during this year's survey probably due to the burned vegetation of the west side and the dry conditions on the east side of the east branch of this road. About 25 individuals of many-stemmed dudleya were discovered on the east side of the eastern branch (Figure 16-2) and a GPS point was collected. The population was confined to a small area (approx 1-3 m^2 and thus, a GPS polygon was not created in the field). This population, as well as records of an "unknown rare plant," are noted in the MCB Camp Pendleton GIS data.

Road 17: Observation Post India. Habitat consisted of good quality chamise chaparral recovering from a recent fire (approximately two years ago). Two rare plants, Ramona horkelia and Rainbow manzanita, were found spotty throughout the area (Figure 17-1). The MCB Camp Pendleton GIS layer data had Ramona horkelia documented on Road 10, less than a half mile to the northwest. The habitat conditions and plant community at Road 17 are similar to areas of Road 10 in which the possible new *Ceanothus* species was detected. This plant may have some affinities to *Ceanothus leucodermis*, a non-listed species, but appears distinct (photos 1 and 2) (Mulligan, pers. comm.). The possible new *Ceanothus* was detected at two locations along Road 17 and is common throughout the general area (Figure 7-9).

Photos 4 and 5. Probable new *Ceanothus* sp. with affinities to *Ceanothus leucodermis*, found at Roads 10 and 17.

Road 18: Roblar Rd. Habitat consisted of mostly degraded mixed and native grasslands with some riparian areas. Much of the grassland area to the north has been burned in the last year. A population of about 50 individuals of many-stemmed dudleya was located on the east side of the road, north of the Road 9 intersection (Figure 18-2). According to MCB Camp Pendleton GIS layer data, many-stemmed dudleya was previously documented near this area (outside of the road corridor). The current finding in the project area is a new locality of the species. Also, TLB has been previously documented in MCB Camp Pendleton GIS data on the northern end of the road, but was not located during this survey. This could be due to the recent fire and dry conditions.

Road 19: Range 219. Habitat consisted of mostly recently (early 2008) burned low quality grasslands and oak woodlands. No rare plants were encountered during protocol surveys, except for a few Engelmann oaks found in the riparian area in the central section of the road. The MCB Camp Pendleton

GIS layer data had no rare plant occurrences for this area. A least Bell's vireo was heard several times on the third survey in the coast live oak woodland near Basilone Road.

Road 20: Range 218. Habitat consisted of mostly coyote brush, riparian, and some highly degraded mixed grassland. No rare plants were encountered during protocol surveys, however, one unusual *Senecio* shrub was found in the riparian area on the west side of the road. A larger population of the shrub was also found on Road 7. A specimen was collected and sent to an expert for identification. The MCB Camp Pendleton GIS layer data had no rare plant occurrences for this area.

Road 21: Range 214/215. Habitat consisted of mostly mixed, non-native and native grasslands, most of which were burned this year. No rare plants were encountered during protocol surveys, but potential occurrence for TLB is moderate to high. This area should be searched after the area has recovered from the fire. The MCB Camp Pendleton GIS layer data had no rare plant occurrences for this area, however TLB was documented about one mile west on the frontage road parallel to Basilone Rd, well outside of the project area.

Road 22: Range 210. Habitat consisted of mostly mixed and native grassland and coast live oak riparian. The grassland areas were mostly burned in a recent fire, therefore were not in very good condition. Approximately 200 individuals of dwarf brodiaea were found at the eastern end of the survey area and 3 individuals were found in the next focus area to the west. The MCB Camp Pendleton GIS layer data had no rare plant occurrences for this area.

Road 23: Artillery/Storage Area 17. Habitat is mostly developed for training and consisted mostly of non-native grasslands with some disturbed coastal sage scrub. No rare plants were found during protocol surveys. The MCB Camp Pendleton GIS layer data had no rare plant occurrences for this area.

Road 24: Range 407/Artillery 18. Habitat consisted mostly of non-native and native grasslands. One population of 491 many-stemmed dudleya was found and recorded at this site on a north facing slope south of the dirt access road and north of the SIAC (Appendix D, CNDDB forms and Figure 24-2). The MCB Camp Pendleton GIS layer data had no rare plant occurrences for the project area at Road 24. A pre-1997 record of *Dichondra occidentalis* is identified in the MCB Camp Pendleton GIS data along the Range 407 access road, but not within or near the current project.

CONCLUSIONS AND RECOMMENDATIONS

No state or federally threatened or endangered or proposed species were encountered during 2007 and 2008 rare plant surveys. Three CNPS list 1B species and 1 CNPS list 4 species were encountered during 2007 and 2008 rare plant surveys. Recommend that the three CNPS 1B species and the Engelmann oaks, CNPS list 4, be avoided during the repair of the access roads. Further investigation of the taxonomic status of the unidentified *Senecio* and *Ceanothus* and, depending on the resolution, the extent of their occurrence on MCB Camp Pendleton is recommended.

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APPENDIX A
FIGURES

The attached figures are organized by road number. An overview figure is provided for each road, showing the survey transects and the study area. Rare plants were found at Roads 2, 10, 16, 17, 18, and 24; unusual or otherwise notable species were mapped at Roads 9 and 22. For each of these roads, insets of the rare plant locations are provided at a scale of 1:4800. To ensure consistency, the Figure numbers correspond with the Figure numbers provided in the Plant Community Mapping Report and Wetland Delineation (TEC 2007a, 2007b), and thus are not always sequential in this Rare Plant Report.

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Figure 21-0 Road 21 Overview A-29
Figure 22-0 Road 22 Overview A-30
Figure 23-0 Road 23 Overview A-31
Figure 24-0 Road 24 Overview A-32
Figure 24-2 Road 24 Inset A-33

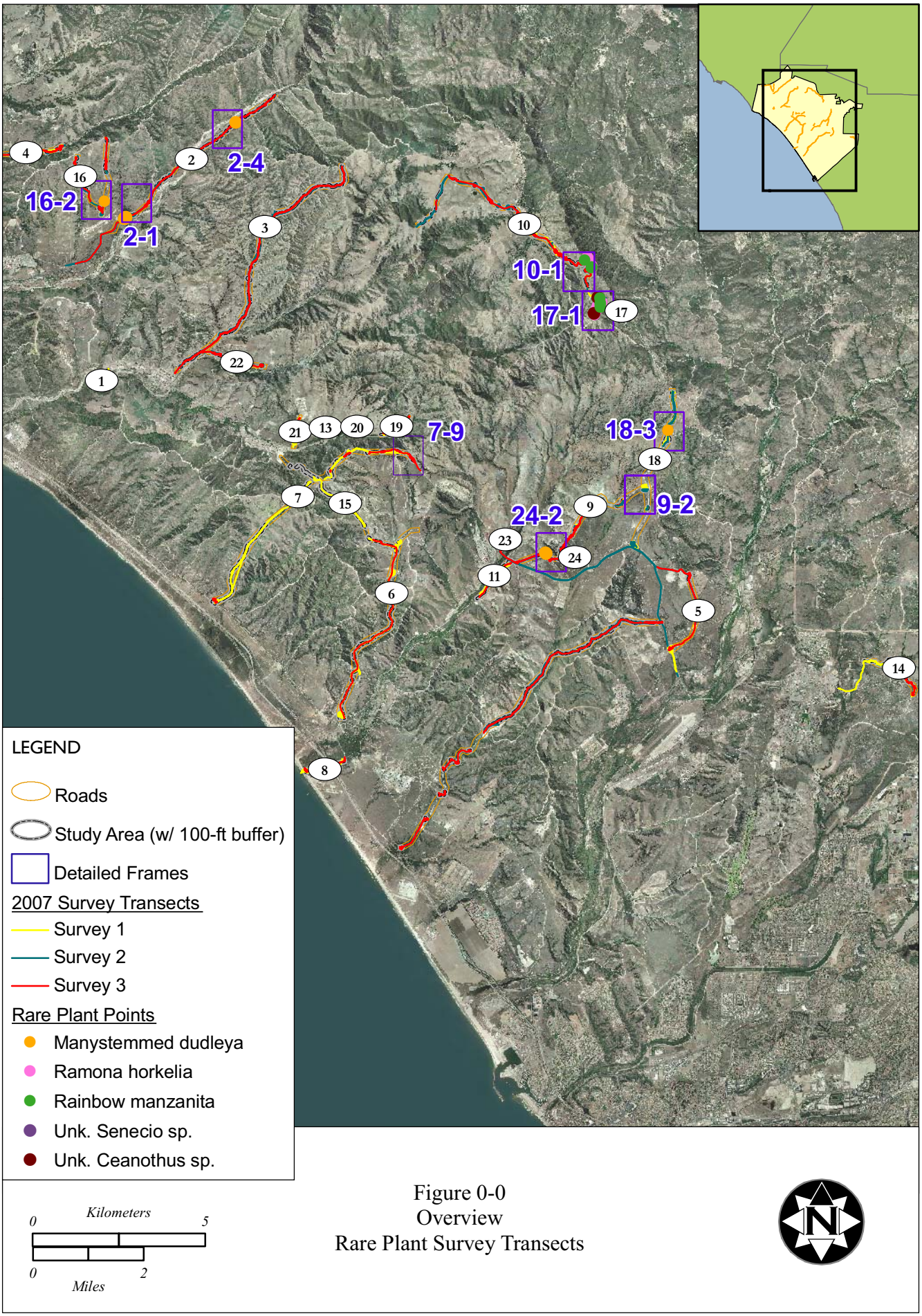
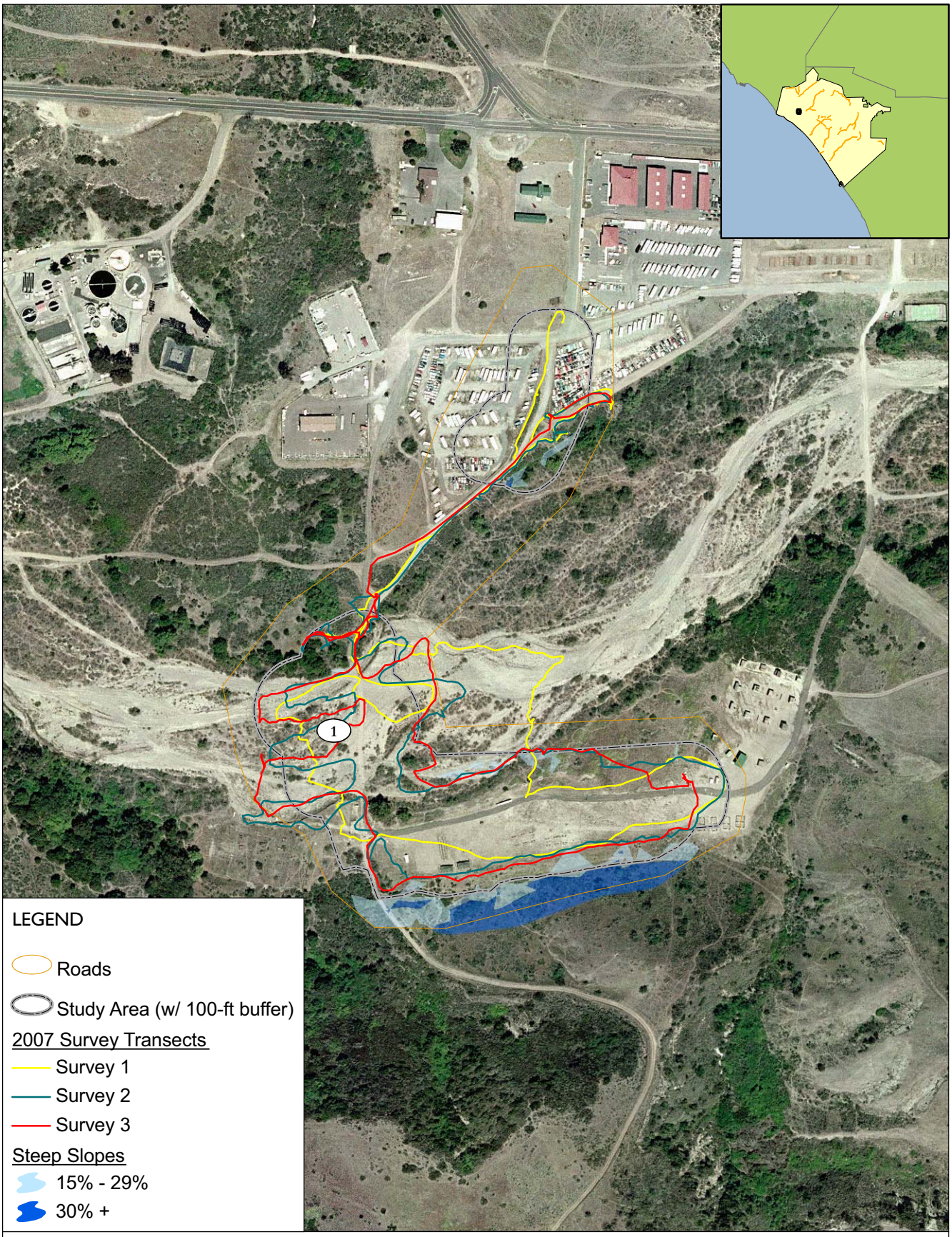


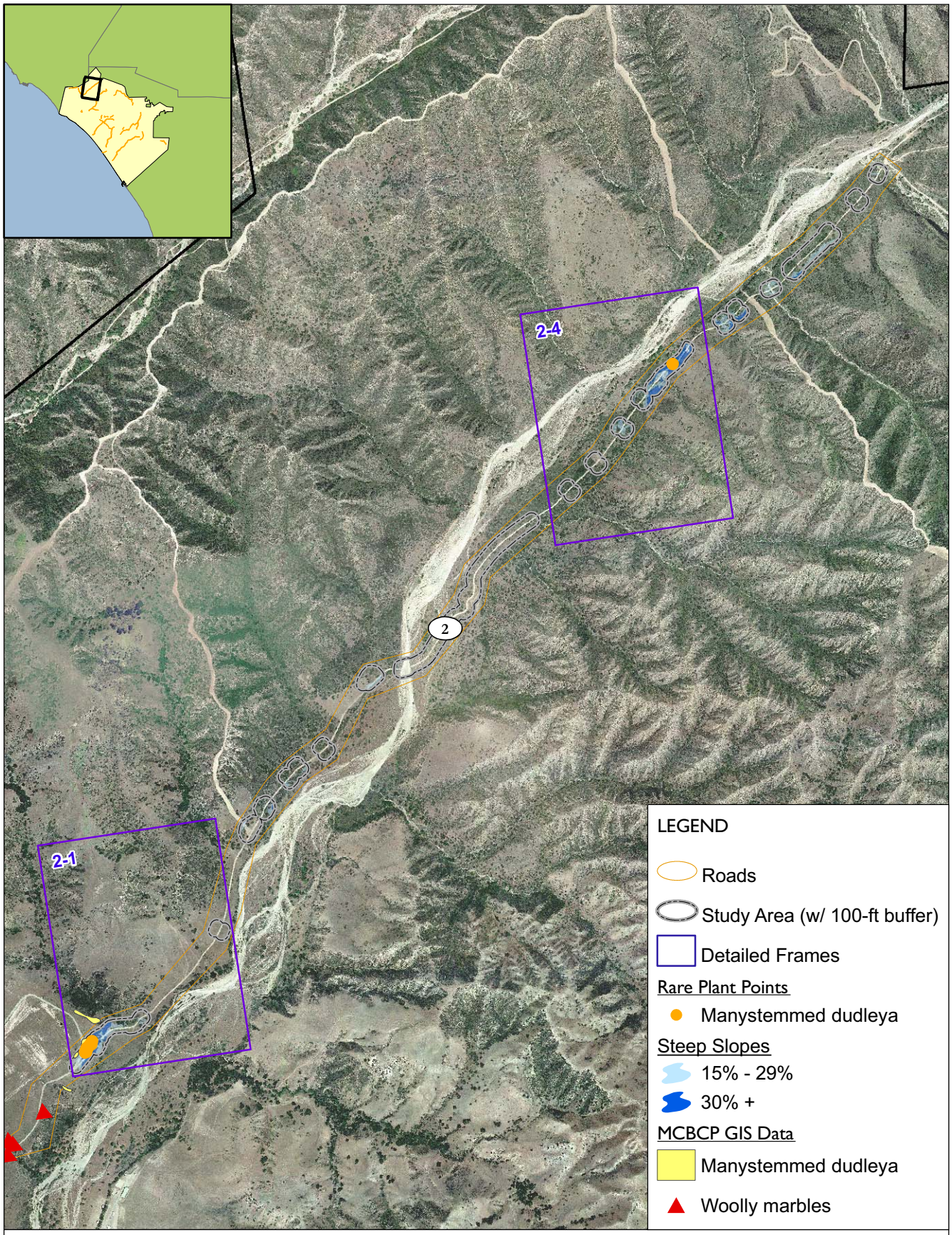
Figure 0-0
Overview
Rare Plant Survey Transects



0 Meters 40

0 150 Feet

Figure 1-0
Road 1; Overview
Rare Plant Survey Transects



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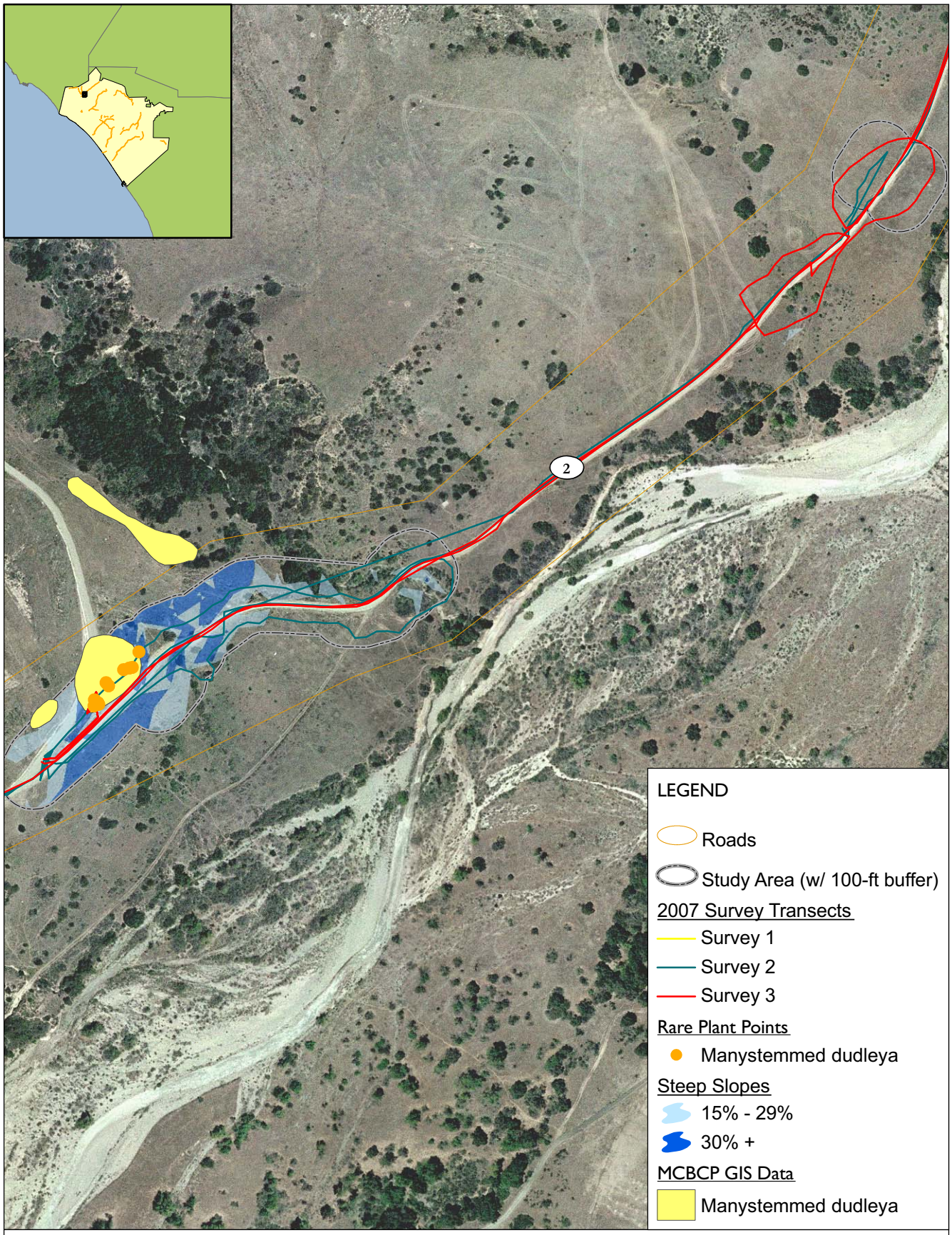
Feet

Figure 2-0
Road 2; Overview
Rare Plant Survey Transects



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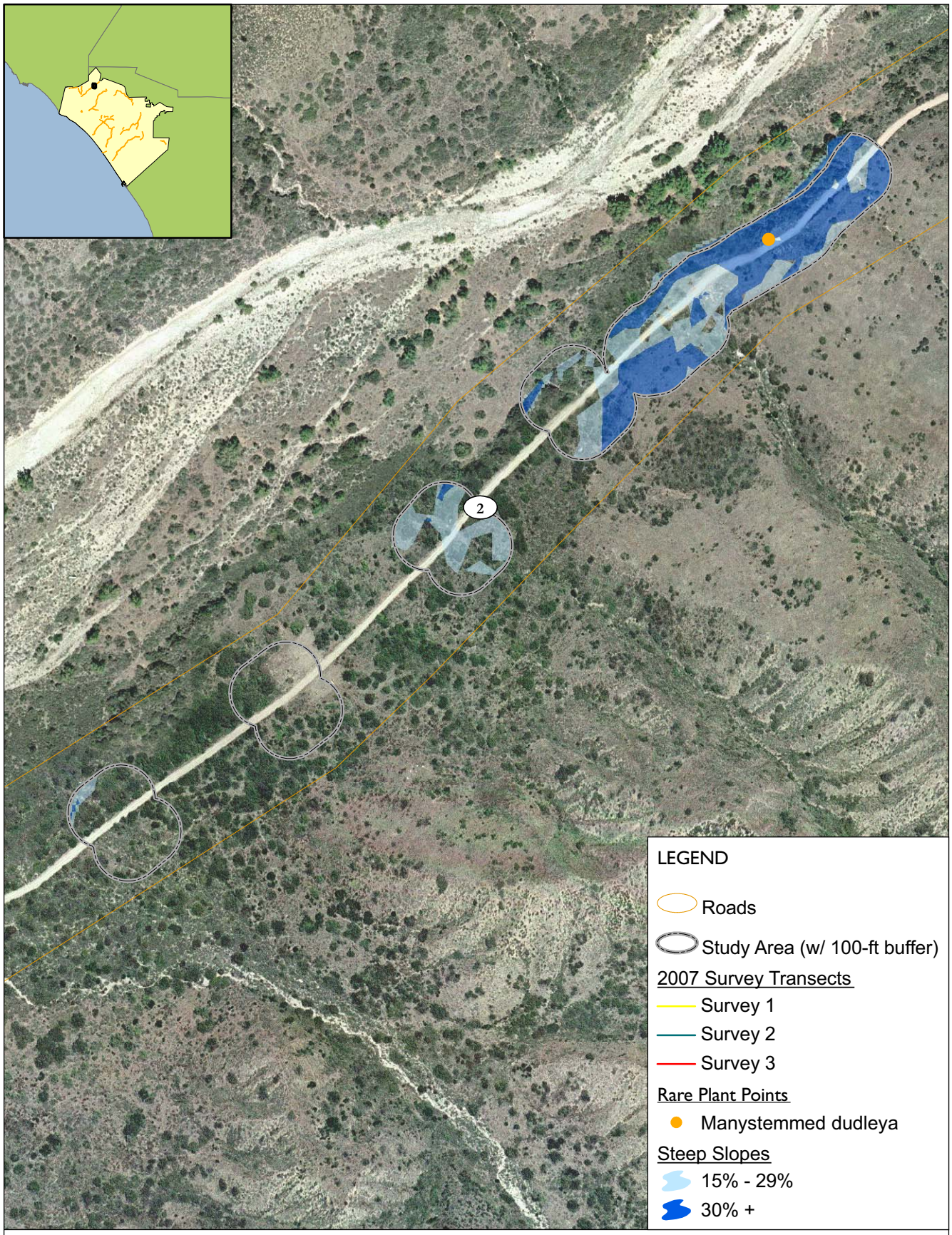
0 150 Feet

Figure 2-1
Road 2; Southwest Inset
Rare Plant Survey Transects



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0 150 Feet

Figure 2-4
Road 2; Northeast Inset
Rare Plant Survey Transects

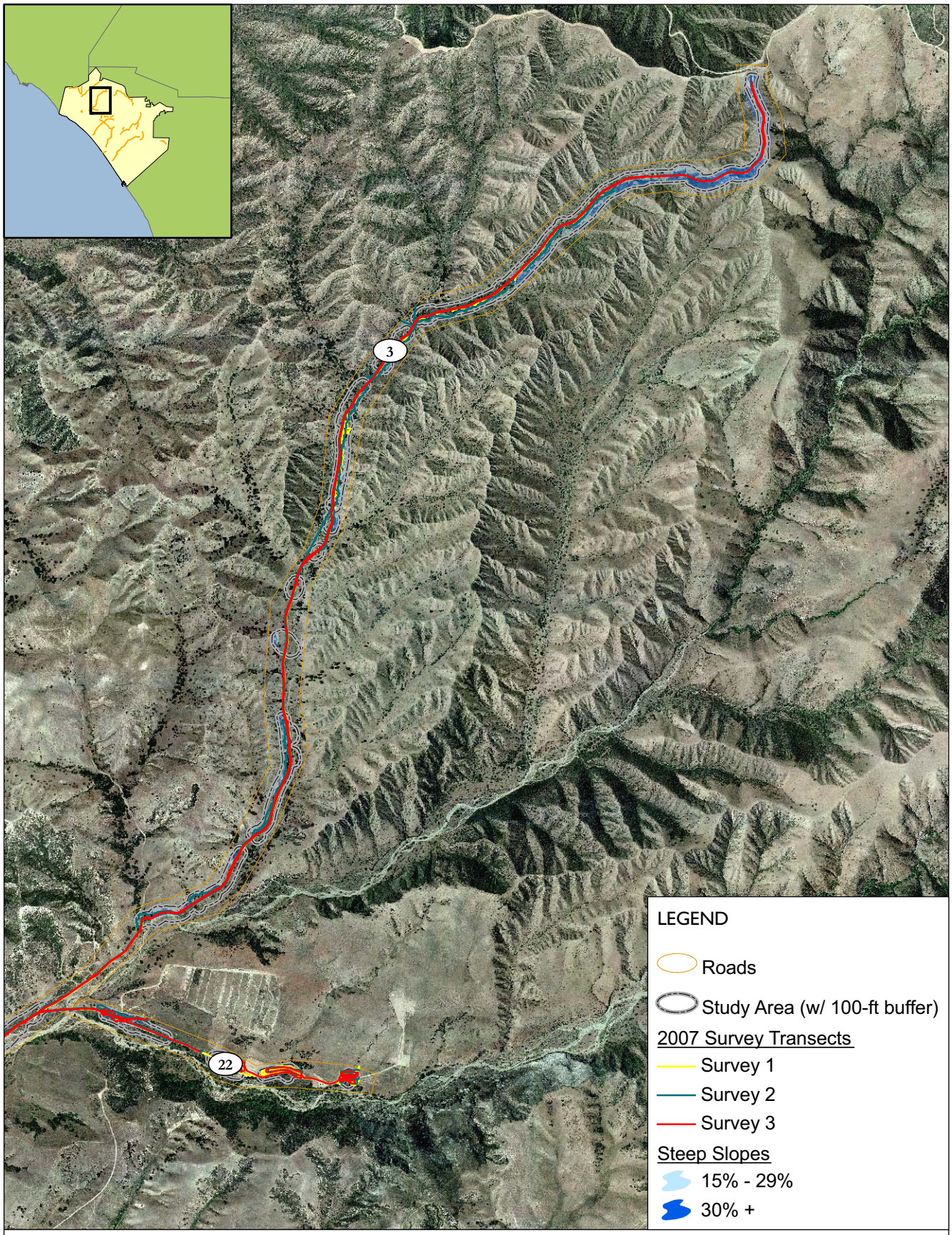

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Figure 3-0
Road 3; Overview
Rare Plant Survey Transects

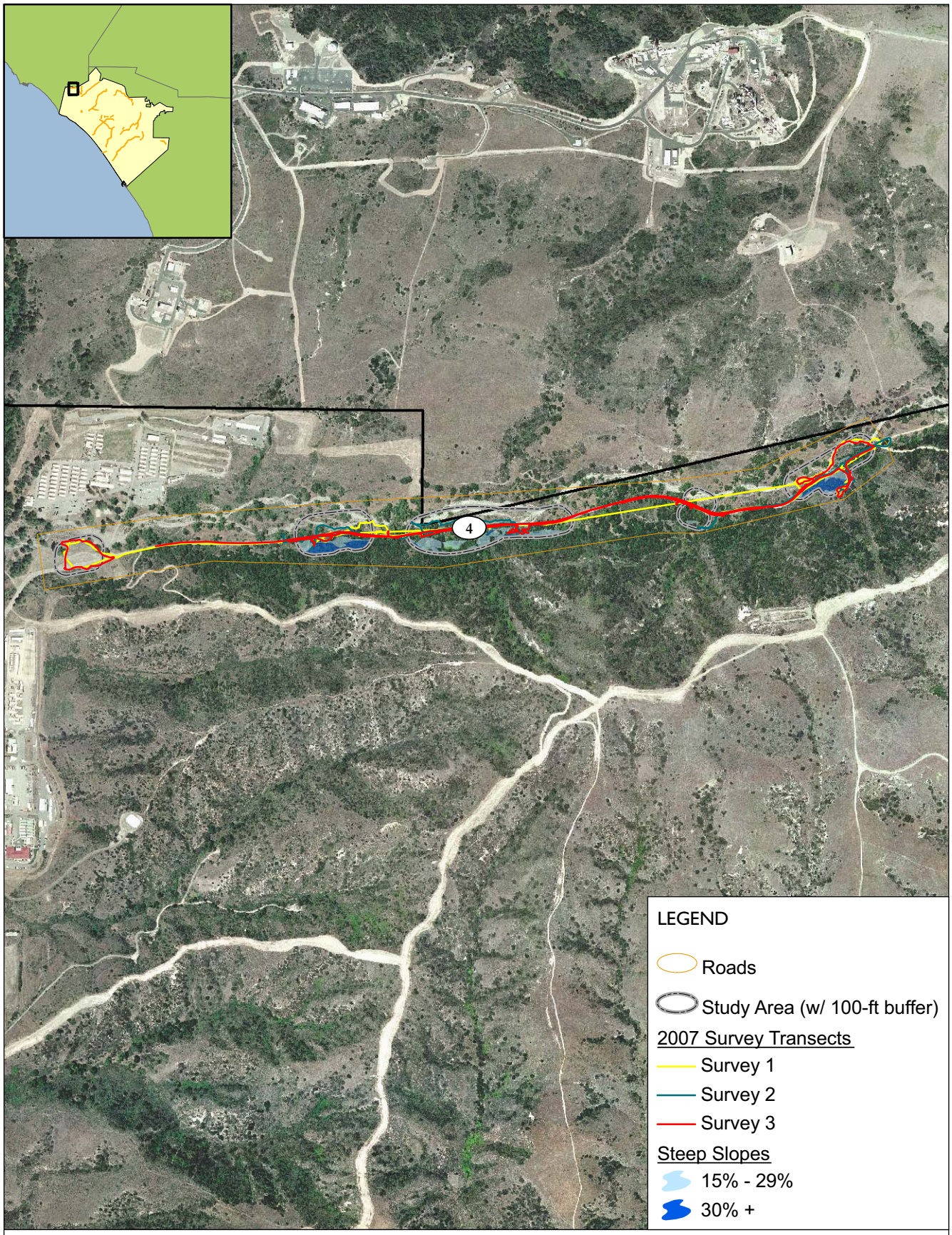

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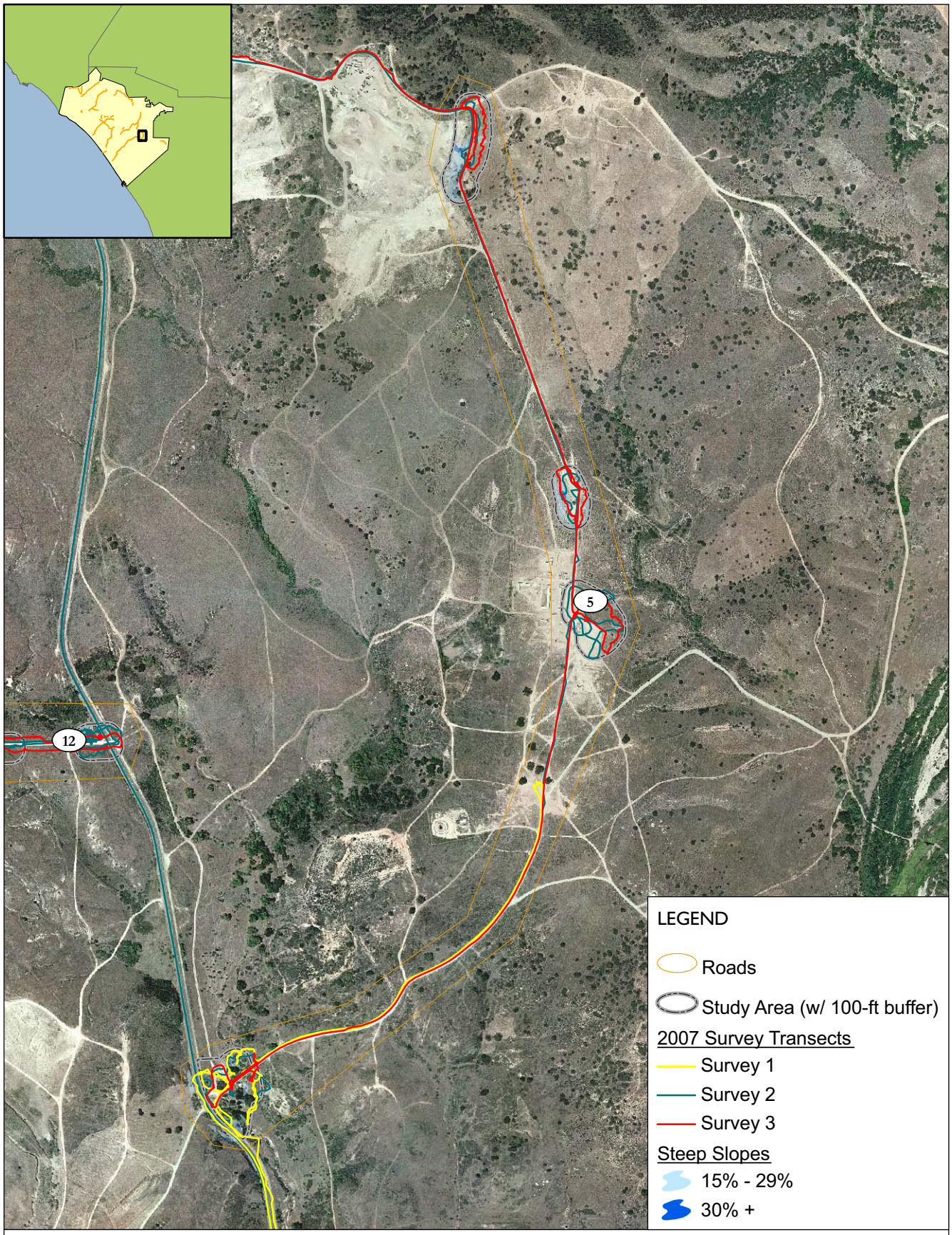
Figure 4-0
Road 4; Overview
Rare Plant Survey Transects



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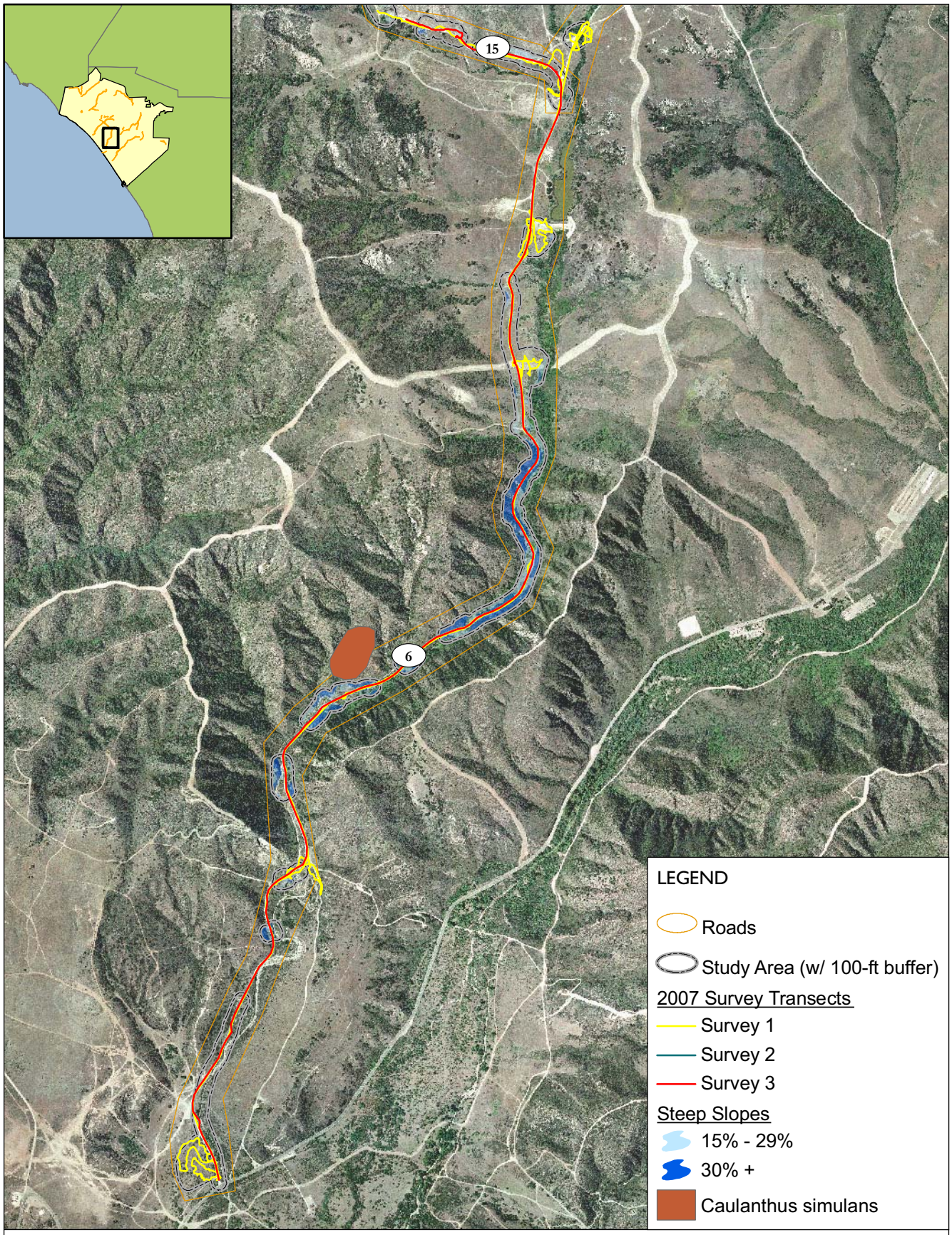
0 380 Feet

Figure 5-0
Road 5; Overview
Rare Plant Survey Transects



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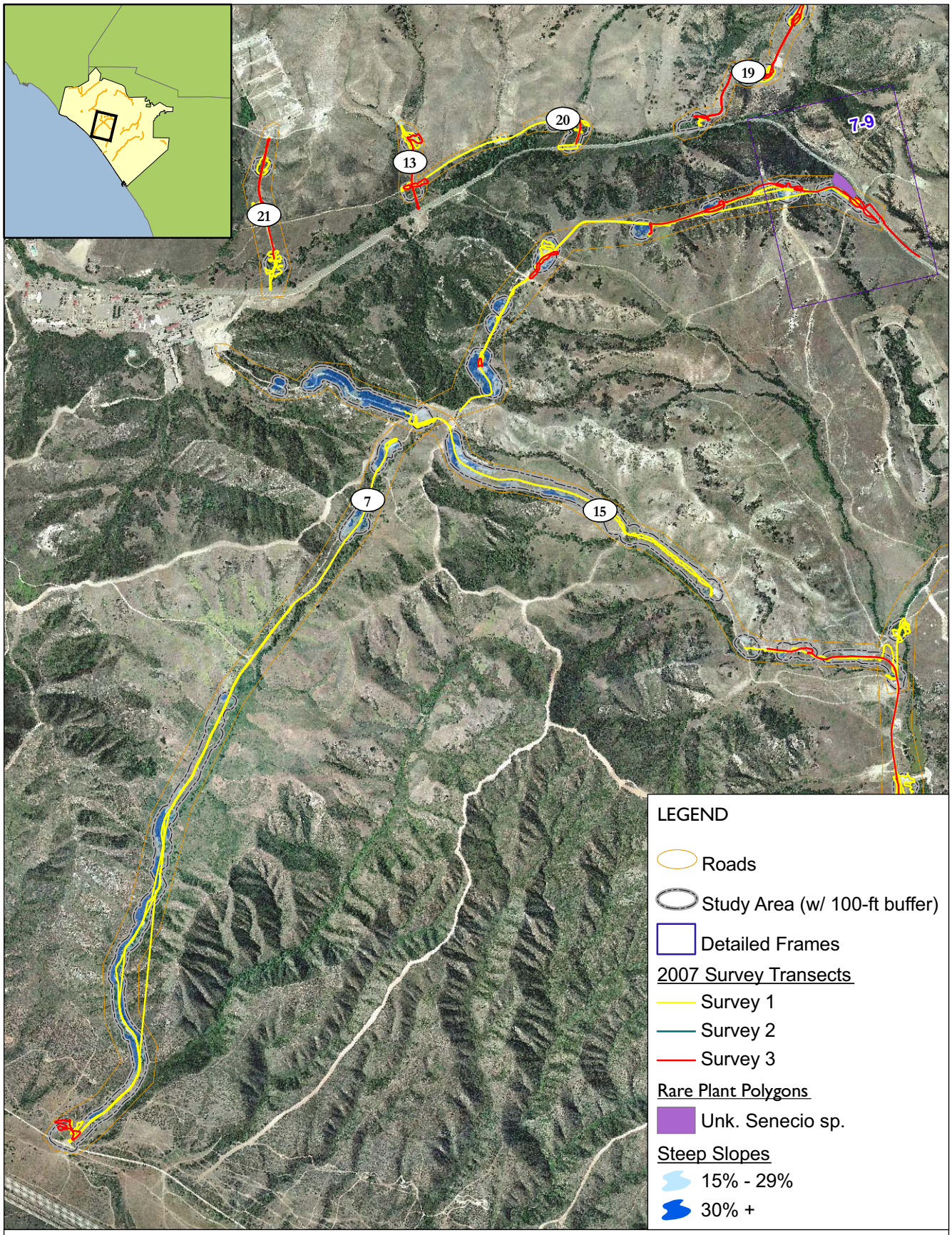
0 750 Feet

Figure 6-0
Road 6; Overview
Rare Plant Survey Transects



Meters
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Feet

Figure 7-0
Road 7; Overview
Rare Plant Survey Transects

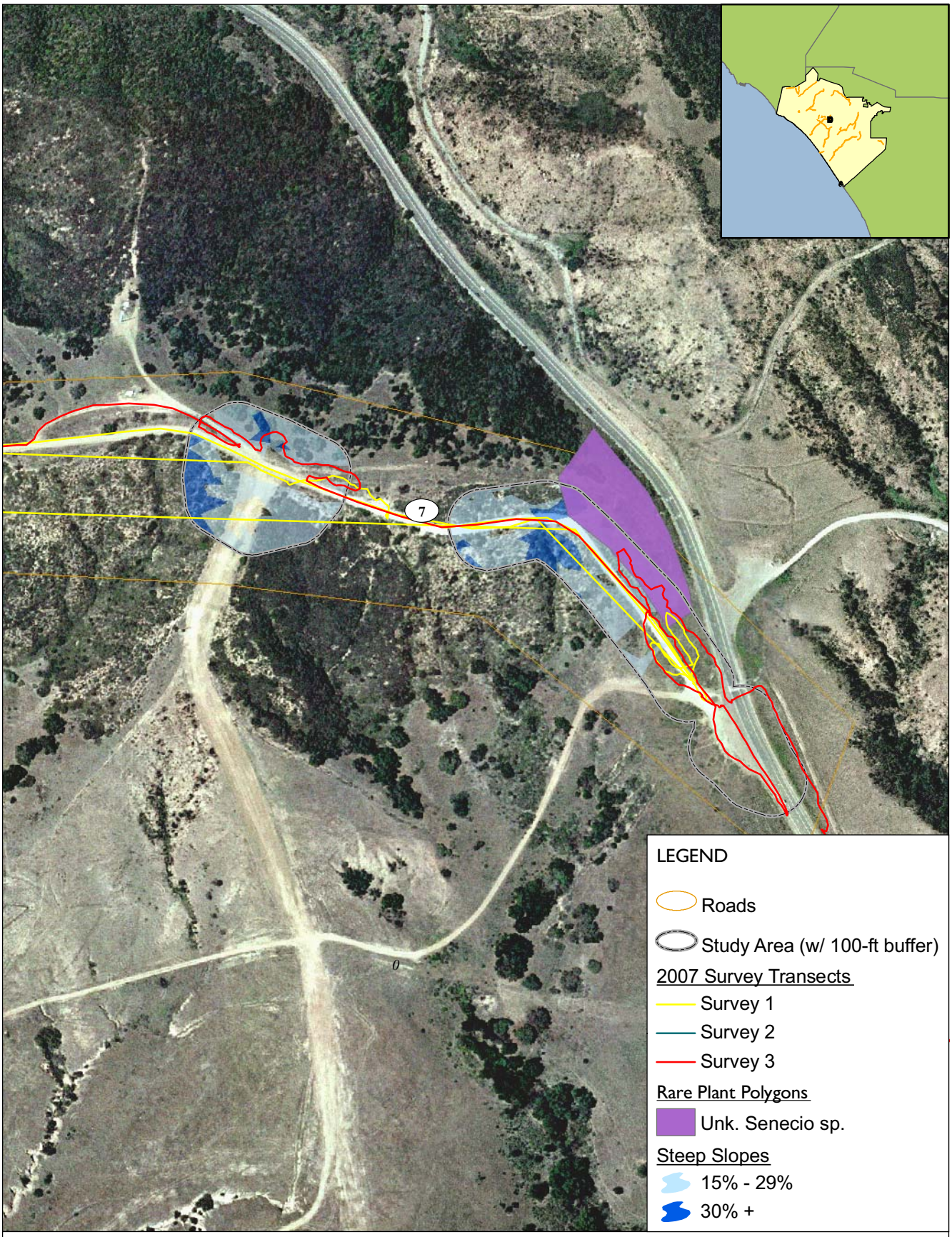

Figure 7-9
Road 7; Inset
Rare Plant Survey Transects

Meters
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Feet

Figure 8-0
Road 8; Overview
Rare Plant Survey Transects

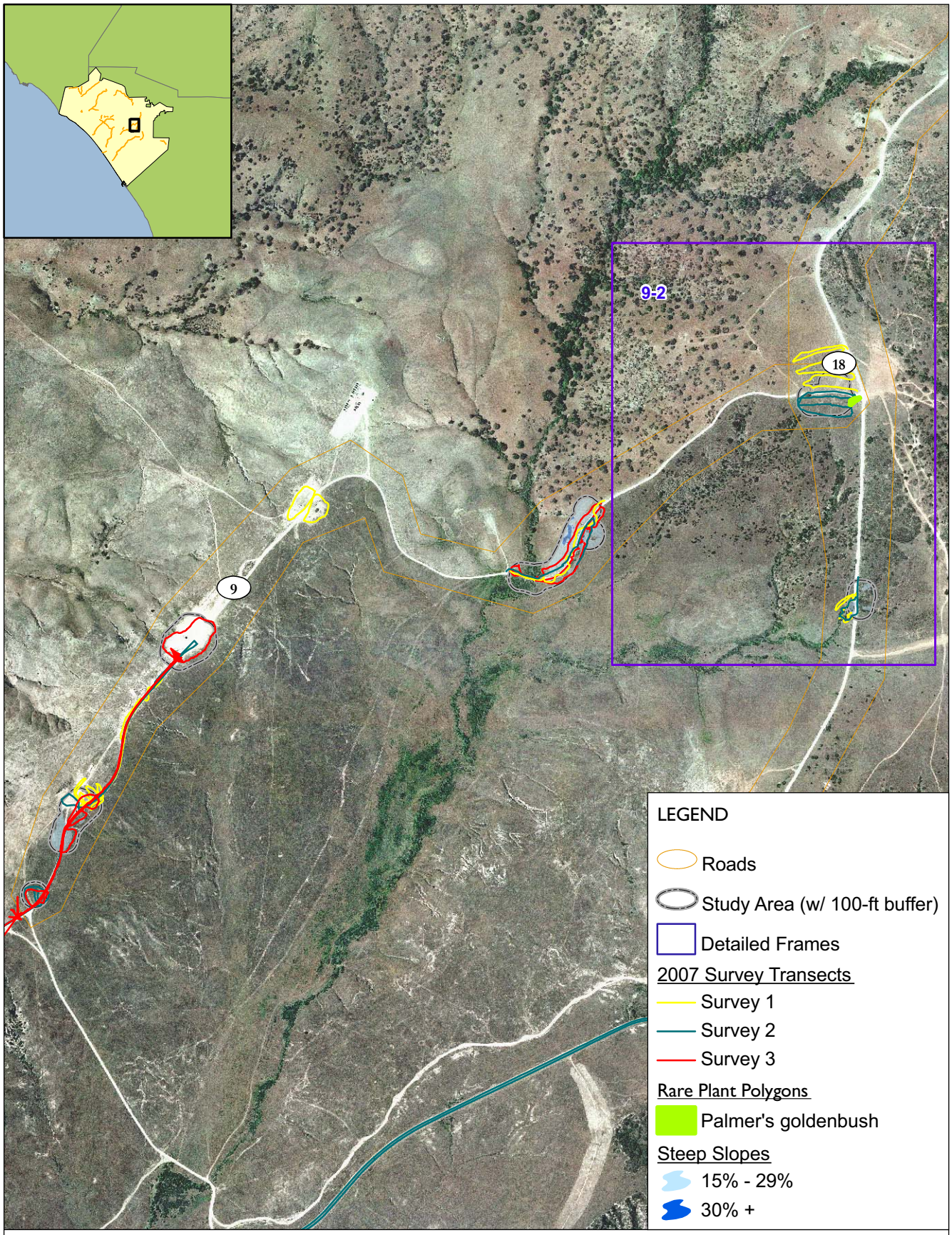

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Figure 9-0
Road 9; Overview
Rare Plant Survey Transects

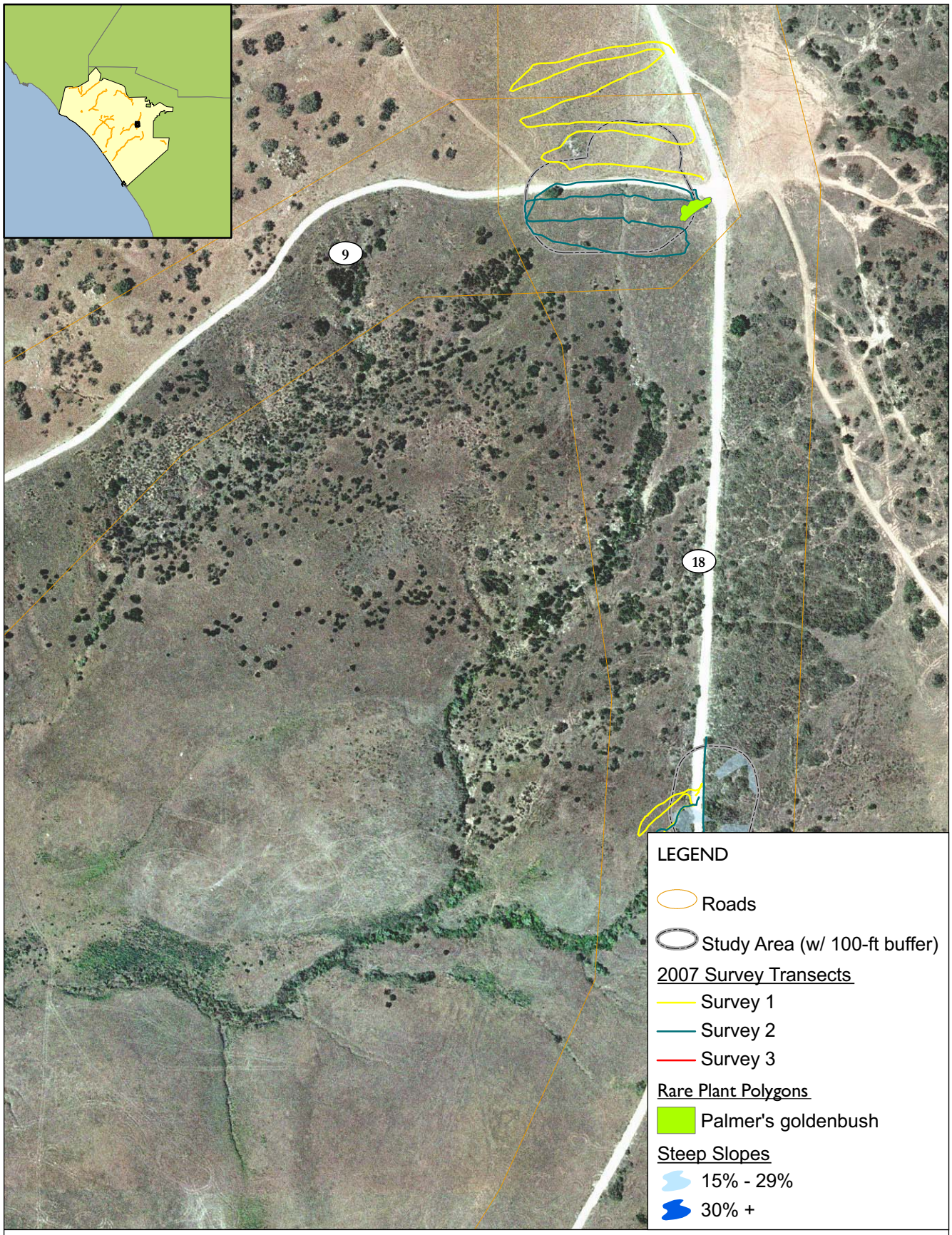

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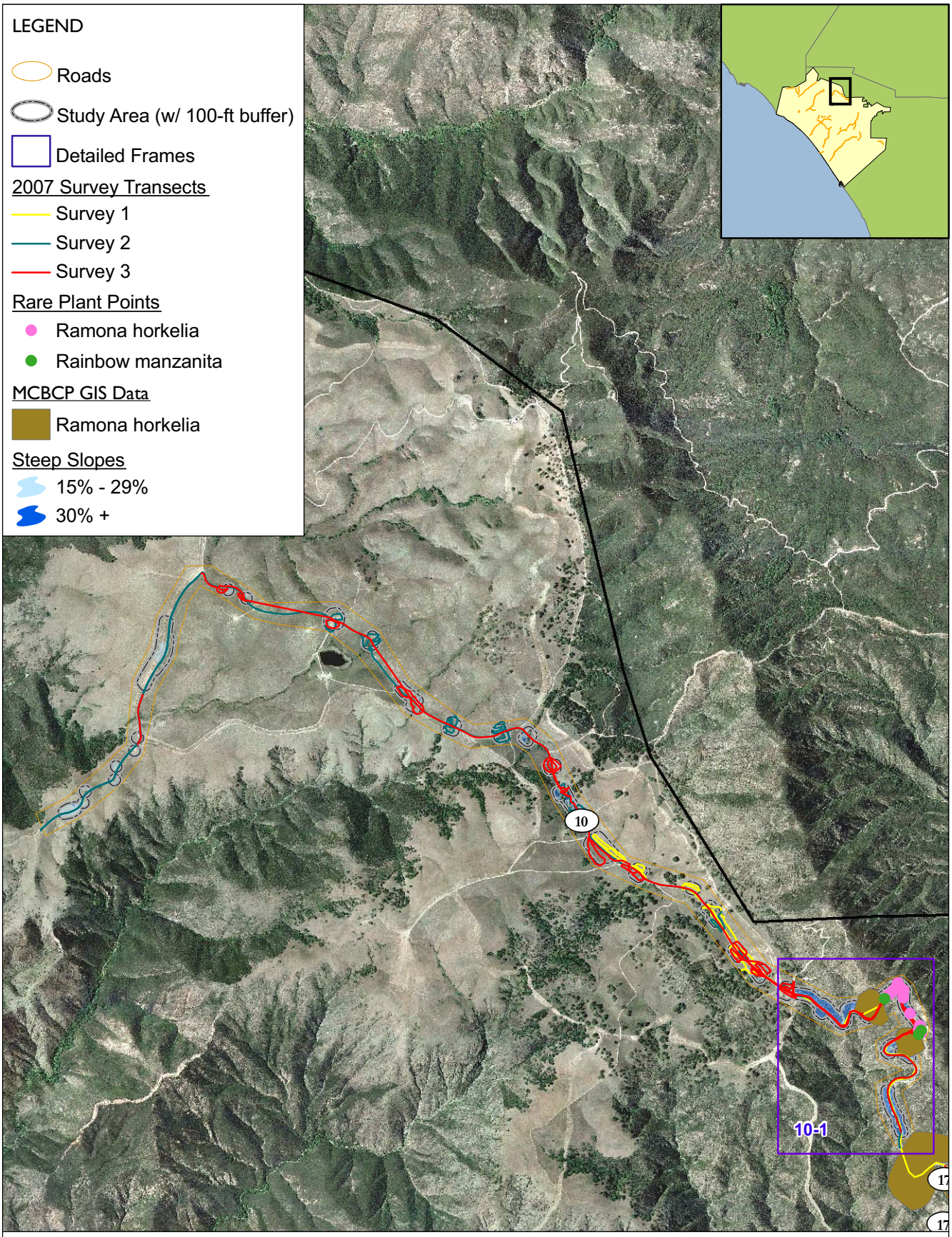
Figure 9-2
Road 9; Inset
Rare Plant Survey Transects



Meters
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Feet

Figure 10-0
Road 10; Overview
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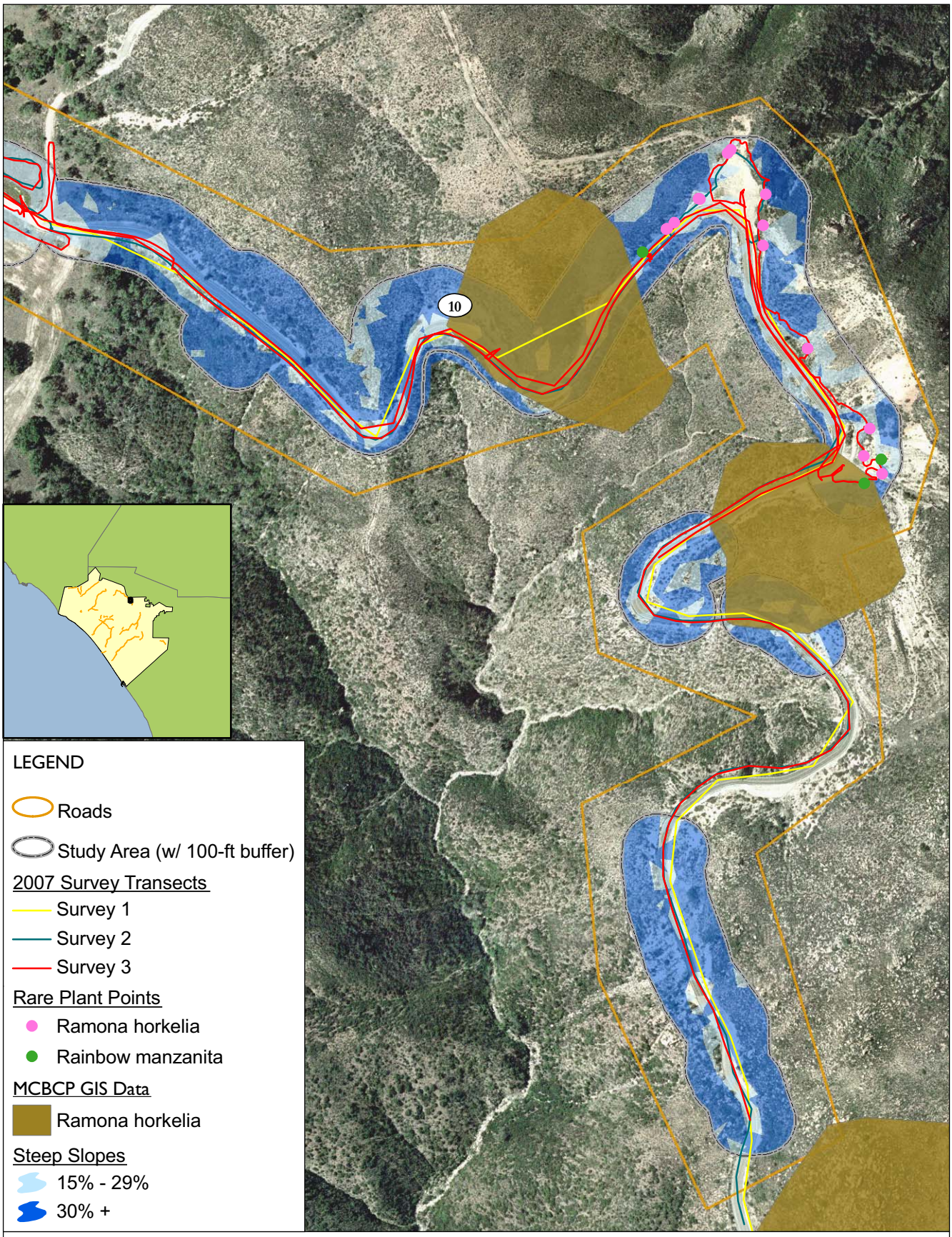

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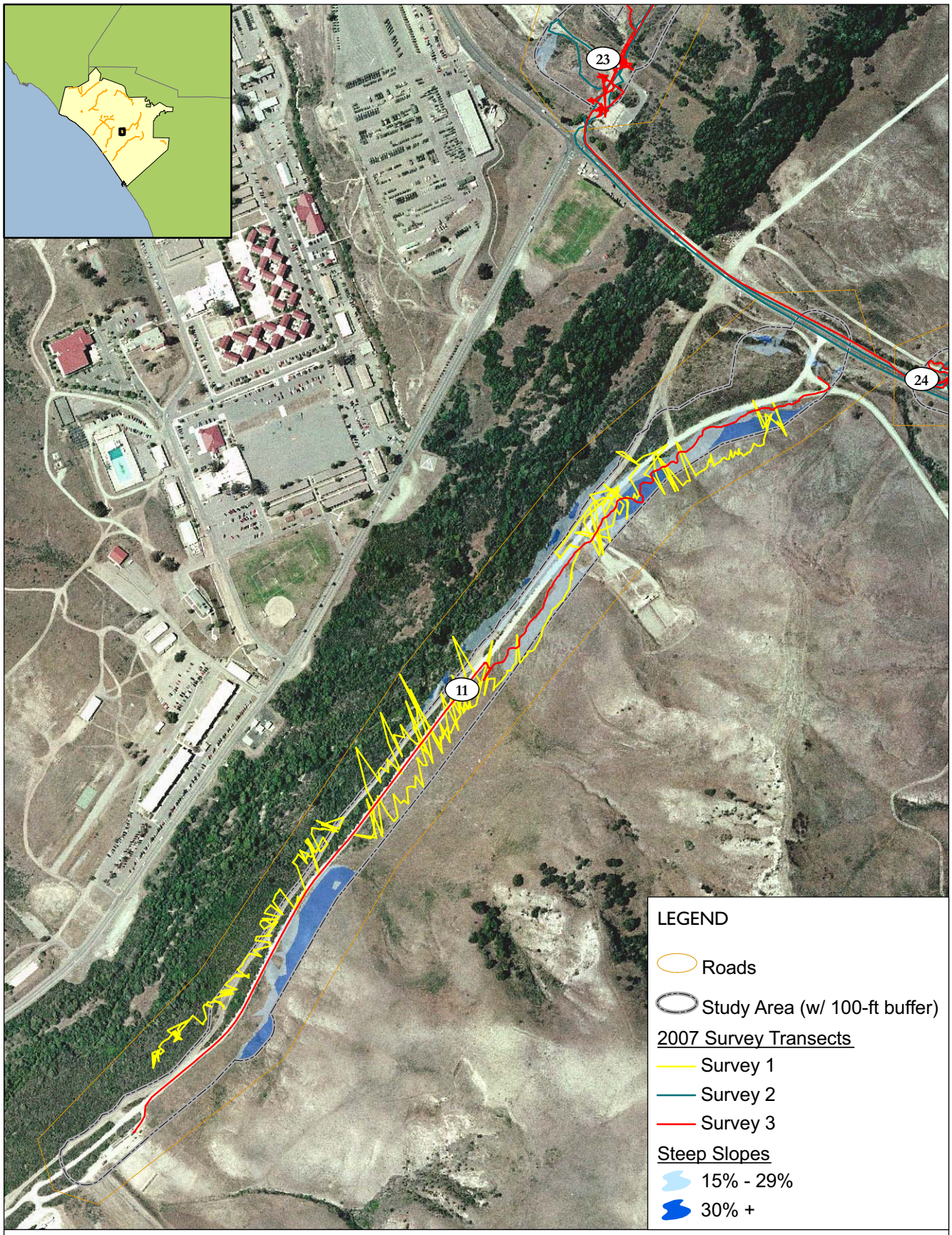
Figure 10-1
Road 10; Inset
Rare Plant Survey Transects



Meters
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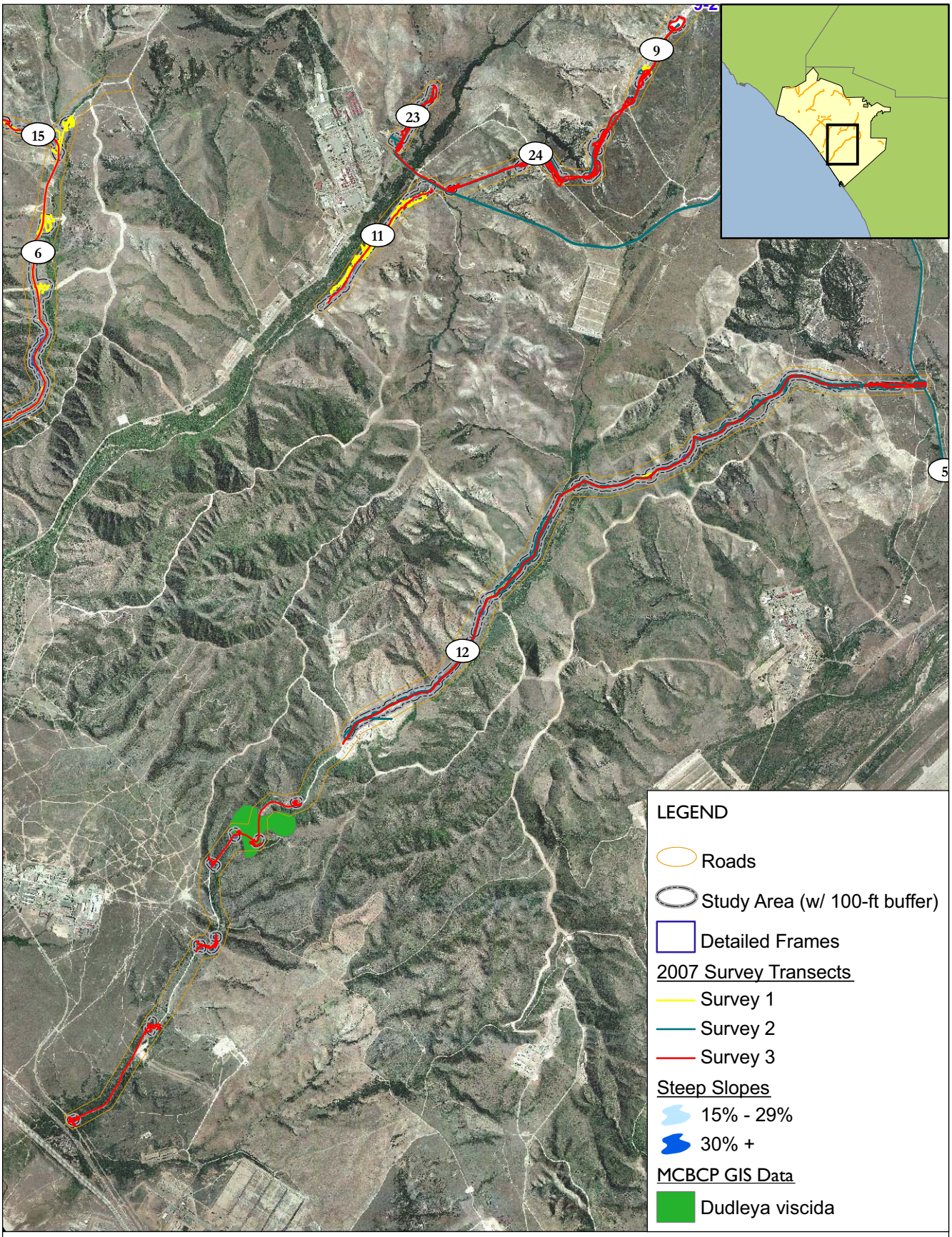
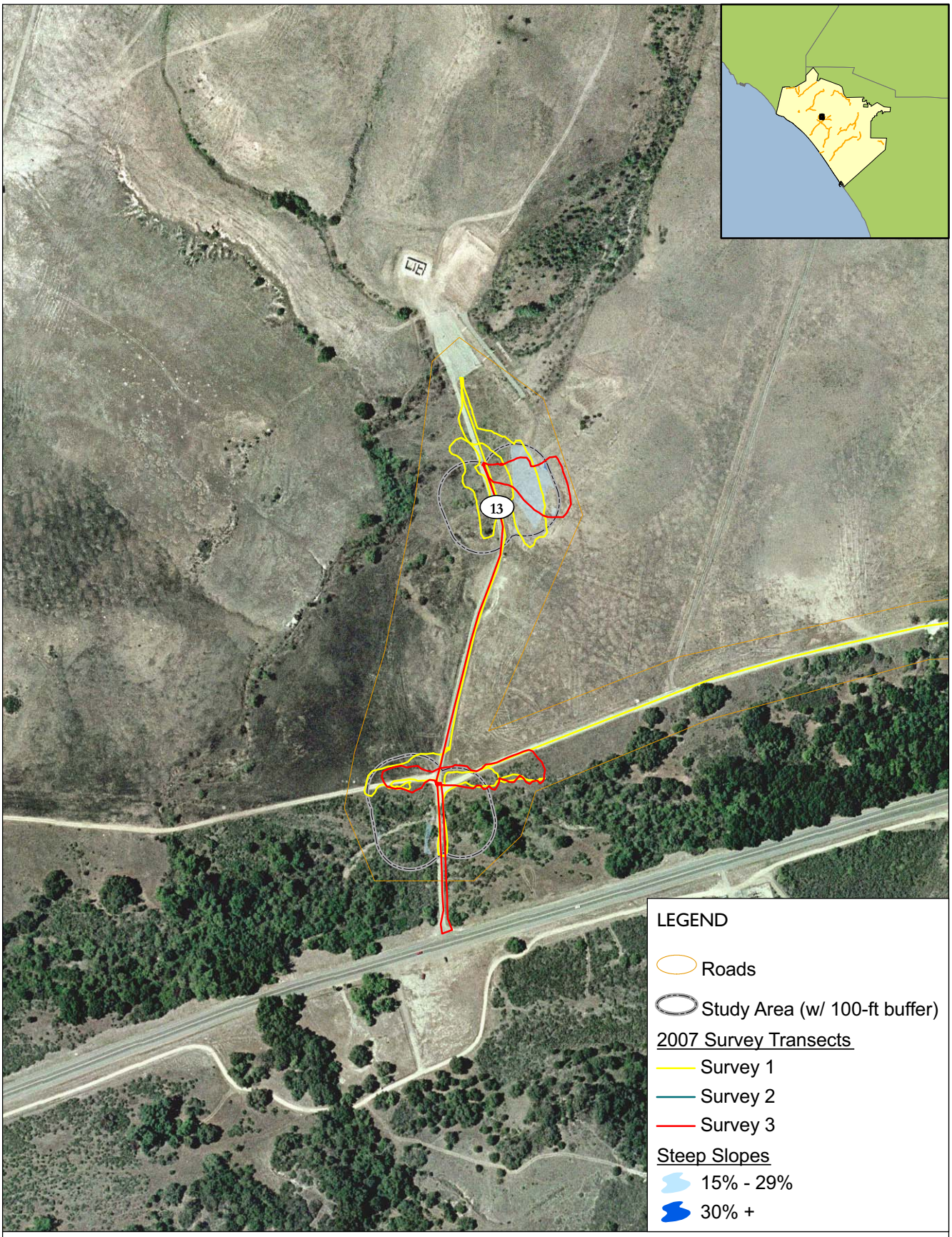
Feet

Figure 11-0
Road 11; Overview
Rare Plant Survey Transects



Meters
0 300
0 1,480
Feet

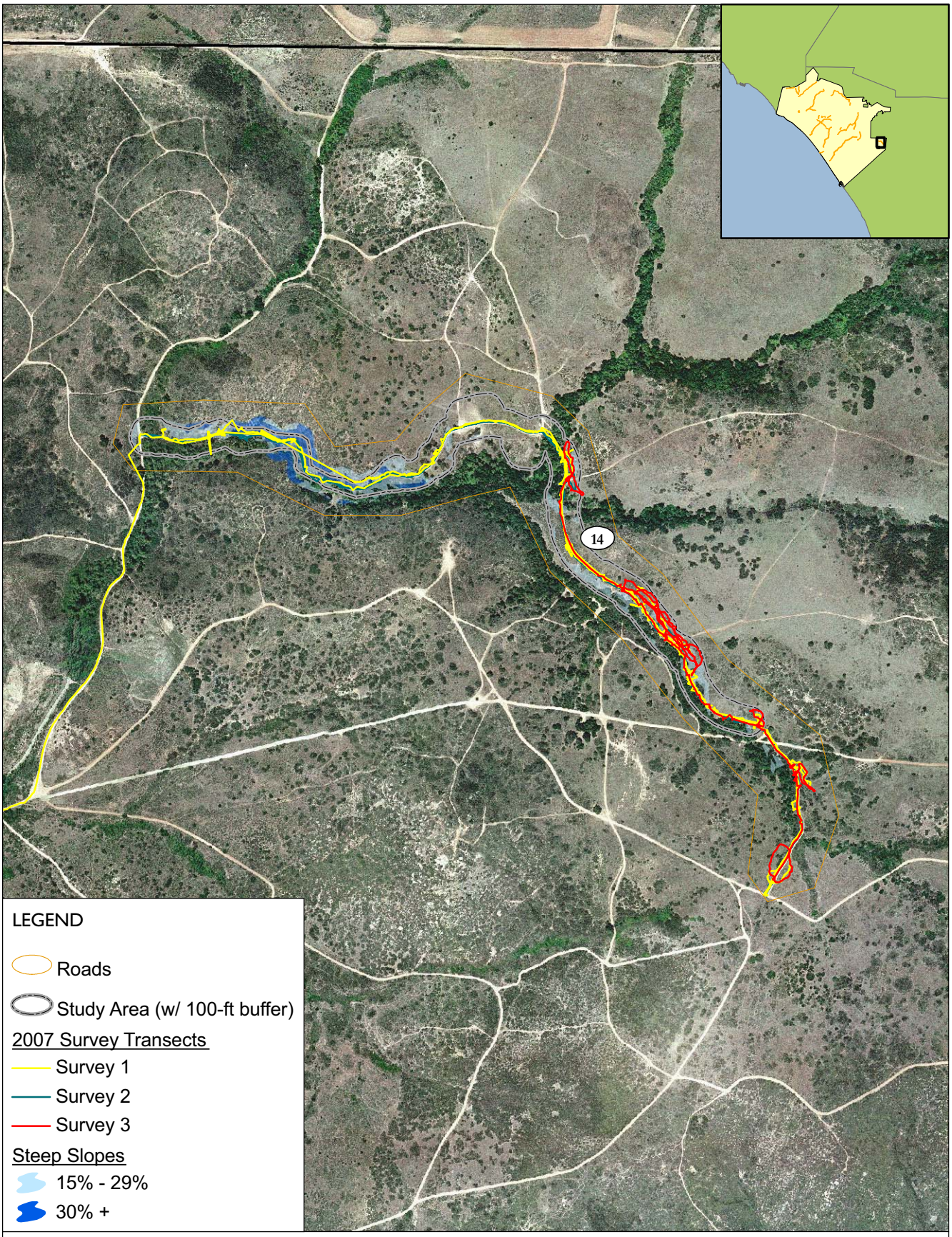
Figure 12-0
Road 12; Overview
Rare Plant Survey Transects



0 Meters 40

0 150 Feet

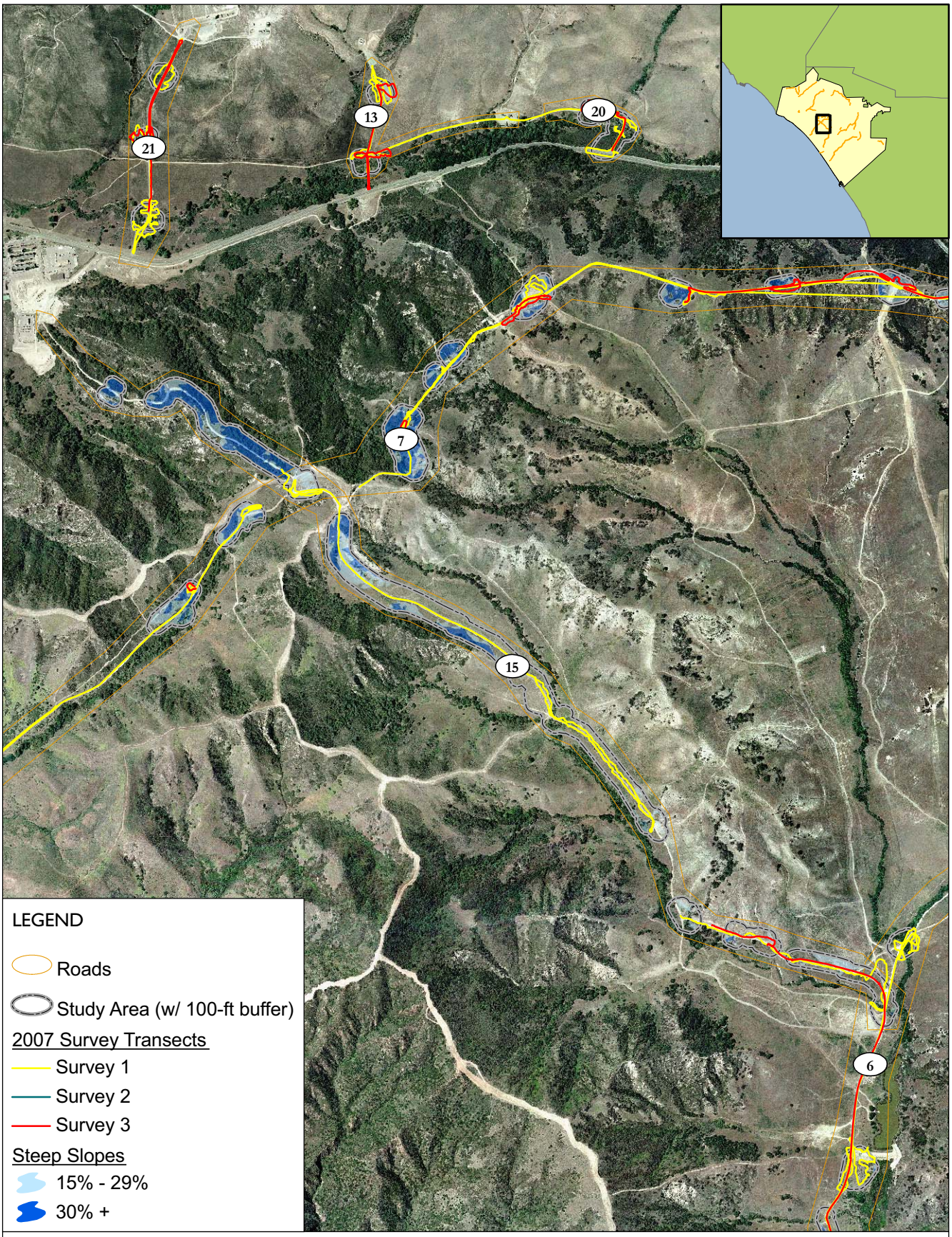
Figure 13-0
Road 13; Overview
Rare Plant Survey Transects



0 Meters 100

0 380 Feet

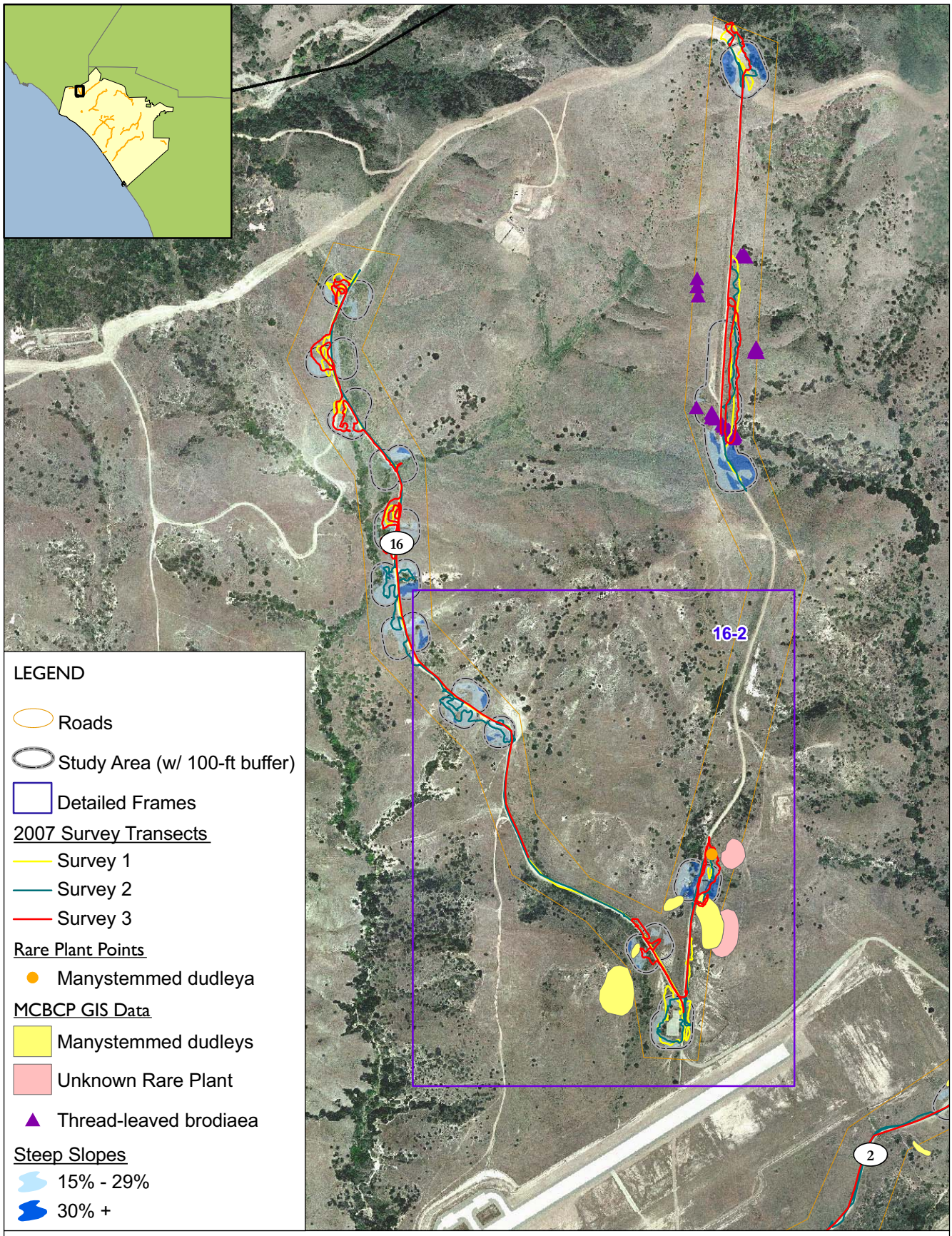
Figure 14-0
Road 14; Overview
Rare Plant Survey Transects



0 Meters 180

0 680 Feet

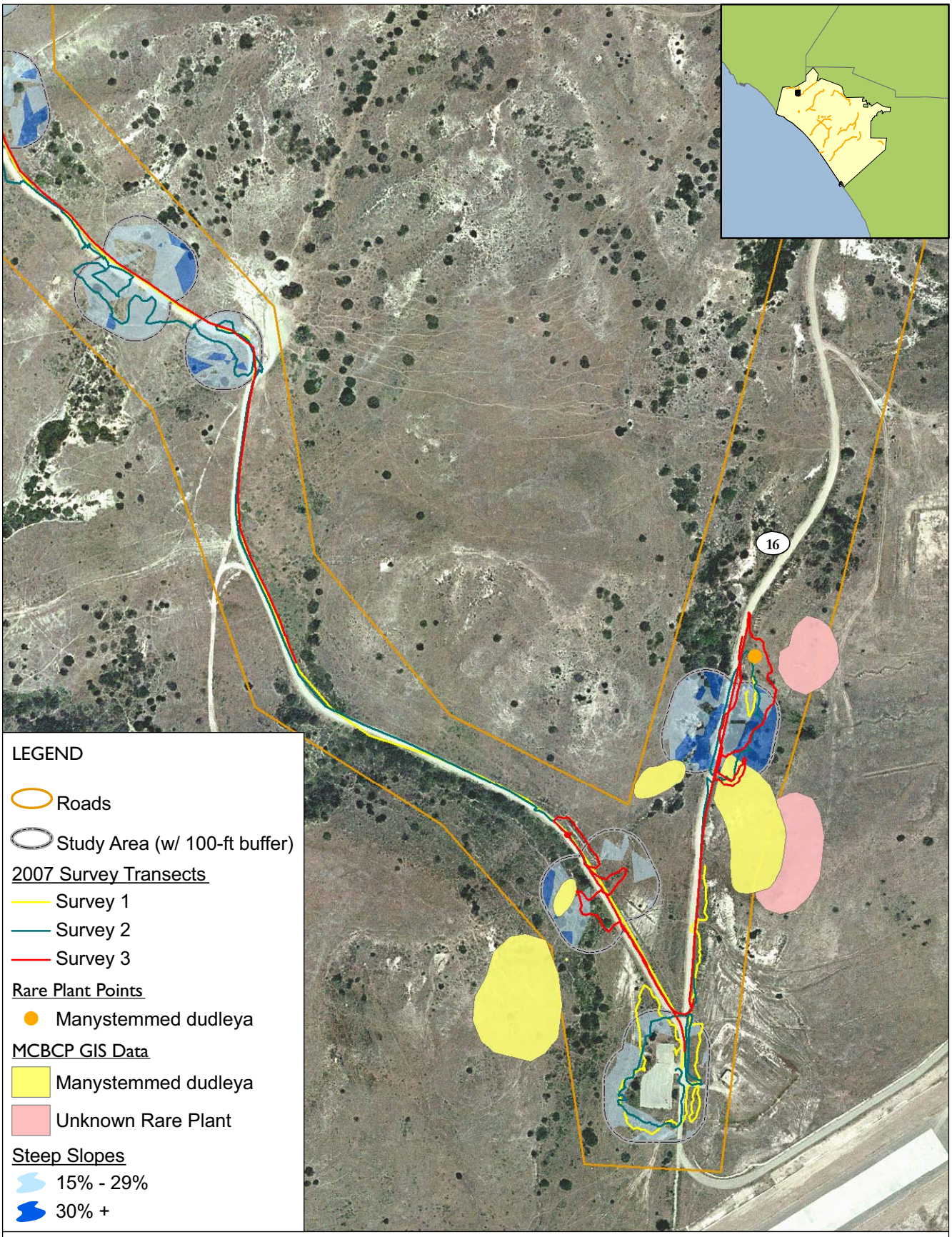
Figure 15-0
Road 15; Overview
Rare Plant Survey Transects



Meters 0 80

0 380 Feet

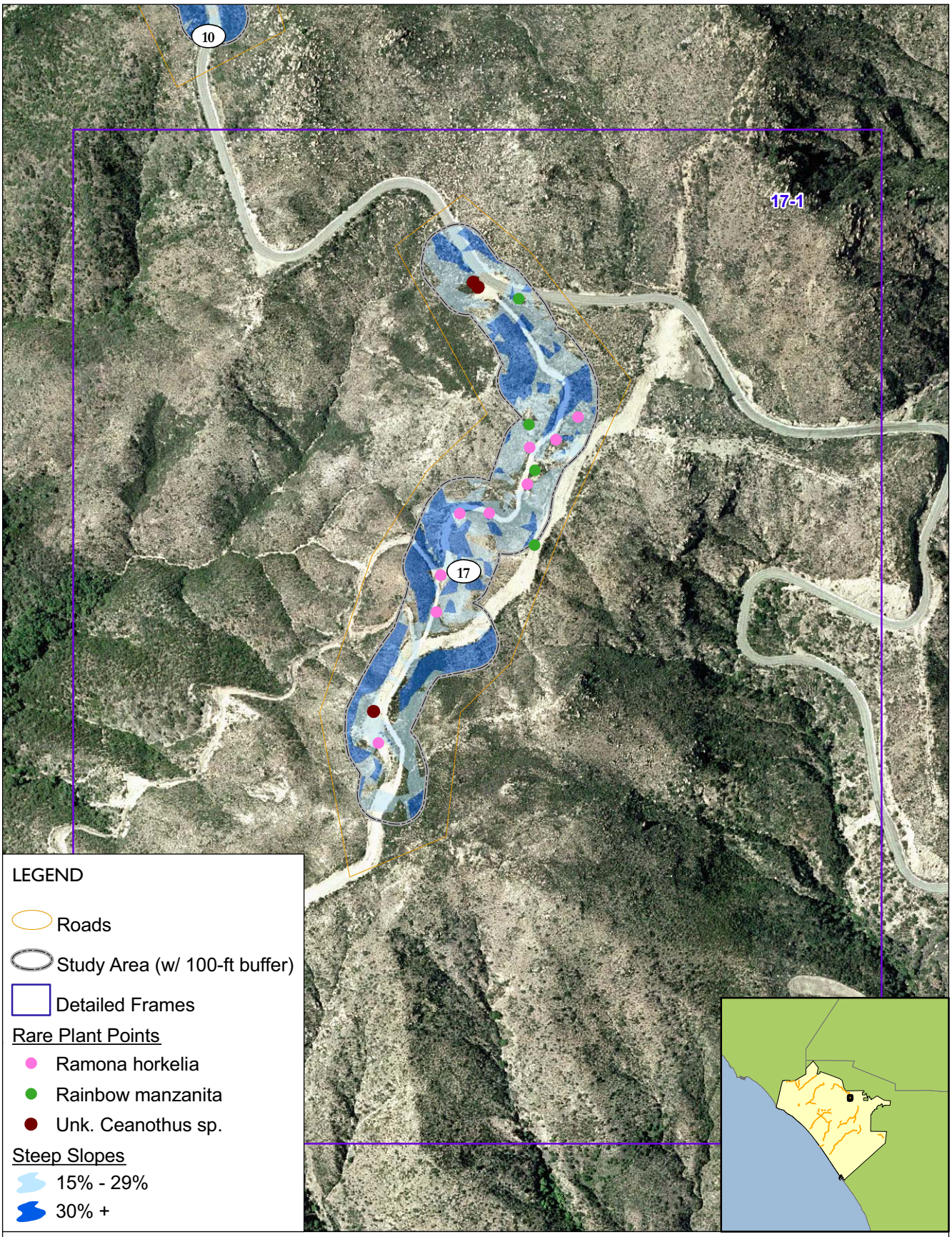
Figure 16-0
Road 16; Overview
Rare Plant Survey Transects



0 Meters 100

0 Feet 400

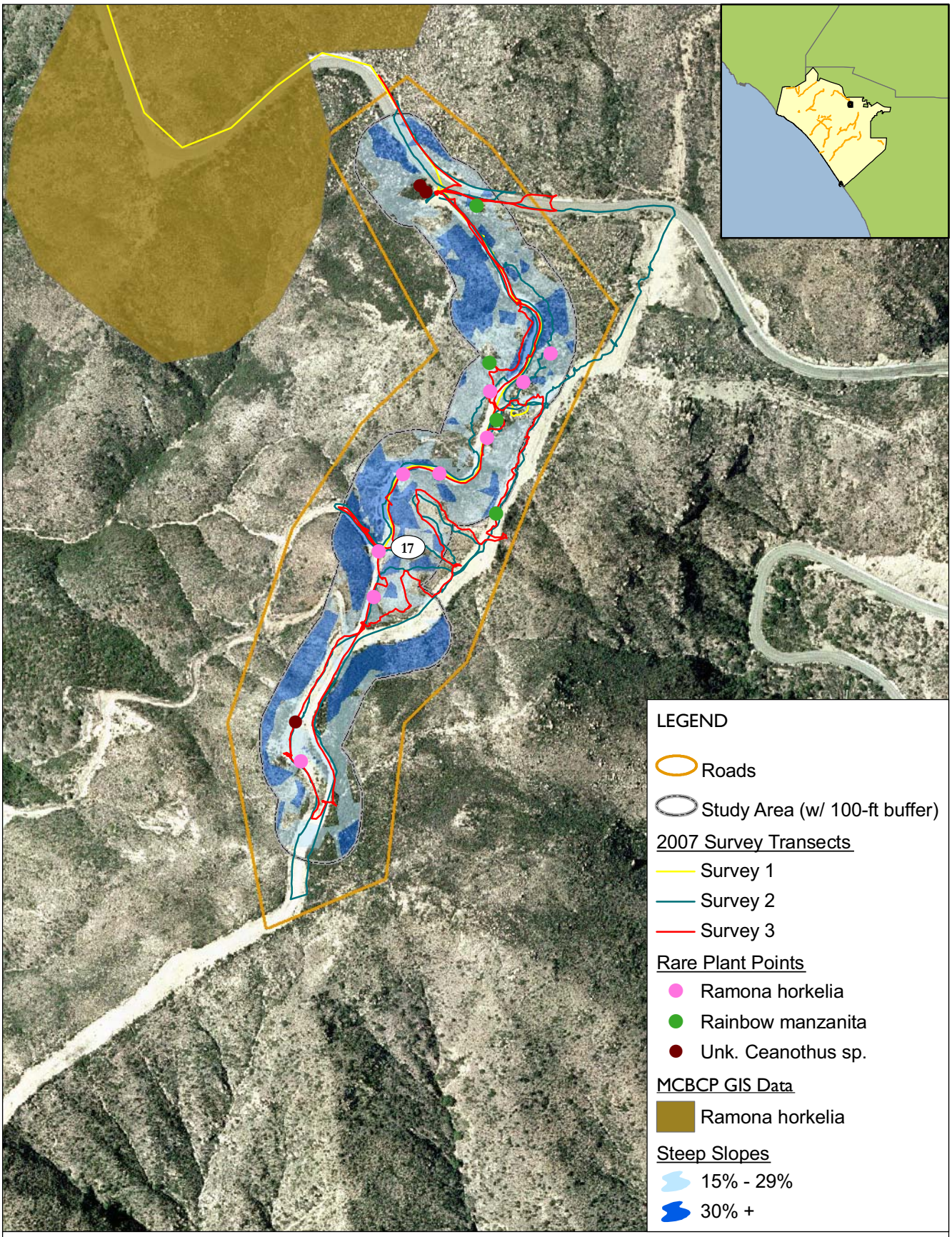
Figure 16-2
Road 16; Inset
Rare Plant Survey Transects



Meters 0 40

0 180 Feet

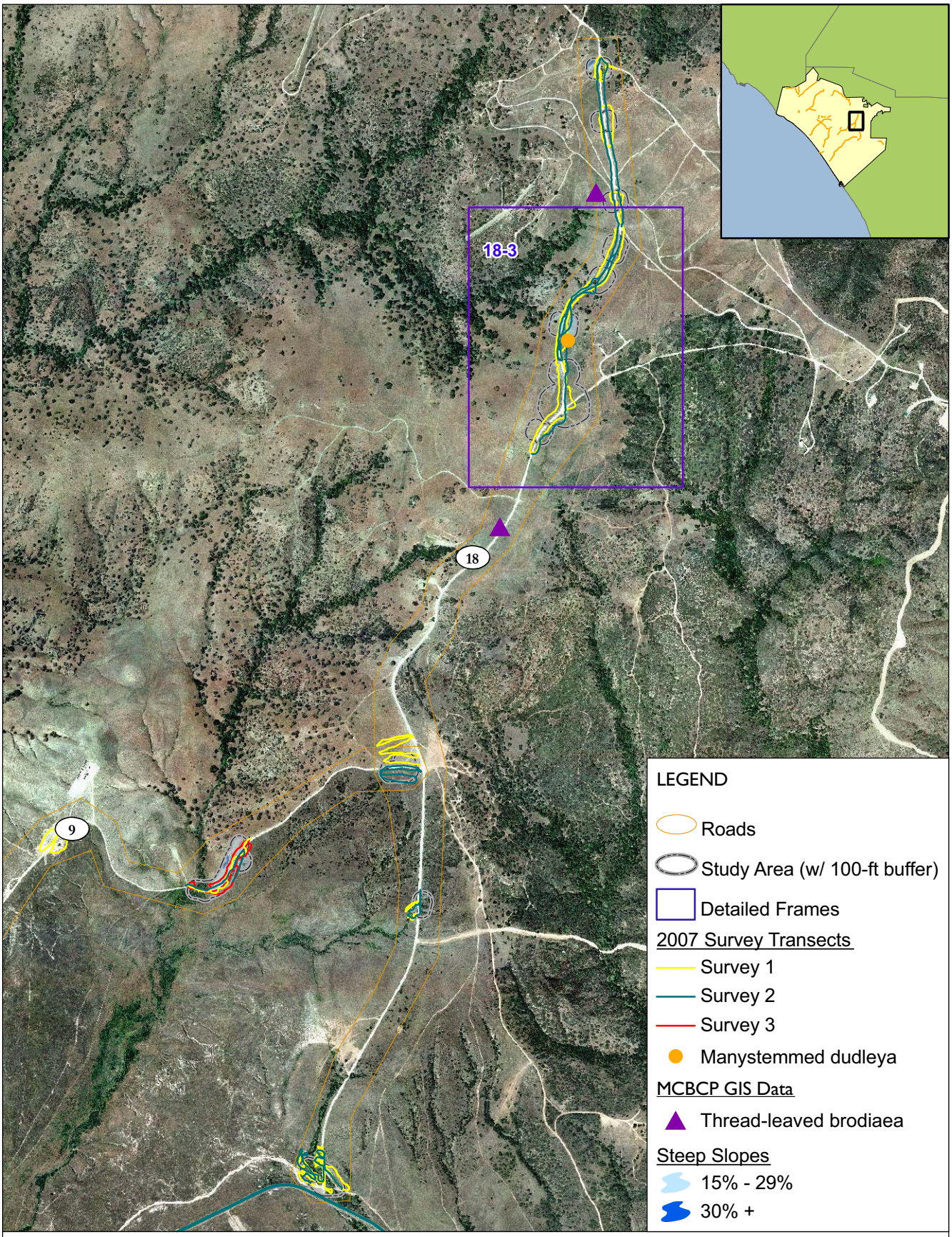
Figure 17-0
Road 17; Overview
Rare Plant Survey Transects



0 Meters 80

0 220 Feet

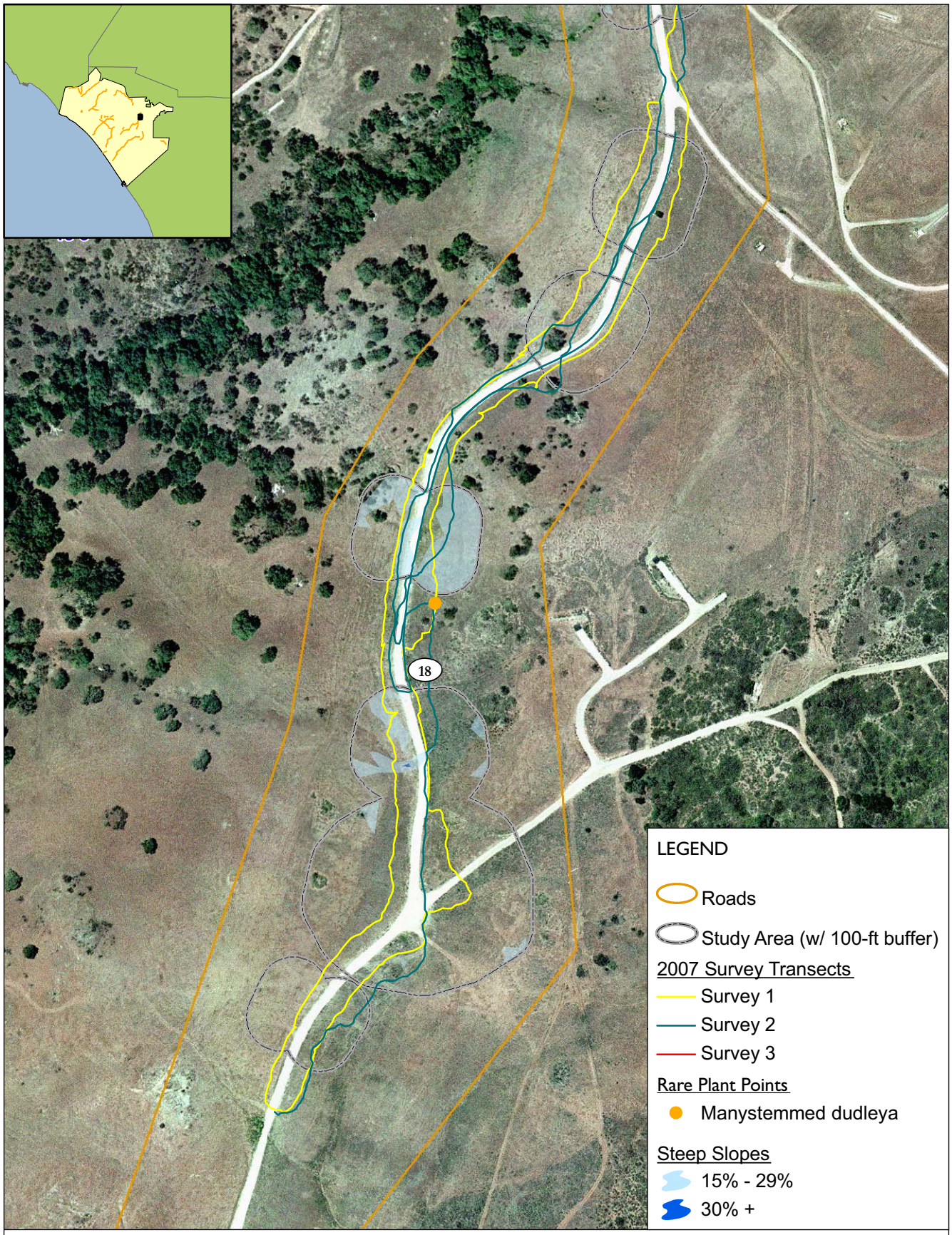
Figure 17-1
Road 17; Inset
Rare Plant Survey Transects



0 Meters 180

0 620 Feet

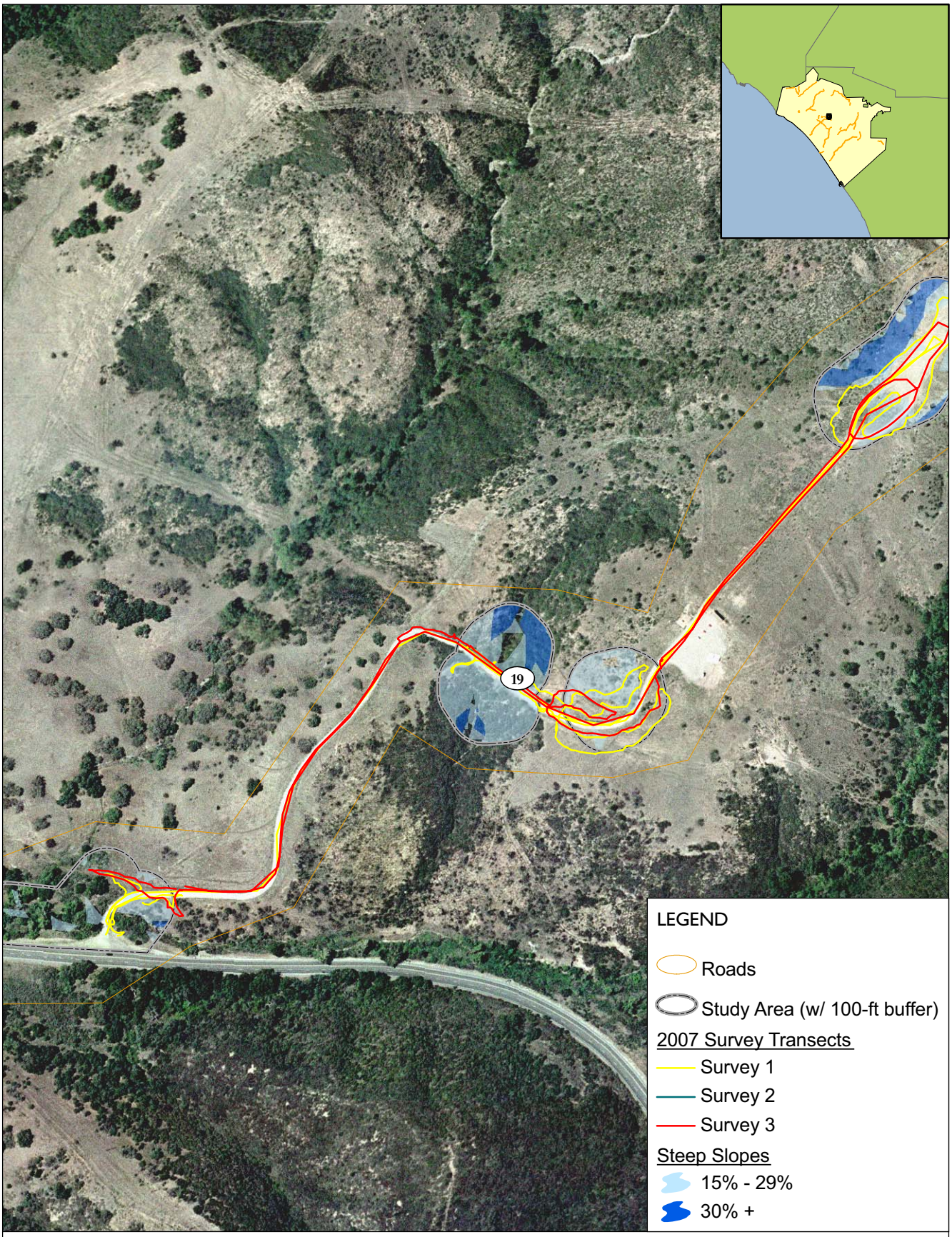
Figure 18-0
Road 18; Overview
Rare Plant Survey Transects



0 Meters 40

0 140 Feet

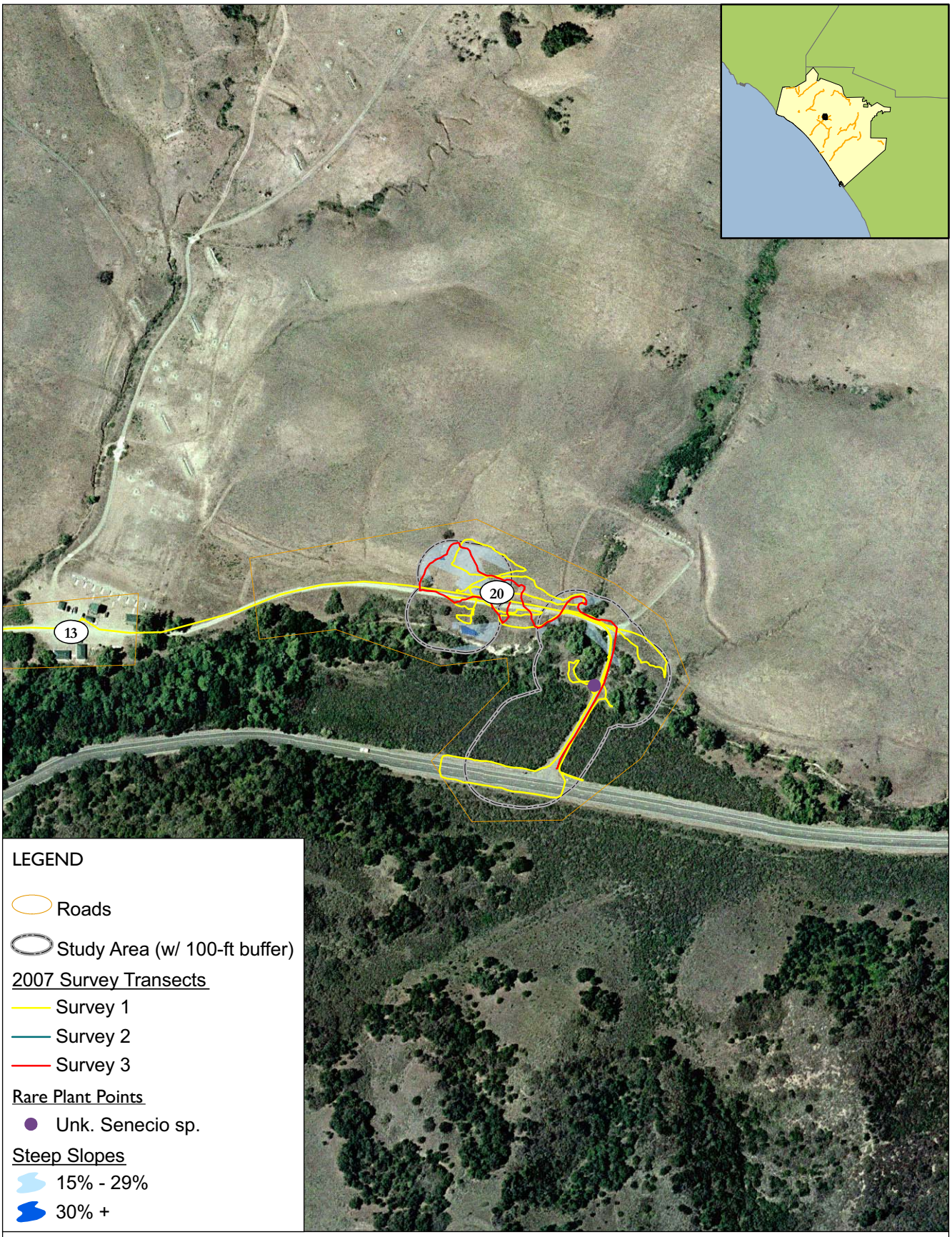
Figure 18-3
Road 18; Inset
Rare Plant Survey Transects



0 Meters 40

0 150 Feet

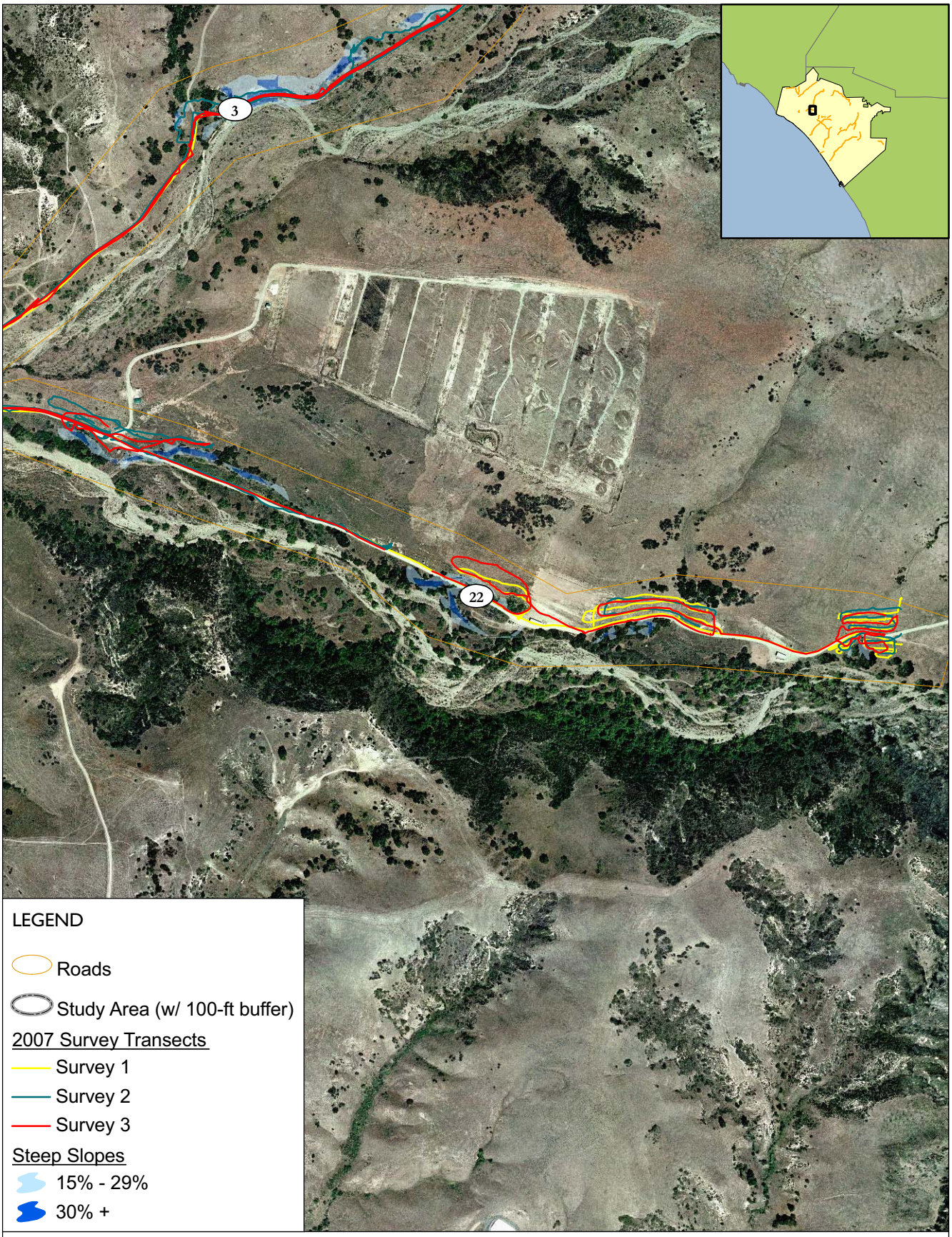
Figure 19-0
Road 19; Overview
Rare Plant Survey Transects



0 Meters 40

0 150 Feet

Figure 20-0
Road 20; Overview
Rare Plant Survey Transects



0 Meters 80

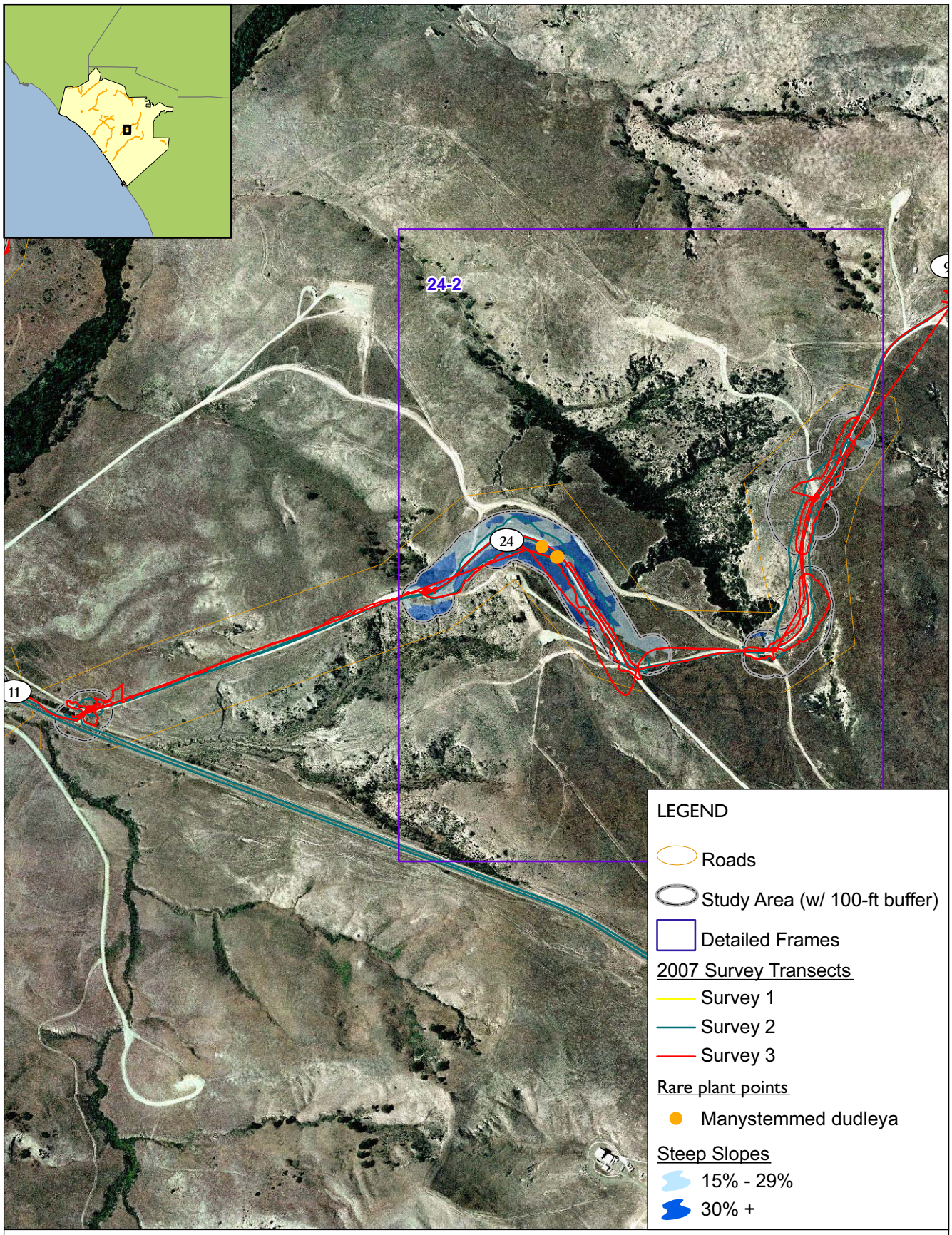
0 300 Feet

Figure 22-0
Road 22; Overview
Rare Plant Survey Transects

0 Meters 40

0 150 Feet

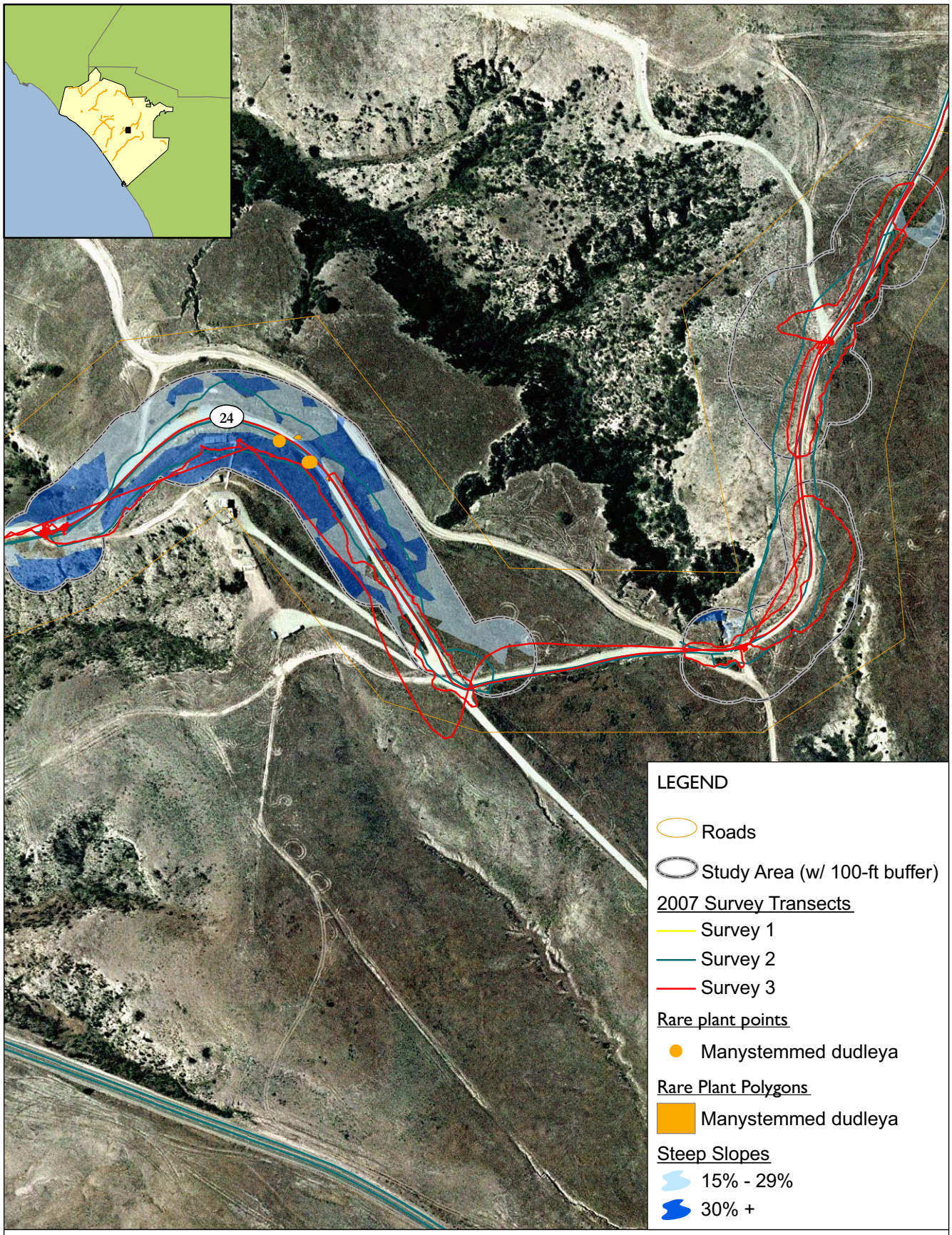
Figure 23-0
Road 23; Overview
Rare Plant Survey Transects



0 Meters 80

0 280 Feet

Figure 24-0
Road 24; Overview
Rare Plant Survey Transects



0 Meters 40

0 140 Feet

Figure 24-2
Road 24; Inset
Rare Plant Survey Transects

APPENDIX B

SPECIAL STATUS PLANT SPECIES KNOWN TO OCCUR OR POTENTIALLY OCCURING ON CAMP PENDLETON

Appendix B. Special Status Plant Species Known to Occur or Potentially Occuring on Camp Pendleton

(Page 1 of 7)

(**Bold** indicates known occurrence on Camp Pendleton)

I. Federally-Listed or Candidate Threatened or Endangered Species				
Species Name	**Common Name**	**Status Fed/CA/CNPS**	**Habitat**	**Life Form, Blooming Period**
Acanthomintha ilicifolia	San Diego thorn-mint	T/E/1B.1	chaparral, coastal scrub, grassland, vernal pools; clay	annual herb, Apr-Jun
Ambrosia pumila	San Diego ambrosia	E/-/1B.1	chaparral, coastal scrub, grassland, vernal pools; often in disturbed areas	perennial herb (rhizomatous), Apr-Oct
Arctostaphylos glandulosa ssp. *crassifolia*	Del Mar manzanita	E/-/1B.1	maritime chaparral; sandy	evergreen shrub, Dec-Apr
Baccharis vanessae	Encinitas baccharis	T/E/1B.1	maritime chaparral; sandstone	deciduous shrub, Aug-Nov
Brodiaea filifolia	**thread-leaved brodiaea**	**T/E/1B.1**	**chaparral (openings), cismontane woodland, coastal scrub, playas, grassland, vernal pools; often clay**	**bulbiferous herb, Mar-Jun**
Eryngium aristulatum* var. *parishii	**San Diego button-celery**	**E/E/1B.1**	**coastal scrub, grassland, vernal pools; mesic**	**annual/perennial herb, Apr-Jun**
Navarretia fossalis	**spreading navarretia**	**T/-/1B.1**	**chenopod scrub, marshes and swamps (assorted shallow freshwater), playas, vernal pools**	**annual herb, Apr-Jun**
Phacelia stellaris	**Brand's phacelia**	**C/-/1B.1**	**coastal dunes, coastal scrub**	**annual herb, Mar-Jun**

Special Status Plant Species Known to Occur or Potentially Occurring on Camp Pendleton
(Page 2 of 7)
(**Bold** indicates known occurrence on Camp Pendleton)

CA-listed and Species included on CNPS Lists 1B and 2				
Species Name	**Common Name**	**Status Fed/CA/CNPS**	**Habitat**	**Life Form, Blooming Period**
Adolphia californica	California adolphia	-/-/2.1	chaparral, coastal scrub, grassland	deciduous shrub, Dec-May
Aphanisma blitoides	Aphanisma	-/-/1B.1	coastal bluffs, coastal dunes, coastal scrub (sandy)	annual herb, Mar-Jun
Arctostaphylos rainbowensis	**Rainbow manzanita**	**-/-/1B.1**	**chaparral**	**evergreen shrub, Jan-Feb**
Atragalus tener var. *titi*	coastal dunes milk-vetch	-/-/1B.1	coastal bluff scrub, coastal dunes, coastal prairie	perennial herb, Mar-May
Atriplex coulteri	**Coulter's saltbush**	**-/-/1B.1**	**coastal bluff scrub, coastal dunes, coastal scrub, grassland (clay)**	**perennial herb, Mar-Oct**
Atriplex pacifica	South Coast saltscale	-/-/1B.1	coastal bluff scrub, coastal dunes, coastal scrub, playas	annual herb, Mar-Oct
Atriplex serenana var. *davidsonii*	Davidson's saltscale	-/-/1B.2	coastal bluff scrub, coastal scrub; alkaline	annual herb, Apr-Oct
Brodiaea orcuttii	**Orcutt's brodiaea**	**-/-/1B.1**	**chaparral, woodland, meadows/seeps, grassland, vernal pools; clay, serpentinite**	**bulbiferous herb, May-Jul**
Ceanothus verrucosus	wart-stemmed ceanothus	-/-/ 2.2	chaparral	evergreen shrub, Dec-May
Centromadia parryi ssp. *australis*	southern tarplant	-/-/1B.1	marshes and swamps (margins), grassland (mesic), vernal pools	annual herb, May-Nov
Centromadia pungens ssp. *laevis*	smooth tarplant	-/-/1B.1	chenopod scrub, meadows and seeps, playas, riparian woodland, grassland; alkaline	annual herb, Apr-Sep
Chaenactis glabriuscula var. *orcuttiana*	Orcutt's pincushion	-/-/1B.1	coastal bluff scrub (sandy), coastal dunes	annual herb, Jan-Aug
Chorizanthe polygonoides var. *longispina*	long-spined spineflower	-/-/1B.2	chaparral, coastal scrub, meadows and seeps, grassland; often clay	annual herb, Apr-Jul
Comarostaphylis diversifolia* ssp. *diversifolia	**summer holly**	**-/-/1B.2**	**chaparral**	**evergreen shrub, Apr-Jun**
Coreopsis maritima	**sea dahlia**	**-/-/2.2**	**coastal bluff scrub, coastal scrub**	**perennial herb, Mar-May**
Dudleya blochmaniae* ssp. *blochmaniae	**Blochman's dudleya**	**-/-/1B.1**	**coastal bluff scrub, chaparral, coastal scrub, grassland; rocky, often clay or serpentinite**	**perennial herb, Apr-Jun**

Special Status Plant Species Known to Occur or Potentially Occurring on Camp Pendleton (Page 3 of 7)

(**Bold** indicates known occurrence on Camp Pendleton)

CA-listed and Species included on CNPS Lists 1B and 2				
Species Name	**Common Name**	**Status Fed/CA/CNPS**	**Habitat**	**Life Form, Blooming Period**
Dudleya multicaulis	**many-stemmed dudleya**	**-/-/1B.2**	**chaparral, coastal scrub, grassland; often clay**	**perennial herb, Apr-Jul**
Dudleya variegata	variegated dudleya	-/-/1B.2	chaparral, cismontane woodland, coastal scrub, grassland, vernal pools/clay	perennial herb, May-Jun
Dudleya viscida	**sticky dudleya**	**-/-/1B.2**	**coastal bluff scrub, chaparral, coastal scrub; rocky**	**perennial herb, May-Jun**
Eryngium pendletonense	**Pendleton button-celery**	**-/-/1B.1**	**coastal bluff scrub, grassland, vernal pools; clay, vernally mesic**	**perennial herb, Apr-Jun**
Euphorbia misera	cliff spurge	-/-/2.2	coastal bluff scrub, coastal scrub; rocky	shrub, Dec-Aug
Horkelia cuneata ssp. *puberula*	mesa horkelia	-/-/1B	chaparral, cismontane woodland, coastal scrub; sandy or gravelly. Believed extirpated from San Diego County.	perennial herb, Feb-Sep
Horkelia truncata	**Ramona horkelia**	**-/-/1B.3**	**chaparral, cismontane woodland; clay**	**perennial herb, May-Jun**
Lasthenia glabrata ssp. *coulteri*	Coulter's goldfields	-/-/1B.1	marshes and swamps (coastal salt), playas, vernal pools	annual herb, Feb-Jun
Lotus nuttallianus	**Nuttall's lotus**	**-/-/1B.1**	**coastal dunes, coastal scrub; sandy**	**annual herb, Mar-Jun**
Monardella hypoleuca* ssp. *lanata	**felt-leaved monardella**	**-/-/1B.2**	**chaparral, cismontane woodland**	**perennial herb (rhizomatous), Jun-Aug**
Nama stenocarpum	mud nama	-/-/2.2	marshes and swamps; lake margins, riverbanks	annual/perennial herb, Jan-Jul
Navarretia prostrata	prostrate navarretia	-/-/1B.1	coastal scrub, meadows, grassland, vernal pools	annual herb, Apr-Jul
Nemacaulis denudata* var. *denudata	**coastal wooly heads**	**-/-/1B.2**	**coastal dunes**	**annual herb, Apr-Sep**
Nemacaulis denudata var. *gracilis*	slender wooly heads	-/-/2.2	coastal dunes	annual herb, Mar-May
Quercus dumosa	**Nuttall's scrub oak**	**-/-/1B.1**	**closed-cone forest, chaparral, coastal scrub/sandy, clay loam**	**evergreen shrub, Feb-Apr**

Special Status Plant Species Known to Occur or Potentially Occurring on Camp Pendleton
(Page 4 of 7)
(**Bold** indicates known occurrence on Camp Pendleton)

CA-listed and Species included on CNPS Lists 1B and 2				
Species Name	**Common Name**	**Status Fed/CA/CNPS**	**Habitat**	**Life Form, Blooming Period**
Satureja chandleri	**San Miguel savory**	**-/-/1B.2**	**chaparral, cismontane woodland, coastal scrub, riparian woodland, grassland; rocky, gabbroic or metavolcanic**	**perennial herb, Mar-Jul**
Suaeda esteroa	estuary seablite	-/-/1B.2	marshes and swamps (coastal salt)	perennial herb, May-Jan
Tetracoccus dioicus	Parry's tetracoccus	-/-/1B.2	chaparral, coastal scrub	deciduous shrub, Apr-May

Special Status Plant Species Known to Occur or Potentially Occurring on Camp Pendleton
(Page 5 of 7)
(**Bold** indicates known occurrence on Camp Pendleton)

Species Included on CNPS Lists 3 and 4				
Species Name	**Common Name**	**Status Fed/CA/CNPS**	**Habitat**	**Life Form, Blooming Period**
Abronia maritima	**red sand-verbena**	**-/-/4.2**	**coastal Dunes**	**perennial herb Feb-Nov**
Artemisia palmeri	San Diego sagewort	-/-/4.2	chaparral, coastal scrub riparian scrub, riparian woodland; sandy, mesic	deciduous shrub, May-Sep
Asplenium vespertinum	western spleenwort	-/-/4.2	chaparral, cismontane woodland, coastal scrub; rocky	perennial herb (rhizomatous), fertile Feb-Jun.
Azolla mexicana	Mexican mosquito fern	-/-/4.2	marshes and swamps (ponds, slow water)	annual/perennial herb, fertile Aug
Calandrinia breweri	Brewer's calandrinia	-/-/4.2	chaparral, coastal scrub; sandy or loamy; disturbed sites and burns	annual herb, Mar-Jun
Calandrinia maritima	**seaside calandrinia**	**-/-/4.2**	**coastal bluff scrub, coastal scrub, grassland; sandy**	**annual herb, Feb-Aug**
Camissonia lewisii	Lewis's evening primrose	-/-/3	coastal bluff scrub, cismontane woodland, coastal dunes, coastal scrub, grassland; sandy or clay	annual herb, Mar-Jun
Caulanthus simulans	**Payson's jewel-flower**	**-/-/4.2**	**chaparral, coastal scrub; sandy, granitic**	**annual herb, Feb-Jun**
Chamaebatia australis	**southern mountain misery**	**-/-/4.2**	**chaparral (gabbroic or metavolcanic)**	**evergreen shrub, Nov-May**
Convolvulus simulans	small-flowered morning-glory	-/-/4.2	chaparral (openings) coastal scrub, grassland; clay, serpentine seeps	annual herb, Mar-Jun
Deinandra paniculata	**paniculate tarplant**	**-/-/4.2**	**coastal scrub, grassland; usually vernally mesic**	**annual herb, Apr-Nov**
Dichondra occidentalis	**western dichondra**	**-/-/4.2**	**chaparral, cismontane woodland, coastal scrub, grassland**	**perennial herb (rhizomatous), Mar-Jun**
Harpagonella palmeri	**Palmer's grapplinghook**	**-/-/4.2**	**chaparral, coastal scrub, grassland,**	**annual herb, Mar-May**
Hordeum intercedens	**vernal barley**	**-/-/3.2**	**coastal dunes, coastal scrub, saline flats and depressions in grassland, vernal pools**	**annual herb, Mar-Jun**

Special Status Plant Species Known to Occur or Potentially Occurring on Camp Pendleton
(Page 6 of 7)
(**Bold** indicates known occurrence on Camp Pendleton)

CNPS List 3 and List 4 Species				
Species Name	**Common Name**	**Status Fed/CA/CNPS**	**Habitat**	**Life Form, Blooming Period**
Juglans californica	Southern California black walnut	-/-/4.2	chaparral, cismontane woodland, coastal scrub; alluvial	deciduous tree, Mar-Aug
Juncus acutus* ssp. *leopoldii	**southwestern spiny rush**	**-/-/4.2**	**coastal dunes (mesic), meadows and seeps (alkaline seeps), marshes and swamps (coastal salt)**	**perennial herb (rhizomatous), May-Jun**
Lilium humboldtii* ssp. *ocellatum	**ocellated Humboldt lily**	**-/-/4.2**	**chaparral, cismontane woodland, coastal scrub, lower montane coniferous forest, riparian woodland; openings**	**perennial herb (bulbiferous), Mar-Jul**
Lycium californicum	California box-thorn	-/-/4.2	coastal bluff scrub, coastal scrub	shrub, Mar-Aug
Microseris douglasii var. *platycarpha*	small-flowered microseris	-/-/4.2	cismontane woodland, coastal scrub, grassland, vernal pools; clay	annual herb, Mar-May
Mucronea californica	California spineflower	-/-/4.2	chaparral, cismontane woodland, coastal dunes, coastal scrub, grassland; sandy	annual herb, Mar-Aug
Myosurus minimus* ssp. *apus	**little mouse tail**	**-/-/3.1**	**grassland, vernal pools (alkaline)**	**annual herb, Mar-Jun**
Ophioglossum californicum	California adder's-tongue	-/-/4.2	chaparral, grassland, margins of vernal pools; mesic	perennial herb (rhizomatous), fertile Dec-Jun
Orobanche parishii ssp. *brachyloba*	short-lobed broomrape	-/-/4.2	coastal bluff scrub, coastal dunes, coastal scrub; sandy	parasitic perennial herb, Apr-Oct
Pentachaeta aurea	golden-rayed pentachaeta	-/-/4.2	cismontane woodland, coastal scrub, lower montane coniferous forest, grassland	annual herb, Mar-Jul
Piperia cooperi	chaparral rein orchid	-/-/4.2	chaparral, cismontane woodland, grassland	perennial herb, Mar-Jun
Polygala cornuta* var. *fishiae	**Fish's milkwort**	**-/-/4.3**	**chaparral, cismontane woodland, riparian woodland**	**deciduous shrub, May-Aug**
Quercus engelmannii	**Engelmann oak**	**-/-/4.2**	**chaparral, cismontane woodland, riparian woodland, grassland,**	**deciduous tree, Mar-Jun**
Romneya coulteri	**Coulter's matilija poppy**	**-/-/4.2**	**chaparral, coastal scrub; often in burns**	**perennial herb (rhizomatous), Mar-Jul**

Special Status Plant Species Known to Occur or Potentially Occurring on Camp Pendleton
(Page 7 of 7)

(**Bold** indicates known occurrence on Camp Pendleton)

CNPS Lists 3 and 4 Species

Species Name	Common Name	Status Fed/CA/CNPS	Habitat	Life Form, Blooming Period
Suaeda taxifolia	**woolly seablite**	**-/-/4.2**	**coastal bluff scrub, coastal dunes, marshes and swamps; margins of coastal salt marshes**	**evergreen shrub, Jan-Dec**
Viguiera laciniata	**San Diego County viguiera**	**-/-/4.2**	**chaparral, coastal scrub**	**shrub, Feb-Jun**

Status:

Federal Status (determined by U. S. Fish and Wildlife Service):

E - Endangered. In danger of extinction throughout all or a significant portion of its range.
T - Threatened. Likely-become an endangered species within the foreseeable future throughout all or a significant portion of its range.
C – Candidate for listing as threatened or endangered.

CA Status (determined by California Department of Fish and Game):

E - CA listed as Endangered
T - CA listed as Threatened

California Native Plant Society List (CNPS) List:

1B - Plants considered rare or endangered in California and elsewhere
2 - Plants considered rare or endangered in California but more common elsewhere.
3 - Plants for which more information is needed.
4 - Plants of limited distribution – a watch list.

CNPS Threat Codes

.1 - Seriously endangered in California (over 80% of occurrences threatened / high degree and immediacy of threat)
.2 – Fairly endangered in California (20-80% occurrences threatened)
.3 – Not very endangered in California (<20% of occurrences threatened or no current threats known)

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APPENDIX C
PLANT LIST

Appendix C. Plant List

Group	Family	Spp	Common	Roads 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Equisetophytes																											
	Equisetaceae	*Equisetum telmateia ssp. braunii*	Giant Horsetail								X																
Eudicots																											
	Adoxaceae	*Sambucus mexicana*	Blue Elderberry	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Aizoaceae	*Carpobrotus chilensis*	Sea-fig			X		X			X															X	X
		Mesembryanthemum nodiflorum	Slender-Leaf Iceplant								X																
	Amaranthaceae	*Atriplex leucophylla*	Seascale, Beach Saltbush								X																
		Atriplex semibaccata	Australian Saltbush		X		X	X	X	X									X						X	X	X
		Chenopodium californicum	California Goosefoot				X	X	X																	X	X
		Chenopodium murale	Nettle-Leaf Goosefoot								X																
		Salsola tragus	Prickly Russian-thistle	X	X	X		X	X	X	X				X	X		X	X		X	X	X	X	X	X	X
	Anacardiaceae	*Lomatium dasycarpum ssp. dasycarpum*	Woolly-Fruit Lomatium										X							X							
		Lomatium lucidum	Shiny Lomatium			X										X						X	X	X			
		Malosma laurina	Laurel Sumac	X	X	X		X	X	X			X		X	X	X	X	X	X	X	X	X	X	X	X	X
		Rhus integrifolia	Lemonadeberry		X	X	X	X	X	X	X				X	X	X	X	X			X	X	X		X	X
		Rhus ovata	Sugar Bush										X							X							
		Schinus molle	Peruvian Pepper Tree					X	X																	X	X
		Toxicodendron diversilobum	Western Poison-oak	X	X		X	X	X	X	X				X		X	X	X							X	X
	Apiacaeae	*Conium maculatum*	Poison Hemlock	X		X	X	X	X		X	X			X	X		X			X	X	X	X		X	X
		Daucus pusillus	Rattlesnake Weed			X	X	X	X	X	X				X	X		X				X	X	X		X	X
		Foeniculum vulgare	Sweet Fennel	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X		X	X	X	X	X	X	X
	Apiaceae	*Apium graveolens*	Common Celery								X																

Group	Family	Spp	Common	Roads 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Eudicots																											
	Apiaceae	*Sanicula arguta*	Sharp-Tooth Sanicle				X														X						
	Apocynaceae	*Asclepias californica*	California/Round-Hood Milkweed										X							X							
		Asclepias fascicularis	Narrow-leaf Milkweed					X	X			X									X				X	X	X
	Asteraceae	*Achillea millefolium*	Yarrow, Milfoil				X																				
		Ambrosia confertiflora	Weak-Leaf Bur-Sage				X	X	X																	X	X
		Ambrosia psilostachya	Western Ragweed	X	X	X	X	X	X	X	X	X		X	X	X			X		X	X	X	X	X	X	X
		Artemisia californica	Coastal Sagebrush	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		Artemisia douglasiana	Mugwort	X			X	X	X		X	X			X		X									X	X
		Artemisia dracunculus	Tarragon, Dragon Sagewort												X												
		Baccharis pilularis	Coyote Brush		X		X	X	X	X	X			X	X		X	X	X		X				X	X	X
		Baccharis salicifolia	Mule-fat			X	X	X	X	X	X	X	X	X	X	X	X	X		X		X	X	X	X	X	X
		Baccharis sarothroides	Broom Baccharis																		X						
		Brickellia californica	California Brickellbush					X	X																X	X	X
		Carduus pycnocephalus	Italian Thistle			X	X	X							X	X		X				X	X	X		X	X
		Centaurea melitensis	Tecalote	X	X		X	X	X	X		X	X	X	X			X	X	X	X					X	X
		Chaenactis artemisiifolia	White Pincushion	X																							
		Chaenactis glabriuscula var. glabriuscula	Yellow Pincushion	X																							
		Chrysanthemum coronarium	Garland Chrysanthemum					X	X									X								X	X
		Cirsium occidentale	California Thistle			X										X						X	X				
		Conyza canadensis	Horseweed				X	X	X																	X	X

Group	Family	Spp	Common	Roads 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Eudicots																											
	Asteraceae	*Corethrogyne filaginifolia var. filaginifolia*	Common Sand-Aster	X	X	X	X	X	X	X		X	X	X	X	X		X		X	X	X	X	X	X	X	X
		Cotula australis	Australian Brass-Buttons										X							X							
		Cotula coronopifolia	African Brass-Buttons	X							X																
		Cynara cardunculus	Artichoke Thistle											X													
		Deinandra fasciculata	Fascicled Tarweed	X	X	X	X	X	X			X	X	X	X	X			X	X	X	X	X	X	X	X	X
		Encelia californica	Bush Sunflower					X	X																	X	X
		Ericameria palmeri var. pachylepis	Palmer's Goldenbush																		X						
		Erigeron foliosus var. foliosus	Leafy Daisy																		X						
		Eriophyllum confertiflorum var. confertiflorum	Long-Stem Golden-Yarrow	X		X	X	X	X				X		X	X		X		X	X	X	X	X		X	X
		Filago gallica	Narrow-Leaf Filago	X			X						X							X	X						
		Gnaphalium californicum	California Everlasting	X	X		X	X	X			X	X						X	X	X					X	X
		Gnaphalium luteo-album	Everlasting Cudweed										X							X							
		Gnaphalium stramineum	Cotton-Batting Plant				X																				
		Grindelia camporum var. bracteosa	Rayless Gumplant		X	X		X	X			X	X	X	X	X			X	X	X	X	X	X	X	X	X
		Hazardia squarrosa var. grindelioides	Southern Sawtooth Goldenbush		X	X							X		X	X		X	X	X	X	X	X	X			
		Hedypnois cretica	Crete Hedypnois	X	X	X	X	X	X		X	X	X			X			X	X	X	X	X	X		X	X
		Helianthus gracilentus	Slender Sunflower			X				X			X			X				X		X	X				
		Heterotheca grandiflora	Telegraph Weed	X	X		X	X	X	X		X	X		X			X	X	X	X				X	X	X

Group	Family	Spp	Common	Roads 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Eudicots																											
	Asteraceae	*Hypochaeris glabra*	Smooth Cat's Ear				X	X	X				X							X	X					X	X
		Isocoma menziesii	Goldenbush	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X
		Jaumea carnosa	Salty Susan, Fleshy Jaumea								X																
		Lactuca serriola	Prickly Lettuce	X		X	X	X	X							X					X	X	X	X		X	X
		Lasthenia gracilis	Common Goldfields																		X						
		Lepidospartum squamatum	Scale-Broom	X			X																				
		Matricaria matricarioides	Common Pineapple-Weed	X			X	X	X																	X	X
		Osmadenia tenella	Osmadenia	X		X										X					X	X	X	X			
		Osteospermum fruticosum	Trailing African Daisy		X														X								
		Picris echioides	Bristly Ox-Tongue	X	X						X		X	X					X	X							
		Pluchea sericea	Arrow Weed								X																
		Pseudognaphalium biolettii	Bicolor Cudweed	X			X																				
		Pseudognaphalium canescens	Everlasting Cudweed										X							X							
		Pseudognaphalium spp.	Everlasting			X										X						X	X	X			
		Senecio sp.	Unknown Senecio			X				X						X						X	X	X			
		Senecio vulgaris	Common Groundsel	X			X																				
		Solidago californica	California Goldenrod			X										X		X				X	X	X			
		Sonchus asper ssp. asper	Prickly Sow-Thistle	X				X	X				X	X				X		X	X					X	X
		Sonchus oleraceus	Common Sow-thistle		X		X	X	X		X		X		X			X	X	X	X					X	X
		Venegasia carpesioides	Jesuit Flower					X	X				X							X						X	X

Group	Family	Spp	Common	Roads 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Eudicots																											
	Asteraceae	*Xanthium strumarium*	Cockebur				X	X	X		X							X								X	X
	Boraginaceae	*Amsinckia menziesii*	Fiddleneck					X	X								X									X	
		Cryptantha muricata	Prickly Cryptantha										X							X							
		Plagiobothrys collinus var. fulvescens	Rough Popcornflower										X							X							
		Plagiobothrys nothofulvus	Rusty Popcornflower										X							X							
	Brassicaceae	*Brassica nigra*	Black Mustard	X	X		X			X		X		X	X				X								
		Cakile maritima	European Sea Rocket								X																
		Hirschfeldia incana	Short-pod Mustard	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		Raphanus sativus	Wild Radish	X				X	X		X				X						X					X	X
		Rorippa nasturtium-aquaticum	Water-Cress								X																
		Sisymbrium orientale	Hare's-Ear Cabbage								X																
	Cactaceae	*Cylindropuntia prolifera*	Coast Cholla					X	X																	X	X
		Opuntia littoralis	Coast Prickly-pear			X		X	X	X		X			X	X			X			X	X	X	X	X	X
		Opuntia oriocola	Chaparral Prickly-Pear			X										X						X	X	X			
	Caprifoliaceae	*Lonicera subspicata*	Honeysuckle							X																	
		Lonicera subspicata var. denudata	Johnston's Honeysuckle				X	X	X		X															X	X
		Lonicera subspicata var. subspicata	Southern Honeysuckle				X																				
	Caryophyllaceae	*Silene gallica*	Common Catchfly					X	X																	X	X
		Spergularia bocconi	Boccone's Sand-Spurry	X								X													X		

Group	Family	Spp	Common	Roads 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Eudiots																											
	Citaceae	*Helianthemum scoparium*	Peak Rush-Rose										X							X							
	Convolvulaceae	*Calystegia macrostegia ssp. arida*	Southern California Morning-Glory		X	X	X	X	X	X		X	X	X	X	X			X	X	X	X	X	X	X	X	X
		Calystegia macrostegia ssp. tenuifolia	San Diego Morning-Glory				X							X	X												
		Convolvulus arvensis	Field Bindweed					X	X		X	X		X												X	X
		Cuscuta californica var. breviflora	Short-Flower Chaparral Dodder					X	X																	X	X
	Crassulaceae	*Dudleya edulis*	Ladies' Fingers							X																	
		Dudleya lanceolata	Lance-Leaf Dudleya					X	X																	X	X
		Dudleya multicaulis	Many-Stem Dudleya		X														X		X						
		Dudleya pulverulenta	Chalk Dudleya							X																	
	Cucurbitaceae	*Cucurbita foetidissima*	Calabazilla			X		X	X	X					X	X		X				X	X	X		X	X
		Marah macrocarpus var. macrocarpus	Manroot, Wild-Cucumber				X	X	X	X					X											X	X
	Datiscaceae	*Datisca glomerata*	Durango Root			X	X	X	X	X	X		X		X	X		X		X		X	X	X		X	X
	Ericaceae	*Arctostaphylos glandulosa ssp. zacaensis*	Zaca Lake Manzanita										X							X							
		Arctostaphylos rainbowensis	Rainbow Manzanita										X							X							
	Euphorbiaceae	*Chamaesyce albomarginata*	White-Margin Sandmat							X																	
		Chamaesyce maculata	Spotted Spurge	X		X							X			X				X		X	X	X			
		Chamaesyce polycarpa	Small-Seed Sandmat					X	X																	X	X
		Croton setigerus	Doveweed			X				X		X	X			X				X	X	X	X	X	X		

Group	Family	Spp	Common	Roads 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Eudicots																											
	Euphorbiaceae	*Euphorbia lathyris*	Caper Spurge, Gopher Plant				X																				
		Ricinus communis	Castor Bean	X		X		X	X		X					X		X				X	X	X		X	X
	Fabaceae	*Astragalus trichopodus var. lonchus*	Ocean Locoweed					X	X	X					X											X	X
		Gleditsia triacanthos1	Honey-locust								X																
		Lathyrus sp.	Pea															X									
		Lathyrus vestitus var. alefeldii	San Diego Sweet Pea							X																	
		Lotus hamatus	Grab Lotus		X			X	X					X					X							X	X
		Lotus heermannii var. heermannii	Heermann's Lotus									X															
		Lotus purshianus	Spanish Clover	X	X	X	X	X	X		X	X	X		X	X			X	X	X	X	X	X	X	X	X
		Lotus scoparius var. scoparius	Coastal Deerweed	X	X	X	X	X	X	X		X	X			X	X	X	X	X	X	X	X	X		X	X
		Lupinus bicolor	Miniature Lupine				X																				
		Lupinus concinnus	Bajada Lupine										X							X							
		Lupinus excubitus var. austromontanus	Grape Soda Lupine							X			X					X		X	X						
		Lupinus hirsutissimus	Stinging Lupine				X																				
		Medicago polymorpha	California Burclover					X	X				X							X					X	X	X
		Medicago sativa	Alfalfa			X										X						X	X	X			
		Melilotus albus	White Sweetclover	X			X	X	X		X			X	X											X	X
		Melilotus indicus	Indian Sweetclover	X		X	X	X	X		X	X	X	X	X	X		X		X	X	X	X	X		X	X
		Pickeringia montana var. tomentosa	Hairy Chaparral-Pea										X							X							
	Fagaceae	*Quercus agrifolia var. agrifolia*	Coast Live Oak, Encina	X			X	X	X	X		X	X	X			X	X		X					X	X	X

Group	Family	Spp	Common	Roads 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Eudicots																											
	Fagaceae	*Quercus engelmanni*	Engelmann's Oak			X							X			X		X		X		X	X	X			
		Quercus wislizeni var. frutescens	Interior Live Oak										X							X							
		Quercus xacutidens	a hybrid Oak			X										X						X	X	X			
	Gentianaceae	*Swertia parryi*	Deer's Ears										X							X							
		Centaurium venustum	Canchalagua														X										
	Geraniaceae	*Erodium botrys*	Long-Beak Filaree	X	X	X	X			X		X	X	X		X	X	X	X	X	X	X	X	X	X		
		Erodium brachycarpum	Short-beak Filaree					X	X				X					X		X	X				X	X	X
		Erodium cicutarium	Red-stem Filaree		X	X	X	X	X	X			X	X	X	X	X	X	X	X	X	X	X	X		X	X
		Erodium moschatum	White-stem Filaree	X	X		X	X	X									X	X							X	X
		Geranium dissectum	Cut-leaf Geranium					X	X				X							X						X	X
	Grossulariaceae	*Ribes speciosum*	Fucshia-Flower Gooseberry				X	X	X	X																X	X
	Heliotropaceae	*Heliotropium curassavicum*	Salt Heliotrope			X					X					X						X	X	X			
	Hydrophyllaceae	*Emmenanthe penduliflora var. penduliflora*	Whispering Bells												X												
		Phacelia minor	Wild Canterbury-Bell										X							X							
	Hypericaceae	*Hypericum formosum var. scouleri*	Scouler's St. John's Wort										X							X							
	Lamiaceae	*Marrubium vulgare*	Horehound	X	X		X	X	X	X			X		X			X	X	X	X					X	X
		Salvia apiana	White Sage	X		X	X					X	X		X	X	X	X		X	X	X	X	X			
		Salvia clevelandii	Fragrant Sage										X							X							
		Salvia mellifera	Black Sage				X			X																	
		Salvia spathacea	Hummingbird Sage				X																				

Group	Family	Spp	Common	Roads 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Eudicots																											
	Lamiaceae	*Savia mellifera*	Black Sage					X	X																	X	X
		Stachys ajugoides var. rigida	Hedge-Nettle										X							X	X						
	Lythraceae	*Lythrum hyssopifolia*	Grass Poly	X																							
	Malvaceae	*Malacothamnus fasciculatus*	Bush Mallow	X	X			X	X																	X	X
		Malva parviflora	Cheeseweed		X			X	X						X				X							X	X
	Nyctaginaceae	*Mirabilis laevis var. crassifolia*	Coastal Wishbone Plant					X	X			X									X					X	X
		Sidalcea malviflora ssp. sparsifolia	Checker-Bloom				X						X	X						X	X				X		
	Onagraceae	*Camissonia hirtella*	Field Sun Cup										X							X							
		Clarkia bottae	Punchbowl Godetia				X																				
		Clarkia purpurea	Large Clarkia			X										X	X					X	X	X			
		Clarkia purpurea ssp. quadrivulnera	Four-Spot Clarkia				X						X					X		X							
		Epilobium canum ssp. canum	California Fuchsia									X													X		
		Epilobium ciliatum ssp. ciliatum	Willow Herb								X														X		
		Oenothera elata	Great Marsh Evening-Primrose										X							X							
	Orobanchaceae	*Castilleja affinis ssp. affinis*	Coast Paintbrush				X	X	X																	X	X
	Oxalidaceae	*Oxalis albicans ssp. californica*	California Wood-Sorrel				X	X	X																	X	X
	Papavaraceae	*Eschscholzia californica*	California Poppy	X				X	X	X							X									X	X
	Phrymacae	*Mimulus aurantiacus*	Monkey Flower			X	X	X	X				X		X	X	X	X		X	X	X	X	X		X	X
	Phrymaceae	*Mimulus cardinalis*	Scarlet Monkey Flower										X							X							

Group	Family	Spp	Common	Roads																							
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
		Mimulus guttatus	Seep Monkey Flower								X																
Eudicots																											
	Plantaginaceae	*Keckiella cordifolia*	Climbing Bush Penstemon				X	X	X						X											X	X
		Plantago coronopus	Cut-leaf Plantain				X	X	X			X	X							X						X	X
		Collinsia heterophylla	Chinese Houses				X																				
		Plantago erecta	Dot-Seed Plantain																		X						
		Plantago lanceolata	English Plaintain			X	X	X	X				X			X				X	X	X	X	X		X	X
	Platanaceae	*Platanus racemosa*	Western Sycamore	X		X	X	X	X	X	X		X		X	X				X		X	X	X		X	X
	Plumbaginaceae	*Limonium sinuatum*	Notch-leaf Marsh-rosemary					X	X																	X	X
	Polemoniaceae	*Navarretia hamata ssp. hamata*	Hooked Skunkweed										X							X							
	Polygonaceae	*Chorizanthe fimbriata var. fimbriata*	Fringed Spineflower	X								X															
		Eriogonum fasciculatum var. fasciculatum	Coast California Buckwheat	X		X	X	X	X	X		X	X		X	X		X		X	X	X	X	X		X	X
		Eriogonum fasciculatum var. foliolosum	Inland California Buckwheat					X	X																	X	X
		Eriogonum parvifolium	Bluff Buckwheat								X																
		Rumex crispus	Curly Dock	X		X	X	X	X	X	X	X		X		X		X			X	X	X	X	X	X	X
		Rumex salicifolius var. denticulatus	Toothed Willow Dock				X																				
	Portulacaceae	*Calandrinia ciliata*	Red Maids										X							X							
	Primulaceae	*Samolus parviflorus*	Water-Pimpernel								X																
	Priumlaceae	*Anagallis arvensis*	Scarlet Pimpernel	X				X	X	X		X	X		X			X		X	X					X	X
	Ranunculaceae	*Clematis pauciflora*	Ropevine Clematis					X	X																	X	X
		Delphinium parryi ssp. parryi	Parry's Larkspur				X						X							X							

Group	Family	Spp	Common	Roads 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Eudicots																											
	Ranunculaceae	*Thalictrum fendleri var. polycarpum*	Smooth-Leaf Meadow-Rue				X	X	X																	X	X
	Rhamnaceae	*Ceanothus aff. leucodermi s*	Chaparral Whitethorn										X							X							
		Ceanothus foliosus	Wavy-Leaf Lilac			X										X						X	X	X			
		Ceanothus spinosus	Green-Bark-Lilac					X	X																	X	X
		Ceanothus tomentosus	Ramona-Lilac			X										X						X	X	X			
		Rhamnus californica ssp. californica	California Coffeeberry										X							X	X						
		Rhamnus ilicifolia	Holly-Leaf Redberry										X							X							
	Rosaceae	*Heteromeles arbutifolia*	Toyon			X	X	X	X						X	X		X				X	X	X	X	X	X
		Rosa californica	California Rose			X	X	X	X							X						X	X	X		X	X
		Adenostoma fasciculatum	Chamise			X				X			X			X		X		X		X	X	X			
		Cercocarpus betuloides var. betuloides	Birch-Leaf Mountain-Mahogany										X							X							
		Horkelia truncata	Ramona Horkelia										X							X							
		Prunus ilicifolia ssp. ilicifolia	Islay, Holly-Leaf Cherry										X							X							
		Rubus ursinus	California Blackberry			X	X			X	X					X						X	X	X			
	Rubiaceae	*Galium angustifolium ssp. angustifolium*	Narrow-leaf Bedstraw					X	X				X							X						X	X
		Galium porrigens var. porrigens	Climbing/Oval-Leaf Bedstraw					X	X																	X	X
	Salicaceae	*Salix exigua*	Narrow-Leaf Willow								X										X						
		Salix gooddingii	Black Willow					X	X		X										X					X	X
		Salix laevigata	Red Willow	X				X	X			X			X						X					X	X

Group	Family	Spp	Common	Roads																							
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Eudicots																											
	Salicaceae	*Salix lasiolepis*	Arroyo Willow	X	X		X				X	X			X		X		X		X						
		Salix spp.	Willow				X																				
	Scrophulariaceae	*Myoporum laetum*	Ngaio, Mousehole Tree															X									
		Scrophularia californica	California Bee Plant					X	X																	X	X
	Solanaceae	*Datura wrightii*	Western Jimson Weed				X	X	X																	X	X
		Nicotiana glauca	Tree Tobacco		X	X	X	X	X	X	X				X	X		X	X		X	X	X	X		X	X
		Solanum americanum	White Nightshade					X	X		X	X			X											X	X
		Solanum douglasii	Douglas's Nightshade	X			X																				
	Styracaceae	*Styrax redivivus*	Snowdrop Bush										X							X							
	Tamaricaceae	*Tamarix ramosissima*	Tamarisk, Salt-Cedar		X						X								X								
	Urticaceae	*Urtica dioica ssp. holosericea*	Hoary Nettle							X	X				X												
		Urtica urens	Dwarf Nettle					X	X																	X	X
	Verbenaceae	*Verbena lasiostachys var. lasiostachys*	Western Vervain	X		X	X	X	X				X		X	X		X		X	X	X	X	X		X	X
		Verbena lasiostachys var. scabrida	Robust Vervain					X	X																	X	X
	Viscaceae	*Phoradendron macrophyllum*	Big-Leaf Mistletoe			X		X	X							X						X	X	X		X	X
		Phoradendron villosum	Oak Mistletoe				X																				
	Vitaceae	*Vitis girdiana*	Desert Wild Grape					X	X				X		X					X						X	X
	Zygophyllaceae	*Tribulus terrestris*	Puncture Vine				X																				

Group	Family	Spp	Common	Roads 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Leptosporaginate Ferns																											
	Blechnaceae	*Woodwardia fimbriata*	Giant Chain Fern					X	X																	X	X
	Dennstaedtiaceae	*Pteridium aquilinum var. pubescens*	Western Bracken							X					X												
	Dryopteridaceae	*Dryopteris arguta*	Coastal Wood Fern					X	X				X							X						X	X
	Pteridaceae	*Adiantum jordanii*	California Maidenhair												X												
	Pteridaceae	*Pellaea mucronata var. mucronata*	Bird's Foot Cliff-Brake										X							X							
Magolids-Piperales																											
	Saururaceae	*Anemopsis californica*	Yerba Mansa								X			X	X												
Monocots																											
	Agavaceae	*Agave americana*	American Century Plant	X																							
		Hesperoyucca whipplei	Chaparral Candle					X	X				X				X	X		X						X	X
	Araceae	*Lemna spp.*	Duckweed								X																
	Asphodelaceae	*Asphodelus fistulosus*	Hollow-Stem Asphodel												X												
	Cyperaceae	*Carex sp.*	Sedge							X																	
		Cyperus eragrostis	Tall Flatsedge	X				X	X		X															X	X
		Cyperus involucratus	African Umbrella Plant	X																							
		Eleocharis montevidensis	Dombey's Spike-rush					X	X		X		X							X						X	X
		Schoenoplectus americanus	Olney's Bulrush								X																
		Schoenoplectus californicus	California Bulrush								X																
	Hyacinthaceae	*Chlorogalum parviflorum*	Small-Flower Soap-Plant																		X				X		
	Iridaceae	*Sisyrinchium bellum*	Blue-eyed-grass		X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X
	Juncaceae	*Juncus macrophyllus*	Long-Leaf Rush				X																				

Group	Family	Spp	Common	Roads 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
		Juncus oxymeris	Pointed Rush					X	X				X							X						X	X
Monocots																											
	Juncaceae	*Juncus sp. 1*	Rush																		X						
		Juncus xiphioides	Iris-Leaf Rush								X																
	Liliaceae	*Calochortus splendens*	Mariposa Lily		X		X			X				X					X		X						
	Poaceae	*Achnatherum coronatum*	Giant Stipa										X							X							
		Agrostis viridis	Water Bent								X																
		Avena barbata	Slender Wild Oat	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		Avena fatua	Wild Oat			X		X	X	X			X			X	X	X		X		X	X	X		X	X
		Bothriochloa barbinodis	Cane Bluestem		X	X				X						X		X	X		X	X	X	X	X		
		Brachypodium distachyon	Purple Falsebrome				X			X																	
		Bromus carinatus var. carinatus	California Brome				X																				
		Bromus diandrus	Ripcut Grass	X	X		X	X	X		X	X	X	X	X		X		X	X	X				X	X	X
		Bromus hordeaceus	Soft Chess	X	X	X	X	X	X	X	X	X	X	X		X		X	X	X	X	X	X	X	X	X	X
		Bromus madritensis ssp. madritensis	Compact Brome				X					X	X	X						X	X						
		Bromus madritensis ssp. rubens	Red Brome	X	X	X	X	X			X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X
		Cortaderia selloana	Selloa Pampas Grass		X		X												X								
		Cynodon dactylon	Bermuda Grass	X	X	X	X	X	X		X	X		X	X	X		X	X		X	X	X	X	X	X	X
		Distichlis spicata	Saltgrass	X			X	X	X		X				X			X			X					X	X
		Elymus multisetus	Big Squirreltail										X							X							
		Hordeum murinum	Barley			X				X						X		X				X	X	X			
		Hordeum murinum ssp. glaucum	Glaucous Barley	X	X		X					X			X				X						X		
		Lamarckia aurea	Golden-Top	X		X	X	X	X							X						X	X	X		X	X
		Leymus condensatus	Giant Wild-rye	X	X		X	X	X						X				X		X					X	X

Group	Family	Spp	Common	Roads 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
		Leymus triticoides	Beardless Wild-Rye					X	X				X							X						X	X
Monocots																											
	Poaceae	*Lolium multiflorum*	Italian Ryegrass	X			X	X	X			X	X	X	X			X		X	X				X	X	X
		Lolium perenne	Perennial Ryegrass															X									
		Melica imperfecta	Coast Range Melic					X	X						X											X	X
		Melinis repens ssp. repens	Natal Grass										X							X							
		Muhlenbergia rigens	Deergrass		X														X		X						
		Nasella cernua	Nodding Needlegrass			X						X	X	X				X		X	X	X	X	X			
		Nassella lepida	Foothill Needlegrass												X												
		Nassella pulchra	Purple Needlegrass	X	X	X	X	X	X	X		X	X	X	X	X		X	X	X	X	X	X	X	X	X	X
		Pennisetum setaceum	African Fountain Grass								X																
		Piptatherum miliaceum	Smilo Grass										X							X							
		Polypogon monspeliensis	Annual Beard Grass	X				X	X		X				X						X					X	X
		Schismus barbatus	Mediterranean Schismus					X	X																	X	X
		Vulpia myuros	Hairy Rat-Tail Fescue										X							X							
		Vulpia myuros1	Rat-Tail Fescue				X																				
	Themidaceae	*Bloomeria crocea var. crocea*	Common Goldenstar		X	X	X	X	X	X				X		X		X	X		X	X	X	X	X	X	X
		Brodiaeria terrestris ssp. kernensis	Dwarf Brodiaea																		X						
		Dichelostemma capitatum ssp. capitatum	Blue Dicks		X		X					X	X	X			X		X	X	X				X		
	Typhaceae	*Typha domingensis*	Southern Cattail	X						X	X																

APPENDIX D
CNDDB FORMS

Mail to:
California Natural Diversity Database
Department of Fish and Game
1807 13th Street, Suite 202
Sacramento, CA 95811
Fax: (916) 324-0475 email: CNDDB@dfg.ca.gov

Date of Field Work (mm/dd/yyyy): 04/17/2007

For Office Use Only

Source Code _____ Quad Code _____
Elm Code _____ Occ. No. _____
EO Index No. _____ Map Index No. _____

Reset

California Native Species Field Survey Form

Send Form

Scientific Name: *Horkelia truncata*

Common Name: Ramona Horkelia

Species Found? ☑ Yes ☐ No _____ If not, why?

Total No. Individuals 200+ Subsequent Visit? ☑ yes ☐ no

Is this an existing NDDB occurrence? _____ Yes, Occ. # ☑ no ☐ unk.

Collection? If yes: mrm#1946 Number SD Herbarium Museum / Herbarium

Reporter: Margie Mulligan
Address: San Diego Natural History Museum
P.O. Box 121390, San Diego CA 92112
E-mail Address: mmulligan@sdnhm.org
Phone: 619.255.0302

Plant Information

Phenology: _____% vegetative 100 % flowering _____% fruiting

Animal Information

_____ # adults _____ # juveniles _____ # larvae _____ # egg masses _____ # unknown

☐ breeding ☐ wintering ☐ burrow site ☐ rookery ☐ nesting ☐ other

Location Description ***(please attach map AND/OR fill out your choice of coordinates, below)***

Marine Corps Base Camp Pendleton, Echo Training Area, just east of Artillery Firing Range 40 along Roblar Road. Additional populations in Zulu Impact Area, on road and firebreak to No Firing Area and India Artillery Observation Point.

County: San Diego County Landowner / Mgr.: Marine Corps Base Camp Pendleton

Quad Name: _____ Elevation: 774 m

T____ R____ Sec ____, ____ ¼ of _____¼, Meridian: H☐ M☐ S☐ Source of Coordinates (GPS, topo. map & type): GPS

T____ R____ Sec ____, ____ ¼ of _____¼, Meridian: H☐ M☐ S☐ GPS Make & Model Garmin Rino 130

DATUM: **NAD27** ☐ **NAD83** ☐ **WGS84** ☑ Horizontal Accuracy 10 ft meters/feet

Coordinate System: UTM Zone 10 ☐ UTM Zone 11 ☐ ***OR*** Geographic (Latitude & Longitude) ☑

Coordinates: 33.4255 -117.3802

Habitat Description *(plant communities, dominants, associates, substrates/soils, aspects/slope):*

Mixed Chaparral (burned two years prior?) dominated by Adenostoma fasciculatum, Arctostaphylos glandulosa, Lotus scoparius, Ceanothus sp. (nov.), Styrax officinalis, and Salvia clevelandii. Arctostaphylos rainbowensis throughout area. Soils were decomposed granite with some clay.

Other rare taxa seen at THIS site on THIS date: Arctostaphylos rainbowensis
(separate form preferred)

Site Information Overall site/occurrence quality/viability (site + population): ☑ Excellent ☐ Good ☐ Fair ☐ Poor

Immediate AND surrounding land use: Marine Corps Base Operations and access roads to impact areas.

Visible disturbances: Heavy road use.

Threats: Road expansion and military operations.

Comments: This mixed chaparral is a very unusual habitat type on Camp Pendleton. A few rare plants have been found here and one of the dominant shrubs, Ceanothus sp., could not be identified using the Jepson Manual (Hickman, 1993) or Flora of North America keys (FNA 1993). This area should be further explored for additional rare and unusual plants.

Determination: *(check one or more, and fill in blanks)*

☑ Keyed (cite reference): Jepson
☐ Compared with specimen housed at: _____
☐ Compared with photo / drawing in: _____
☑ By another person (name): Dr. Jon Rebman, SD Herbarium Curator
☐ Other: _____

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	☐	☐	☐
Habitat	☐	☐	☐
Diagnostic feature	☐	☐	☐

May we obtain duplicates at our expense? yes ☐ no ☐

Mail to:
California Natural Diversity Database
Department of Fish and Game
1807 13th Street, Suite 202
Sacramento, CA 95811
Fax: (916) 324-0475 email: CNDDB@dfg.ca.gov

Date of Field Work (mm/dd/yyyy): 04/17/2007

For Office Use Only

Source Code _____ Quad Code _____
Elm Code _____ Occ. No. _____
EO Index No. _____ Map Index No. _____

Reset

California Native Species Field Survey Form

Send Form

Scientific Name: *Horkelia truncata*

Common Name: Ramona Horkelia

Species Found? ☑ Yes ☐ No _____ If not, why?

Total No. Individuals 200+ Subsequent Visit? ☑ yes ☐ no

Is this an existing NDDB occurrence? _____ Yes, Occ. # ☑ no ☐ unk.

Collection? If yes: mrm#1946 Number SD Herbarium Museum / Herbarium

Reporter: Margie Mulligan
Address: San Diego Natural History Museum
P.O. Box 121390, San Diego CA 92112
E-mail Address: mmulligan@sdnhm.org
Phone: 619.255.0302

Plant Information

Phenology: _____% vegetative 100 % flowering _____% fruiting

Animal Information

_____ # adults _____ # juveniles _____ # larvae _____ # egg masses _____ # unknown

☐ breeding ☐ wintering ☐ burrow site ☐ rookery ☐ nesting ☐ other

Location Description ***(please attach map AND/OR fill out your choice of coordinates, below)***

Marine Corps Base Camp Pendleton, Echo Training Area, just east of Artillery Firing Range 40 along Roblar Road. Additional populations in Zulu Impact Area, on road and firebreak to No Firing Area and India Artillery Observation Point.

County: San Diego County Landowner / Mgr.: Marine Corps Base Camp Pendleton

Quad Name: _____ Elevation: 774 m

T____ R____ Sec ____, ____ ¼ of _____¼, Meridian: H☐ M☐ S☐ Source of Coordinates (GPS, topo. map & type): GPS

T____ R____ Sec ____, ____ ¼ of _____¼, Meridian: H☐ M☐ S☐ GPS Make & Model Garmin Rino 130

DATUM: **NAD27** ☐ **NAD83** ☐ **WGS84** ☑ Horizontal Accuracy 10 ft meters/feet

Coordinate System: UTM Zone 10 ☐ UTM Zone 11 ☐ ***OR*** Geographic (Latitude & Longitude) ☑

Coordinates: 33.4255 -117.3802

Habitat Description *(plant communities, dominants, associates, substrates/soils, aspects/slope):*

Mixed Chaparral (burned two years prior?) dominated by Adenostoma fasciculatum, Arctostaphylos glandulosa, Lotus scoparius, Ceanothus sp. (nov.), Styrax officinalis, and Salvia clevelandii. Arctostaphylos rainbowensis throughout area. Soils were decomposed granite with some clay.

Other rare taxa seen at THIS site on THIS date: Arctostaphylos rainbowensis
(separate form preferred)

Site Information Overall site/occurrence quality/viability (site + population): ☑ Excellent ☐ Good ☐ Fair ☐ Poor

Immediate AND surrounding land use: Marine Corps Base Operations and access roads to impact areas.

Visible disturbances: Heavy road use.

Threats: Road expansion and military operations.

Comments: This mixed chaparral is a very unusual habitat type on Camp Pendleton. A few rare plants have been found here and one of the dominant shrubs, Ceanothus sp., could not be identified using the Jepson Manual (Hickman, 1993) or Flora of North America keys (FNA 1993). This area should be further explored for additional rare and unusual plants.

Determination: *(check one or more, and fill in blanks)*

☑ Keyed (cite reference): Jepson
☐ Compared with specimen housed at: _____
☐ Compared with photo / drawing in: _____
☑ By another person (name): Dr. Jon Rebman, SD Herbarium Curator
☐ Other: _____

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	☐	☐	☐
Habitat	☐	☐	☐
Diagnostic feature	☐	☐	☐

May we obtain duplicates at our expense? yes ☐ no ☐

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Source Code _____ Quad Code _____
Elm Code _____ Occ. No. _____
EO Index No. _____ Map Index No. _____

Reset

California Native Species Field Survey Form

Send Form

Scientific Name: *Horkelia truncata*

Common Name: Ramona Horkelia

Species Found? ☑ Yes ☐ No _____ If not, why?

Total No. Individuals 200+ Subsequent Visit? ☑ yes ☐ no

Is this an existing NDDB occurrence? _____ Yes, Occ. # ☑ no ☐ unk.

Collection? If yes: mrm#1946 Number SD Herbarium Museum / Herbarium

Reporter: Margie Mulligan
Address: San Diego Natural History Museum
P.O. Box 121390, San Diego CA 92112
E-mail Address: mmulligan@sdnhm.org
Phone: 619.255.0302

Plant Information

Phenology: _____% vegetative 100 % flowering _____% fruiting

Animal Information

_____ # adults _____ # juveniles _____ # larvae _____ # egg masses _____ # unknown

☐ breeding ☐ wintering ☐ burrow site ☐ rookery ☐ nesting ☐ other

Location Description ***(please attach map AND/OR fill out your choice of coordinates, below)***

Marine Corps Base Camp Pendleton, Echo Training Area, just east of Artillery Firing Range 40 along Roblar Road. Additional populations in Zulu Impact Area, on road and firebreak to No Firing Area and India Artillery Observation Point.

County: San Diego County Landowner / Mgr.: Marine Corps Base Camp Pendleton

Quad Name: _____ Elevation: 774 m

T____ R____ Sec ____, ____ ¼ of _____¼, Meridian: H☐ M☐ S☐ Source of Coordinates (GPS, topo. map & type): GPS

T____ R____ Sec ____, ____ ¼ of _____¼, Meridian: H☐ M☐ S☐ GPS Make & Model Garmin Rino 130

DATUM: **NAD27** ☐ **NAD83** ☐ **WGS84** ☑ Horizontal Accuracy 10 ft meters/feet

Coordinate System: UTM Zone 10 ☐ UTM Zone 11 ☐ ***OR*** Geographic (Latitude & Longitude) ☑

Coordinates: 33.4255 -117.3802

Habitat Description *(plant communities, dominants, associates, substrates/soils, aspects/slope):*

Mixed Chaparral (burned two years prior?) dominated by Adenostoma fasciculatum, Arctostaphylos glandulosa, Lotus scoparius, Ceanothus sp. (nov.), Styrax officinalis, and Salvia clevelandii. Arctostaphylos rainbowensis throughout area. Soils were decomposed granite with some clay.

Other rare taxa seen at THIS site on THIS date: Arctostaphylos rainbowensis
(separate form preferred)

Site Information Overall site/occurrence quality/viability (site + population): ☑ Excellent ☐ Good ☐ Fair ☐ Poor

Immediate AND surrounding land use: Marine Corps Base Operations and access roads to impact areas.

Visible disturbances: Heavy road use.

Threats: Road expansion and military operations.

Comments: This mixed chaparral is a very unusual habitat type on Camp Pendleton. A few rare plants have been found here and one of the dominant shrubs, Ceanothus sp., could not be identified using the Jepson Manual (Hickman, 1993) or Flora of North America keys (FNA 1993). This area should be further explored for additional rare and unusual plants.

Determination: *(check one or more, and fill in blanks)*

☑ Keyed (cite reference): Jepson
☐ Compared with specimen housed at: _____
☐ Compared with photo / drawing in: _____
☑ By another person (name): Dr. Jon Rebman, SD Herbarium Curator
☐ Other: _____

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	☐	☐	☐
Habitat	☐	☐	☐
Diagnostic feature	☐	☐	☐

May we obtain duplicates at our expense? yes ☐ no ☐

Mail to:
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Department of Fish and Game
1807 13th Street, Suite 202
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Date of Field Work (mm/dd/yyyy): 04/17/2007

For Office Use Only

Source Code _____ Quad Code _____
Elm Code _____ Occ. No. _____
EO Index No. _____ Map Index No. _____

Reset

California Native Species Field Survey Form

Send Form

Scientific Name: *Horkelia truncata*

Common Name: Ramona Horkelia

Species Found? ☑ Yes ☐ No _____ If not, why?

Total No. Individuals 200+ Subsequent Visit? ☑ yes ☐ no

Is this an existing NDDB occurrence? _____ Yes, Occ. # ☑ no ☐ unk.

Collection? If yes: mrm#1946 Number SD Herbarium Museum / Herbarium

Reporter: Margie Mulligan
Address: San Diego Natural History Museum
P.O. Box 121390, San Diego CA 92112
E-mail Address: mmulligan@sdnhm.org
Phone: 619.255.0302

Plant Information

Phenology: _____% vegetative 100 % flowering _____% fruiting

Animal Information

_____ # adults _____ # juveniles _____ # larvae _____ # egg masses _____ # unknown

☐ breeding ☐ wintering ☐ burrow site ☐ rookery ☐ nesting ☐ other

Location Description ***(please attach map AND/OR fill out your choice of coordinates, below)***

Marine Corps Base Camp Pendleton, Echo Training Area, just east of Artillery Firing Range 40 along Roblar Road. Additional populations in Zulu Impact Area, on road and firebreak to No Firing Area and India Artillery Observation Point.

County: San Diego County Landowner / Mgr.: Marine Corps Base Camp Pendleton

Quad Name: _____ Elevation: 774 m

T____ R____ Sec ____, ____ ¼ of _____¼, Meridian: H☐ M☐ S☐ Source of Coordinates (GPS, topo. map & type): GPS

T____ R____ Sec ____, ____ ¼ of _____¼, Meridian: H☐ M☐ S☐ GPS Make & Model Garmin Rino 130

DATUM: **NAD27** ☐ **NAD83** ☐ **WGS84** ☑ Horizontal Accuracy 10 ft meters/feet

Coordinate System: UTM Zone 10 ☐ UTM Zone 11 ☐ ***OR*** Geographic (Latitude & Longitude) ☑

Coordinates: 33.4255 -117.3802

Habitat Description *(plant communities, dominants, associates, substrates/soils, aspects/slope):*

Mixed Chaparral (burned two years prior?) dominated by Adenostoma fasciculatum, Arctostaphylos glandulosa, Lotus scoparius, Ceanothus sp. (nov.), Styrax officinalis, and Salvia clevelandii. Arctostaphylos rainbowensis throughout area. Soils were decomposed granite with some clay.

Other rare taxa seen at THIS site on THIS date: Arctostaphylos rainbowensis
(separate form preferred)

Site Information Overall site/occurrence quality/viability (site + population): ☑ Excellent ☐ Good ☐ Fair ☐ Poor

Immediate AND surrounding land use: Marine Corps Base Operations and access roads to impact areas.

Visible disturbances: Heavy road use.

Threats: Road expansion and military operations.

Comments: This mixed chaparral is a very unusual habitat type on Camp Pendleton. A few rare plants have been found here and one of the dominant shrubs, Ceanothus sp., could not be identified using the Jepson Manual (Hickman, 1993) or Flora of North America keys (FNA 1993). This area should be further explored for additional rare and unusual plants.

Determination: *(check one or more, and fill in blanks)*

☑ Keyed (cite reference): Jepson
☐ Compared with specimen housed at: _____
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☑ By another person (name): Dr. Jon Rebman, SD Herbarium Curator
☐ Other: _____

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	☐	☐	☐
Habitat	☐	☐	☐
Diagnostic feature	☐	☐	☐

May we obtain duplicates at our expense? yes ☐ no ☐

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APPENDIX F
MEMORANDUM OF UNDERSTANDING BETWEEN THE U.S. DEPARTMENT OF DEFENSE AND THE USFWS TO PROMOTE THE CONSERVATION OF MIGRATORY BIRDS

MEMORANDUM OF UNDERSTANDING
BETWEEN THE
U.S. DEPARTMENT OF DEFENSE
AND THE
U.S. FISH AND WILDLIFE SERVICE
TO PROMOTE THE CONSERVATION OF MIGRATORY BIRDS

This Memorandum of Understanding (MOU) is entered into between the U.S. Department of Defense (DoD) and the U.S. Fish and Wildlife Service (FWS) (hereinafter "the Parties").

A. Purpose and Scope

Pursuant to Executive Order 13186 (January 17, 2001), Responsibilities of Federal Agencies to Protect Migratory Birds, this MOU outlines a collaborative approach to promote the conservation of migratory bird populations.

This MOU does not address incidental take during military readiness activities, which is being addressed in a rulemaking in accordance with section 315 of the National Defense Authorization Act for Fiscal Year 2003 (Pub. L. 107-314, 116 Stat. 2458).

This MOU specifically pertains to the following categories of DoD activities:

(1) Natural resource management activities, including, but not limited to, habitat management, erosion control, forestry activities, agricultural outleasing, conservation law enforcement, invasive weed management, and prescribed burning;

(2) Installation support functions, including but not limited to, the maintenance, construction or operation of administrative offices, military exchanges, road construction, commissaries, water treatment facilities, storage facilities, schools, housing, motor pools, non-tactical equipment, laundries, morale, welfare, and recreation activities, shops, landscaping, and mess halls;

(3) Operation of industrial activities;

(4) Construction or demolition of facilities relating to these routine operations; and

(5) Hazardous waste cleanup.

This MOU identifies specific activities where cooperation between the Parties will contribute substantially to the conservation of migratory birds and their habitats. This MOU does not authorize the take of migratory birds.

B. Authorities

The Parties' responsibilities under the MOU are authorized by provisions of the following laws:

Alaska National Interest Lands Conservation Act of 1980 (16 USC 410hh-3233)
Bald and Golden Eagle Protection Act of 1940 (16 U.S.C. 668-668d)
Endangered Species Act of 1973 (16 U.S.C. 1531 et seq.)
Fish and Wildlife Act of 1956 (16 U.S.C. 742 et seq.)
Fish and Wildlife Conservation Act of 1980 (16 U.S.C. 2901-2911)
Fish and Wildlife Coordination Act (16 U.S.C. 661-667)
Migratory Bird Conservation Act (16 U.S.C. 715-715d, 715e, 715f-715r)
Migratory Bird Treaty Act (16 U.S.C. 703-711)
National Environmental Policy Act of 1969 (42 U.S.C. 4321-4347)
Sikes Act Improvement Act of 1997 (16 USC 670a-670o)
Agreements to limit encroachments and other constraints on military training, testing, and operations (10 U.S.C. § 2684a)

C. Background

The Parties have a common interest in the conservation and management of America's natural resources. The Parties agree that migratory birds are important components of biological diversity and that the conservation of migratory birds will both help sustain ecological systems and help meet the public demand for conservation education and outdoor recreation, such as wildlife viewing and hunting opportunities. The Parties also agree that it is important to: 1) focus on bird populations; 2) focus on habitat restoration and enhancement where actions can benefit specific ecosystems and migratory birds dependent upon them; and 3) recognize that actions taken to benefit some migratory bird populations may adversely affect other migratory bird populations.

The DoD mission is to provide for the Nation's defense. DoD's conservation program works to ensure continued access to land, air, and water resources for realistic military training and testing while ensuring that the natural and cultural resources entrusted to DoD's care are sustained in a healthy condition.

The DoD is an active participant in international bird conservation partnerships including Partners in Flight (PIF) and the North American Bird Conservation Initiative (NABCI). Military lands frequently provide some of the best remaining habitat for migratory bird species of concern, and DoD plans to continue its leadership role in bird conservation partnerships.

Through the PIF initiative, DoD works in partnership with numerous Federal and State agencies and nongovernmental organizations for the conservation of migratory and resident birds and to enhance migratory bird survival. Through DoD PIF, a list of species of concern (see Definitions) has been developed for each Bird Conservation Region where DoD facilities occur, thus improving DoD's ability to evaluate any migratory bird conservation concerns on respective DoD lands.

Integrated Natural Resources Management Plans (INRMPs) offer a coordinated approach for incorporating habitat conservation efforts into installation management.

INRMPs are a significant source of baseline conservation information and conservation initiatives used when preparing National Environmental Policy Act (NEPA) documents for all DoD management activities. This linkage helps to ensure that appropriate conservation and mitigation measures are identified in NEPA documents and committed to, when appropriate, in final decision documents.

The DoD PIF program provides a framework for incorporating landbird, shorebird and waterbird habitat management efforts into INRMPs. DoD's strategy focuses on inventorying and long-term monitoring to determine changes in migratory bird populations on DoD installations. Effective on-the-ground management may then be applied to those areas identified as having the highest conservation value. DoD's PIF goal is to support the military's training and testing mission while being a vital and supportive partner in regional, national, and international bird conservation initiatives. DoD strives to implement cooperative projects and programs on military lands to benefit the health and well-being of birds and their habitats, whenever possible. The Department of Defense implements bird inventories and monitoring programs in numerous ways including Monitoring Avian Productivity and Survivorship (MAPS) and Next Generation Radar (NEXRAD) for studying bird movements in the atmosphere. DoD also maintains an integrated pest management (IPM) program designed to reduce the use of pesticides to the minimum necessary.

The mission of the FWS is to work with others to conserve, protect, manage, and enhance fish, wildlife, plants, and their habitats for the continuing benefit of the American people. The FWS is legally mandated to implement the provisions of the Migratory Bird Treaty Act (MBTA), which include responsibilities for population management (e.g., monitoring), habitat protection (e.g., acquisition, enhancement, and modification), international coordination, and regulation development and enforcement. The FWS also promotes migratory bird conservation through its coordination and consultation efforts with other entities.

Many FWS programs are involved in bird conservation activities, including:

1. The Division of Migratory Bird Management and Regional Migratory Birds and Habitat Programs serve as focal points in the United States for policy development and strategic planning, developing and implementing monitoring and management initiatives that help maintain healthy populations of migratory birds and their habitat, and providing continued opportunities for citizens to enjoy bird-related recreation.

2. The Division of Bird Habitat Conservation is instrumental in supporting habitat conservation partnerships through the administration of bird conservation grant programs and development of Joint Ventures that serve as major vehicles for implementing the various bird conservation plans across the country.

3. Ecological Services Field Offices across the country serve as the primary contacts for environmental reviews that include, when requested, projects developed by local military installations and DoD regional offices involving migratory bird issues. The Field Offices coordinate with the Regional Migratory Bird Offices, as necessary, during these reviews regarding permits

and overall migratory bird conservation coordination for DoD activities.

4. The Office of Law Enforcement is the principal FWS program that enforces the legal provisions of the MBTA .

The Parties agree this MOU shall be implemented to the extent permitted by law and in harmony with agency missions, subject to the availability of appropriations and budgetary limits.

D. <u>Responsibilities</u>

1. **Each Party shall**:

a. Emphasize an interdisciplinary, collaborative approach to migratory bird conservation in cooperation with other governments, State and Federal agencies, and non-federal partners within the geographic framework of the NABCI Bird Conservation Regions

b. Strive to protect, restore, enhance, and manage habitat of migratory birds, and prevent or minimize the loss or degradation of habitats on DoD-managed lands, by:

(1) Identifying and avoiding management actions that have the potential to adversely affect migratory bird populations, including breeding, migration, or wintering habitats; and by developing and implementing, as appropriate, conservation measures that would avoid or minimize the take of migratory birds or enhance the quality of the habitat used by migratory birds.;

(2) Working with partners to identify, conserve, and manage Important Bird Areas, Western Hemisphere Shorebird Reserve Network sites, and other significant bird conservation sites that occur on DoD-managed lands;

(3) Preventing or abating the pollution or detrimental alteration of the habitats used by migratory birds;

(4) Developing and integrating information on migratory birds and their habitats into outreach and education materials and activities; and

(5) Controlling the introduction, establishment, and spread of non-native plants or animals that may be harmful to migratory bird populations, as required by Executive Order 13112 on Invasive Species.

c. Work with willing landowners to prevent or minimize the loss or degradation of migratory bird habitats on lands adjacent or near military installation boundaries. This cooperative conservation may include:

(1) Participating in efforts to identify, protect, and conserve

important migratory bird habitats or other significant bird conservation sites and ecological conditions that occur in landscapes or watersheds that may be affected by activities on DoD lands;

(2) Developing and integrating information on migratory bird resources found on DoD lands into other partners' outreach and education materials and activities; and

(3) Using available authorities to enter into agreements with other Federal agencies, States, other governmental entities, and private conservation organizations to conserve and enhance habitat in a compatible manner so military operations are not restricted.

d. Promote collaborative projects such as:

(1) Developing or using existing inventory and monitoring programs, at appropriate scales, with national or regional standardized protocols, to assess the status and trends of bird populations and habitats, including migrating, breeding, and wintering birds;

(2) Designing management studies and research projects using national or regional standardized protocols and programs, such as MAPS to identify the habitat conditions needed by applicable species of concern, to understand interrelationships of co-existing species, and to evaluate the effects of management activities on habitats and populations of migratory birds;

(3) Sharing inventory, monitoring, research, and study data for breeding, migrating, and wintering bird populations and habitats in a timely fashion with national data repositories such as Breeding Bird Research and Monitoring Database (BBIRD), National Point Count Database, National Biological Information Infrastructure, and MAPS;

(4) Working in conjunction with each other and other Federal and State agencies to develop reasonable and effective conservation measures for actions that affect migratory birds and their natural habitats;

(5) Participating in or promoting the implementation of existing regional or national inventory and monitoring programs such as Breeding Bird Survey (BBS), BBIRD, Christmas Bird Counts, bird atlas projects, or game bird surveys (e.g., mid-winter waterfowl surveys) on DoD lands where practicable and feasible.

(6) Using existing partnerships and exploring opportunities for expanding and creating new partnerships to facilitate combined funding for inventory, monitoring, management studies, and research.

e. Provide training opportunities to DoD natural resources personnel on migratory bird issues, to include bird population and habitat inventorying,

monitoring methods, and management practices that avert detrimental effects and promote beneficial approaches to migratory bird conservation.

f. Participate in the Interagency Council for the Conservation of Migratory Birds to evaluate implementation of this MOU.

g. Promote migratory bird conservation internationally, as it relates to wintering, breeding and migration habitats of birds that breed on DoD lands.

h. Promote and undertake ecologically sound actions to curb the introduction in the wild of exotic or invasive species harmful to migratory birds.

2. **The Department of Defense Shall**:

a. Follow all migratory bird permitting requirements for non-military readiness activities that are subject to 50 CFR Parts 21.22 (banding or marking), 21.23 (scientific collecting), 21.26 (special Canada goose permit), 21.27 (special purposes), or 21.41 (depredation). No permit is required to take birds in accordance with Parts 21.43 - 21.47 (depredation orders).

b. Encourage incorporation of comprehensive migratory bird management objectives in the preparation of DoD planning documents, including Integrated Natural Resource Management Plans, Pest Management Plans, Installation Master Plans, NEPA analyses, and non-military readiness elements of Bird Aircraft Strike Hazard documents. Comprehensive planning efforts for migratory birds include PIF Bird Conservation Plans, the North American Waterfowl Management Plan, U.S. Shorebird Conservation Plan, and North American Waterbird Conservation Plan and associated regional plans where available.

c. Incorporate conservation measures addressed in Regional or State Bird Conservation Plans in INRMPs.

d. Consistent with imperatives of safety and security, allow the FWS and other partners reasonable access to military lands for conducting sampling or survey programs such as MAPS, BBS, BBIRD, International Shorebird Survey, and breeding bird atlases.

e. Prior to starting any activity that is likely to affect populations of migratory birds:

(1) Identify the migratory bird species likely to occur in the area of the proposed action and determine if any species of concern could be affected by the activity;

(2) Assess and document, through the project planning process, using NEPA when applicable, the effect of the proposed action on species of concern. Use best available demographic, population, or habitat

association data in the assessment of effects upon species of concern;

(3) Engage in early planning and scoping with the FWS relative to potential impacts of a proposed action, to proactively address migratory bird conservation, and to initiate appropriate actions to avoid or minimize the take of migratory birds.

f. Manage military lands and non-military readiness activities in a manner that supports migratory bird conservation, giving consideration to the following factors:

(1) Habitat protection, restoration, and enhancement. Military lands contain many important habitats for migratory birds. Some unique, sensitive, endangered and/or declining habitat types that may require special management attention include:

(a) Grasslands. Many native grassland communities require intensive management to maintain and restore vigor and species diversity and to provide habitat for migratory birds and other wildlife dependent on native grasslands. Grassland management and restoration tools include controlled burning, mowing, grazing, native species planting, and exotic plant removal. Many grasslands have evolved with a natural fire regime, and the management activities often emulate this fire regime.

(b) Riparian and wetland habitats. Military lands contain riparian and wetland habitats that may be critical for migratory birds. DoD will strive to prevent the destruction or degradation of wetlands and riparian vegetation, and also restore those habitats, when feasible, where they have been degraded.

(c) Coastal beach, salt marsh, and dune habitats. Military lands support some of the best remaining undisturbed coastal habitats. DoD will strive to protect, restore and prevent the destruction of coastal and island habitats that are important to breeding, migrating and wintering shorebirds, salt marsh land birds and colonial water birds.

(d) Longleaf pine ecosystem. Some of the best remaining examples of the longleaf pine ecosystem occur on military lands. Such habitats benefit from prescribed fire and other management measures which DoD regularly implements on thousands of acres in the Southeast. The DoD manages and will continue to manage this ecosystem to benefit and promote migratory bird conservation.

(2) Fire and fuels management practices. Fire plays an important role in shaping plant and animal communities and is a valuable tool in restoring habitats altered by decades of fire suppression. Fire management may include fire suppression, but also involves fire

prevention and fuels treatment, including prescribed burning and monitoring, to protect communities and provide for healthy ecosystems. Fire management planning efforts will consider the effects of fire management strategies on the conservation of migratory bird populations.

(3) Invasive Species and Aquatic Nuisance Species management practices. Invasive Species and Aquatic Nuisance Species are a threat to native habitats and wildlife species throughout the United States, including military lands. Efforts to control/contain these species must take into account both the impacts from invasive species and the effects of the control efforts on migratory bird populations. Invasive Species and Aquatic Nuisance Species that can threaten migratory birds and their habitats include, but are not limited to, exotic grasses, trees and weeds, terrestrial and aquatic insects and organisms, non-native birds, and stray and feral cats.

(4) Communications towers, utilities and energy development. Increased communications demands, changes in technology and the development of alternative energy sources result in impacts on migratory birds. DoD will review wind turbine and powerline guidelines published by FWS and the Avian Power Line Interaction Committee, respectively, and consult with FWS as needed, in considering potential effects on migratory birds of proposals for locating communications towers, powerlines or wind turbines on military lands. Construction of new utility and energy systems and associated infrastructure should be designed to avoid and minimize impacts on migratory bird populations. Existing utilities may also be considered for retrofitting to reduce impacts.

(5) Recreation and public use. The demand for outdoor recreational opportunities on public lands is increasing. Impacts on migratory birds may occur both through direct and indirect disturbances by visitors and through agency activities associated with providing recreational opportunities to visitors and installation personnel and morale facilities (e.g., facilities construction). DoD provides access to military lands for recreation and other public use, such as Watchable Wildlife and bird watching, where such access does not compromise security and safety concerns or impact migratory birds, other species, or their habitats.

Many conservation measures have been developed to benefit a variety of migratory bird species and their associated habitats. Some of these conservation measures may be directly applicable to DoD non-military readiness related activities; however, the appropriateness and practicality of implementing any specific conservation measure may have to be determined on a case-by-case basis. The FWS will work cooperatively with DoD in providing existing conservation measures and developing new ones as needed. Examples of some conservation measures may be found at http://www.partnersinflight.org/pubs/BMPs.htm for landbird

species.

g. Develop and implement new and/or existing inventory and monitoring programs, at appropriate scales, using national standardized protocols, to evaluate the effectiveness of conservation measures to minimize or mitigate take of migratory birds, with emphasis on those actions that have the potential to significantly impact species of concern.

h. Advise the public of the availability of this MOU through a notice published in the Federal Register.

i. In accordance with DoD INRMP guidance, promote timely and effective review of INRMPs with respect to migratory bird issues with the FWS and respective state agencies. During the INRMP review process, evaluate and coordinate with FWS on any potential revisions to migratory bird conservation measures taken to avoid or minimize take of migratory birds.

3. **The Fish and Wildlife Service Shall**:

a. Work with DoD by providing recommendations to minimize adverse effects upon migratory birds from DoD actions.

b. Through the Division of Migratory Bird Management, maintain a Web page on permits that provides links to all offices responsible for issuing permits and permit application forms for take of migratory birds.

c. Provide essential background information to the DoD when requested to ensure sound management decisions. This may include migratory bird distributions, status, key habitats, conservation guidelines, and risk factors within each BCR. This includes updating the FWS publication of *Birds of Conservation Concern* at regular intervals so it can be reliably referenced.

d. Work to identify special migratory bird habitats (i.e., migration corridors, stop-over habitats, ecological conditions important in nesting habitats) to aid in collaborative planning.

e. Through the Ecological Service Field Office, provide to DoD, upon request, technical assistance on migratory bird species and their habitats.

f. In accordance with FWS Guidelines for Coordination with DoD and Implementation of the 1997 Sikes Act (2005), work cooperatively with DoD in the development, review and revision of INRMPs.

g. Review and comment on NEPA documents and other planning documents forwarded by military installations.

E. <u>It is Mutually Agreed and Understood That:</u>

1. This MOU will not change or alter requirements associated with the MBTA, Endangered Species Act, NEPA, Sikes Act or other statutes or

legal authority.

2. The responsibilities established by this MOU may be incorporated into existing DoD actions; however, DoD may not be able to implement some responsibilities identified in the MOU until DoD has successfully included them in formal planning processes. This MOU is intended to be implemented when new actions are initiated as well as during the initiation of new, or revisions to, INRMPs, Pest Management Plans, and non-military readiness elements of Bird Aircraft Strike Hazard plans. It does not apply to ongoing DoD actions for which a NEPA decision document was finalized prior to, or within 180 days of the date this MOU is signed.

3. This MOU in no way restricts either Party from participating in similar activities with other public or private agencies, governments, organizations, or individuals.

4. An elevation process to resolve any dispute between the Parties regarding a particular practice or activity is in place and consists of first attempting to resolve the dispute with the DoD military installation and the responsible Ecological Services Field Office. If there is no resolution at this level, either Party may elevate the issue to the appropriate officials at the applicable Military Service's Chain of Command and FWS Regional Offices. In the event that there is no resolution by these offices, the dispute may be elevated by either Party to the headquarters office of each agency.

5. This MOU is neither a fiscal nor a funds obligation document. Any endeavor involving reimbursement, contribution of funds, or transfer of anything of value between the Parties will be handled in accordance with applicable laws, regulations, and procedures, including those for government procurement and printing. Such endeavors will be outlined in separate agreements that shall be made in writing by representatives of the Parties and shall be independently authorized by appropriate statutory authority.

6. The Parties shall schedule periodic meetings to review progress and identify opportunities for advancing the principles of this MOU.

7. This MOU is intended to improve the internal management of the executive branch and does not create any right or benefit, substantive or procedural, separately enforceable at law or equity by a party against the United States, its agencies or instrumentalities, its officers or employees, or any other person.

8. Modifications to the scope of this MOU shall be made by mutual consent of the Parties, through issuance of a written modification, signed and dated by both Parties, prior to any changes.

9. Either Party may terminate this instrument, in whole or in part, at any time before the date of expiration by providing the other Party with a written statement to that effect.

The principal contacts for this instrument are as follows:

Brian Millsap, Chief Division of Migratory Bird Management US Fish and Wildlife Service 4401 N. Fairfax Drive MS4107 Arlington, VA 22203	L. Peter Boice, Conservation Team Leader Office of the Secretary of Defense 1225 S. Clark St. Suite 1500 Arlington, VA 22202-4336

This MOU is executed as of the last date signed below and expires no later than five (5) years thereafter, at which time it is subject to review and renewal, or expiration.

F. Definitions

Action – a program, activity, project, official policy, rule, regulation or formal plan directly carried out by DoD, but not a military readiness activity.

Breeding Biology Research and Monitoring Database (BBIRD) - national, cooperative program that uses standardized field methodologies for studies of nesting success and habitat requirements of breeding birds (http://pica.wru.umt.edu/BBIRD/).

Breeding Bird Survey (BBS) – a standardized international survey that provides information on population trends of breeding birds, through volunteer observations located along randomly selected roadside routes in the United States, Canada and Mexico (http://www.mbr-pwrc.usgs.gov/bbs/bbs.html).

Bird Conservation Region – a geographic unit used to facilitate bird conservation actions under the North American Bird Conservation Initiative (http://www.manomet.org/USSCP/bcrmaps.html).

Birds of Conservation Concern – published by the FWS Division of Migratory Bird Management, refers to the list of migratory and non-migratory birds of the United States and its territories that are of conservation concern. The current version of the list Birds of Conservation Concern 2002 is available at (http://migratorybirds.fws.gov/reports/bcc2002.pdf).

Comprehensive Planning Efforts for Migratory Birds – includes Partners in Flight, North American Waterfowl Management Plan, U.S. Shorebird Conservation Plan, Western Hemisphere Shorebird Reserve Network, North American Waterbird Conservation Plan, and other planning efforts integrated through the North American Bird Conservation Initiative.

Conservation Measure – an action undertaken to improve the conservation status of one or more species of migratory birds. Examples include surveys and inventories, monitoring, status assessments, land acquisition or protection, habitat restoration, population manipulation, research, and outreach.

Conservation Planning – strategic and tactical planning of agency activities for the long-

term conservation of migratory birds and their habitats.

Council for the Conservation of Migratory Birds – an interagency council established by the Secretary of the Interior to oversee the implementation of Executive Order 13186.

Ecological Condition – the composition, structure, and processes of ecosystems over time and space. This includes the diversity of plant and animal communities, the productive capacity of ecological systems and species diversity, ecosystem diversity, disturbance processes, soil productivity, water quality and quantity, and air quality. Often referred to in terms of ecosystem health, which is the degree to which ecological factors and their interactions are reasonably complete and functioning for continued resilience, productivity, and renewal of the ecosystem.

Effect (adverse or beneficial) – "effects" and "impacts," as used in this MOU are synonymous. Effects may be direct, indirect, or cumulative, and refer to effects from management actions or categories of management actions on migratory bird populations, habitats, ecological conditions and/or significant bird conservation sites.

Important Bird Areas (IBAs) – a network of sites that provide essential habitat for the long-term conservation of birds. In the United States, the IBA network is administered by the American Bird Conservancy and the National Audubon Society. (http://www.audubon.org/nird/iba/)

Integrated Natural Resources Management Plan (INRMP) – an integrated plan based, to the maximum extent practicable, on ecosystem management that shows the interrelationships of individual components of natural resources management (e.g., fish and wildlife, forestry, land management, outdoor recreation) to military mission requirements and other land use activities affecting an installation's natural resources. INRMPs are required for all DoD installations with significant natural resources, pursuant to the Sikes Act Improvement Act.

International Shorebird Survey – a monitoring program started in 1974 to survey shorebirds (sandpipers, plovers, etc.) across the Western Hemisphere. (http://www.manomet.org/programs/shorebirds).

Management Action – an activity by a government agency that could cause a positive or negative impact on migratory bird populations or habitats. Conservation measures to mitigate potential negative effects of actions may be required.

Migratory Bird – any bird listed in 50 CFR §10.13, Code of Federal Regulations.

Military Readiness Activity – all training and operations of the Armed Forces that relate to combat, including but not limited to the adequate and realistic testing of military equipment, vehicles, weapons and sensors for proper operation and suitability for combat use.

Monitoring Avian Productivity and Survivorship (MAPS) – a program that uses the banding of birds during the breeding season to track the changes and patterns in the number of young produced and the survivorship of adults and young

(http://www.birdpop.org/maps.htm).

National Environmental Policy Act (NEPA) – a Federal statute that requires Federal agencies to prepare a detailed analysis of the environmental impacts of a proposed action and alternatives, and to include public involvement in the decision making process for major Federal actions significantly affecting the quality of the human environment 42 U.S.C. §4321, et. seq.

North American Bird Conservation Initiative (NABCI) – an initiative to align the avian conservation community to implement bird conservation through regionally-based, biologically driven, landscape-oriented partnerships across the North American continent. NABCI includes Federal agencies of Canada, Mexico and the United States, as well as most landbird, shorebird, waterbird, and waterfowl conservation initiatives (http://www.nabci-us.org).

North American Waterbird Conservation Plan – a partnership of Federal and State government agencies, non-governmental organizations, and private interests focusing on the conservation of waterbirds, primarily including marshbirds and inland, coastal, and pelagic colonial waterbirds (www.nacwcp.org/pubs/). The vision of the partnership is that the distribution, diversity and abundance of populations and breeding, migratory, and nonbreeding waterbirds are sustained throughout the lands and waters of North America, Central America, and the Caribbean.

North American Waterfowl Management Plan –a partnership of Federal and State agencies, non-governmental organizations, and private interests focusing on the restoration of waterfowl populations through habitat restoration, protection, and enhancement (http://birdhabitat.fws.gov/NAWMP/nawmphp.htm).

Partners in Flight (PIF) – a cooperative partnership program of more than 300 partners including Federal and State government agencies, non-governmental organizations, conservation groups, foundations, universities and industry focusing on the conservation of landbirds. DoD was an original signatory to the PIF Federal Agencies' MOA. (http://www.partnersinflight.org and http://www.dodpif.org).

Species of Concern – refers to those species listed in the periodic report *Birds of Conservation Concern;* priority migratory bird species documented in the comprehensive bird conservation plans (North American Waterbird Conservation Plan, U.S. Shorebird Conservation Plan, Partners in Flight Bird Conservation Plans); species or populations of waterfowl identified as high, or moderately high, continental priority in the North American Waterfowl Management Plan; listed threatened and endangered bird species in 50 CFR. 17.11; and MBTA listed game birds below desired population sizes.

Take – as defined in 50 C.F.R. 10.12, to include pursue, hunt, shoot, wound, kill, trap, capture, collect, or to attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect.

U.S. Shorebird Conservation Plan – an effort undertaken by a partnership of Federal and State government agencies, as well as non-governmental and private organizations to ensure that stable and self-sustaining populations of all shorebird species are restored

and protected (http://www.fws.gov/shorebird).

The Parties hereto have executed this agreement as of the date shown below.

Director US Fish and Wildlife Service	Assistant Deputy Under Secretary of Defense (Environment, Safety and Occupational Health) US Department of Defense
H Dale Hall 7/7/06 Signature Date	Alex Albert Beehler 7/31/06 Signature Date

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APPENDIX G
COASTAL CALIFORNIA GNATCATCHER SURVEY REPORT

FINAL

NON-NESTING SEASON SURVEY FOR COASTAL CALIFORNIA GNATCATCHER (*Polioptila californica californica*) ALONG JARDINE CANYON ROAD, ACCESS ROADS REPAIR PROJECT, MARINE CORPS BASE CAMP PENDLETON, CA

Sections 10, 11, & 2, T9S R6W; 35, 36, & 25, T8S R6W Margarita Peak 7.5 Minute USGS Quadrangle;
Section 16, T9S R6W San Clemente 7.5 Minute USGS Quadrangle.

Prepared for:

Ms. Adrianne Saboya
NAVFAC SW
937 North Harbor Drive
San Diego, CA 92132

By

Arthur Davenport
Davenport Biological Services
P.O. Box 1692
Barstow, California 92312
619-729-4242

January 2008

Introduction

In support of the Environmental Assessment/Biological Assessment for the Proposed Repair of 24 Training Range Access Roads, Davenport Biological Services (DBS) was hired by TEC Inc. to complete a survey for coastal California gnatcatchers (*Polioptila californica californica*)(CAGN) along Jardine Canyon Road, Marine Corps Base Camp Pendleton, California. Jardine Canyon Road, #3 of 24 roads proposed for repair, is a heavily used training corridor that extends the length of Jardine Canyon between the Quebec and Whisky Impact Areas, and thus has restricted access (Camp Pendleton Military Installation Map, V795S, Edition 3-NIMA, 2000). Jardine Canyon is located at the north end of Camp Pendleton (Figures 1 & 2). The need for the survey was dictated by the presence of potentially suitable habitat that had not previously been covered in base wide CAGN surveys. The survey period partially overlapped both the nesting and non-nesting seasons of the CAGN. The elevation of the survey area ranged from 213 feet to 1,476 feet above mean sea level.

On 25 March 1993, the CAGN was listed as a threatened species under the Federal Endangered Species Act of 1973, as amended (USFWS 1973). Critical Habitat was designated on 24 October 2000 (USFWS 2000). Critical habitat was not designated in mission-critical areas on military installations where an Integrated Resource Management Plan (INRMP) was in place (e.g., Marine Corps Air Base Miramar). In the case of Marine Corps Base Camp Pendleton, critical habitat was not designated because it was concluded that the detriments of designation outweighed the benefits. At the time of designation, the INRMP was in development, and it was concluded that designation would significantly disrupt training during final development of the INRMP and associated formal consultation with the U.S. Fish and Wildlife Service (USFWS 2000).

The CAGN is a small gray songbird. The historic distribution of the CAGN included southern Ventura County, Los Angeles, San Bernardino, Riverside, Orange, and San Diego Counties. The CAGN also occurs in Baja California, Mexico, to approximately 30 degrees North Latitude (American Ornithologists' Union 1957). Though significantly reduced in distribution, populations of the CAGN are known to remain in all six counties. A biologically significant population of CAGN occurs on Marine Corps Base Camp Pendleton.

The CAGN is generally associated with various forms of the coastal sage scrub plant community, including alluvial fan scrub. The CAGN will also use willow riparian, riparian scrub, baccharis scrub, and chaparral when in close association with coastal sage scrub.

The breeding season of the CAGN extends from approximately February 15 through the end of August. Following nesting, the CAGN remains and does not migrate. However, their use area expands beyond that of their nesting territory. Nesting territories range in size from approximately one to 20 acres.

Methods

The CAGN survey was completed under Federal Recovery Permit # TE802450-4. The survey was initiated on 11 July 2007, and was completed on 18 November 2007. A survey of the entire site was repeated nine times. At a minimum, survey passes were completed at least one week apart. Surveys were initiated around 0730 and completed by 1200 hours.

All suitable habitat, including marginal habitat, was surveyed for CAGN. Marginal habitats included baccharis scrub. Surveys were conducted by walking along the edge of Jardine Canyon

Road and periodically playing a call of the CAGN. While within or adjacent to suitable habitat, the call of the CAGN was played two to three times at approximately 20-meter intervals. For approximately three minutes, following the playing of a call, the species was listened and visually scanned for before the call was broadcast again and/or before moving on to the next site. The identification of all birds observed was also determined and recorded.

Figure 1. General Location of Survey Area.

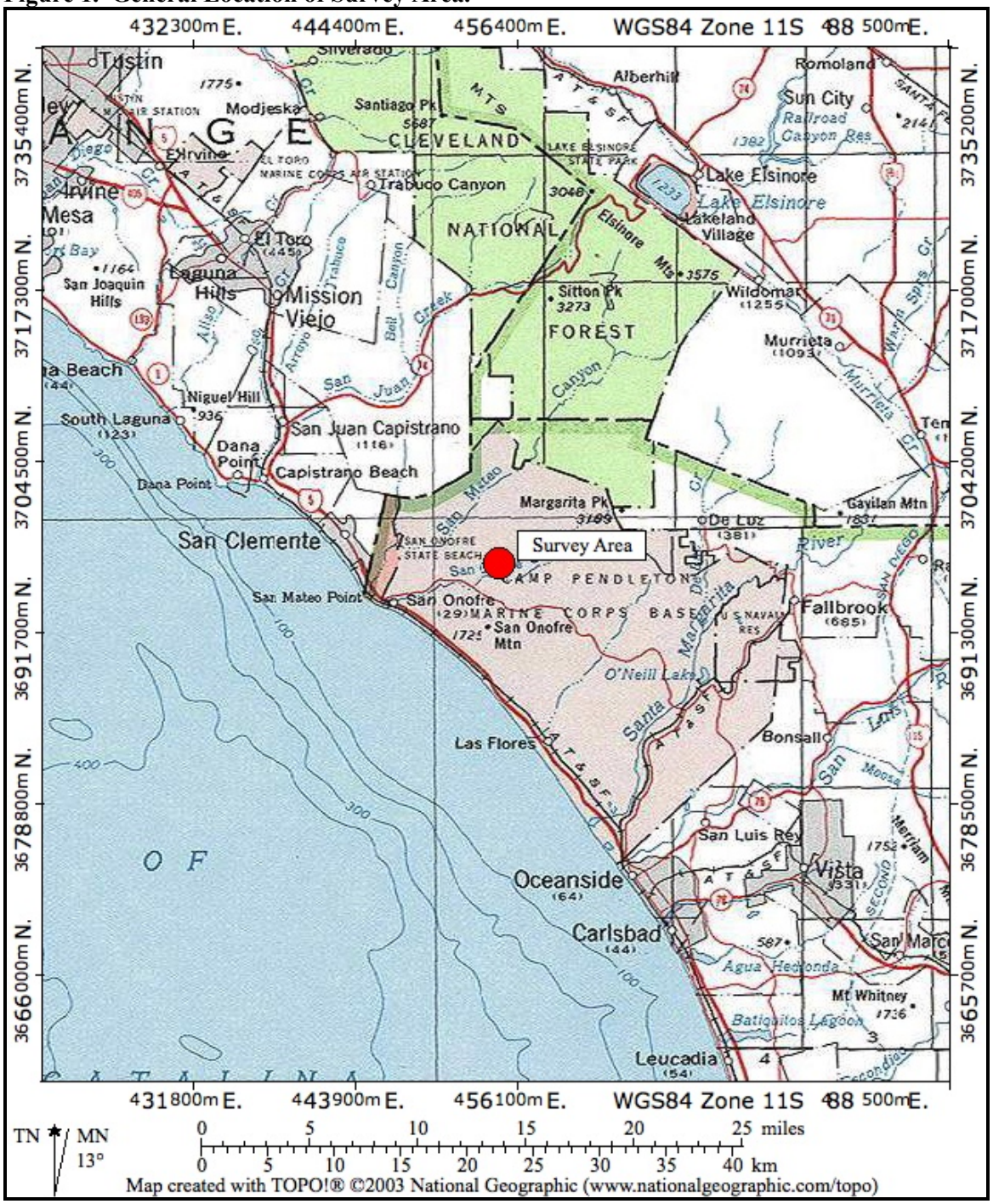
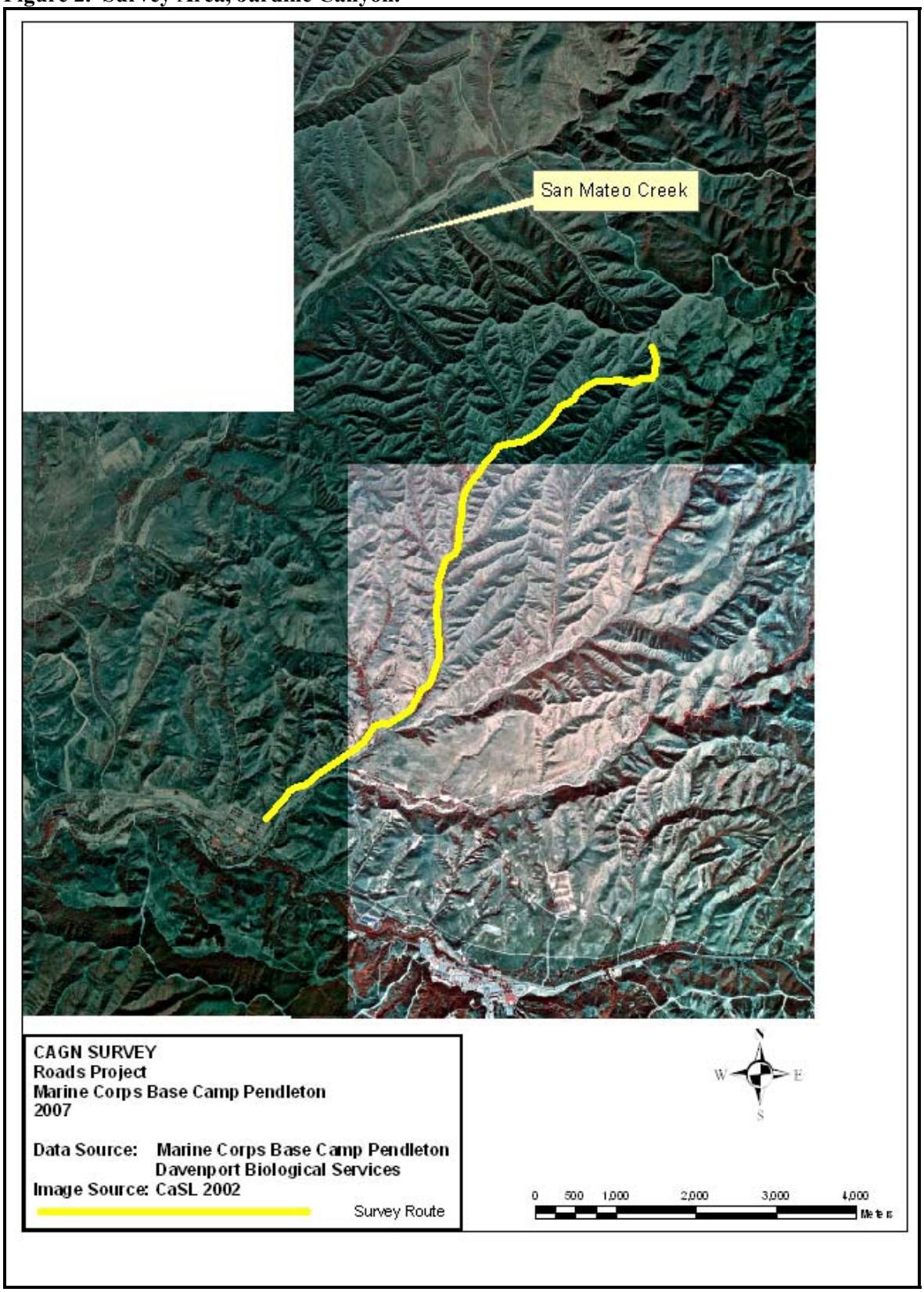


Figure 2. Survey Area, Jardine Canyon.



Information regarding the distribution of CAGN in the vicinity of the survey area was also compiled. In this regard, CAGN locations identified during base wide surveys for CAGN were reviewed. In addition, information from California Natural Diversity Data Base (CNDDB 4 Nov 2007) and the Museum of Vertebrate Zoology, University of California, Berkley, were also examined.

Results

No CAGN were observed or otherwise detected during this survey. However, a total of 40 other species of birds were observed during this survey (Appendix 1).

Information from the base wide survey of CAGNs indicates that this species has been documented immediately adjacent to Jardine Canyon. The record indicated that a CAGN was observed in 1994 near the northeastern end of Jardine Canyon. In addition, several CAGN have been documented in San Mateo Canyon (Figure 3). One of the indicated records in San Mateo Canyon represents a pair of CAGN and was observed in 2006 (A. Davenport, pers. obs., 2007).

Of the 176 specimens of CAGN held at the Museum of Vertebrate Zoology, none were from the area of Jardine Canyon, or adjacent canyons. Based on a search of the California Natural Diversity Data Base, there were no records of CAGN for Jardine Canyon. Of the 743 occurrences, the closest records of CAGN were from the mouth of San Mateo Canyon and San Onofre Creek (Occurrence No. 239, 240, & 262) (Figure 4).

Figure 3. Recent Locations of CAGNs Near Jardine Canyon.

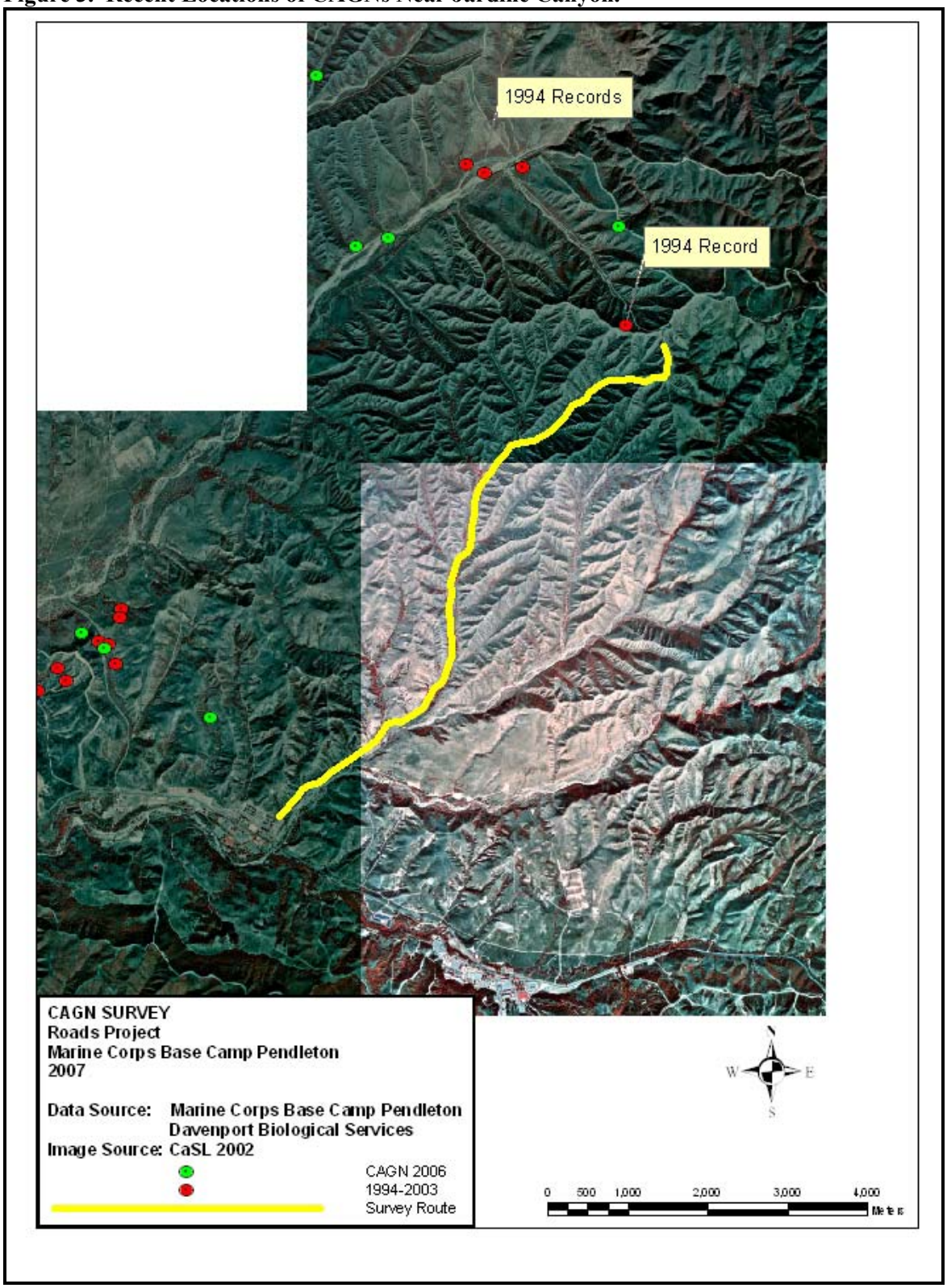
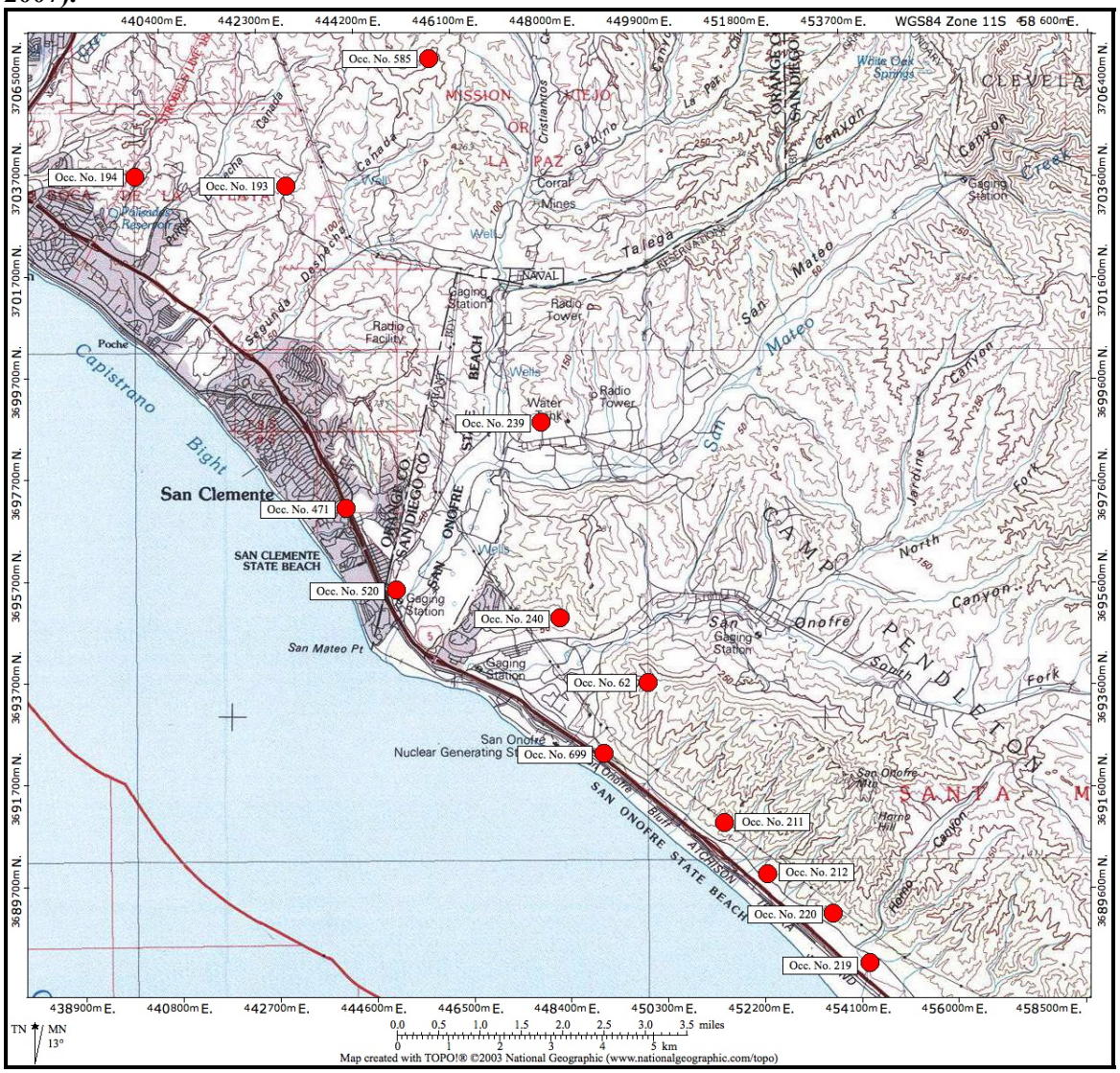


Figure 4. Closest CNDDB Geographic Records of CAGN to Jardine Canyon (CNDDB 2007).



Discussion

Due to survey constraints associated with Jardine Canyon (i.e., it is located within and between active impact areas), and adverse weather conditions, the period between survey events varied in an attempt to avoid conflicts with training and poor survey conditions associated with weather systems. That is, the two-week interval recommended within the survey guidelines was not readily obtainable. Therefore, provided the survey events were at least a week apart, surveys were completed when access was available and weather conditions were thought to be optimal (winds less than 5 mph & no rain). Additionally, the survey was initiated near the end of the nesting season in an attempt to detect nesting CAGN and/or dispersing juveniles.

It is important to note that the two-week interval provided in the survey guidelines was based on spreading a non-breeding season survey across the entire non-breeding season. However, there is

no indication that changing the period between survey events would result in lower detection probabilities for this species. In addition, due to a detection probability of approximately 0.6, nine surveys should increase the confidence in the results of the survey to approximately 95 percent. That is, based on nine surveys passes, the probability of there being a bird that was missed is about 5 percent.

The condition of suitable habitat for CAGN varied across the survey area. The presence of coastal sage scrub within the survey area was patchy due to past disturbance (e.g., brush fires). In addition, the baccharis scrub appeared to be in poor condition due to the below average rainfall. Some areas of coastal sage scrub and baccharis scrub appeared to also be under grazing pressure from bison (*Bison bison*) and coastal mule deer (*Odocoileus hemionus fuliginata).*

Survey conditions during this study were generally excellent. However, a brush fire occurred near the northeast end of Jardine Canyon between 26 August and 9 September 2007 (Figure 5). This fire resulted in the loss of mature coastal sage scrub and chaparral along the south side of the northeastern portion of Jardine Canyon Road. In addition, during the last two surveys, the bird community was disturbed due to the occurrence of major fires near Jardine Canyon.

The absence of CAGN within Jardine Canyon is probably due to the small patches of remaining habitat in combination with its remote location in relation to other occupied habitat. The CAGN does not migrate and does not appear to disperse well over unsuitable habitat. The observation of a CAGN in 1994 close to the northeastern end of Jardine Canyon is likely due to the presence of a large block of coastal sage scrub located immediately north of Jardine Canyon in San Mateo Canyon. The suitable habitat patches at the north end of Jardine Canyon are in close proximity to suitable habitat in San Mateo Canyon so movement between suitable habitat appears more likely in this area. Connectivity to the west seems less likely due to the distance between suitable nesting habitat located along the coast and that within Jardine Canyon; a distance of approximately three to four miles.

It is important to reiterate that CAGNs have been consistently observed in San Mateo Canyon, and a small group likely nests in that, or immediately adjacent area. Therefore, the potential for the future occupation of suitable nesting habitat within the northeastern portion of Jardine Canyon remains.

Figure 5. Northern Edge of Early September Fire Within Jardine Canyon.

Conclusion

Suitable habitat for CAGN was found within and adjacent to the survey area. No CAGN were observed or otherwise detected during this survey.

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Garrett, K. & J. Dunn. 1981. *Birds of Southern California*. The Artesian Press, Los Angeles California. Published by the Los Angeles Audobon Society.

U.S. Fish and Wildlife Service. 1993. Endangered and threatened wildlife and plants; determination of threatened status for the coastal California gnatcatcher. Federal Register 58: 16757.

U.S. Fish and Wildlife Service. 2000. Endangered and threatened wildlife and plants; Final determination of critical habitat for the coastal California gnatcatcher. Federal Register 65: 63679-63743.

Appendix 1. Animals observed within the survey area (based on direct observation and/or sign).

Reptiles	
Western fence lizard	*Sceloporus occidentalis*
Side-blotched lizard	*Uta stansburiana*
Birds	
California Quail	*Callipepla californica*
Red Tailed Hawk	*Buteo jamaicensis*
Cooper's Hawk	*Accipiter cooperii*
Northern Harrier	*Circus cyaneus*
American Kestrel	*Falco sparverious*
Killdeer	*Charadrius vociferus*
Mourning Dove	*Zenaida macroura*
Great Horned Owl	*Bubo virginianus*
Greater Roadrunner Geococc	yx *californianus*
Anna's Hummingbird	*Calypte anna*
Acorn Woodpecker	*Melanerpes formicivorus*
Nuttal's Woodpecker	*Picoides nuttallii*
Northern Flicker	*Colaptes auratus*
Scrub Jay	*Aphhelocoma californica*
Common Raven	*Corvus corax*
Wrentit	*Chamaea fasciata*
Oak Titmouse	*Baeolophus inornatus*
Bushtit	*Psaltriparus minimus*
Bewick's Wren	*Thryomanes bewickii*
Cactus Wren	*Campylorhynchus brunneicapillus*
Ruby-crowned Kinglet	*Regulus calendula*
Western Blue Bird	*Sialia mexicana*
Hermit Thrush	*Catharus guttatus*
Phainopepla	*Phainopepla nitens*
Black Phoebe	*Sayornis nigricans*
Say's Phoebe	*Sayornis saya*
Loggerhead Shrike	*Lanius ludovicianus*
Northern Mockingbird	*Mimus polyglottos*
California Thrasher	*Toxostoma redivivum*
Yellow-Rumped Warbler	*Dendroica coronata*
Yellow Warbler	*Dendroica petechia*
Western Tanager	*Piranga ludoviciana*
California Towhee	*Pipilo crissalis*
Spotted Towhee	*Pipilo maculatus*
Dark-eyed Junco	*Junco hyemalis*
White-crowned Sparrow	*Zonotrichia albicollis*
Lesser Goldfinch	*Carduelis psaltria*
American Goldfinch	*Carduelis tristis*
House Finch	*Carpodacus mexicanus*
European Starling	*Sternus vulgaris*
Mammals	
American Badger	*Taxidea taxus*
Coyote	*Canis latrans*
Valley Pocket Gopher	*Thomomys bottae*
Dusky Footed Wood Rat	*Neotoma fuscipes*
Desert Cottontail	*Sylvilagus audoboni*
Bison	*Bison bison*
Coastal Mule Deer	*Odocoileus hemionus fuliginata*

CERTIFICATION

I hereby certify that the statements furnished above present the data and information required for this biological survey, and that the facts, statements, and information presented are true and correct to the best of my knowledge. Fieldwork conducted for this survey was performed by me or under my supervision.

Date: Nov 27, 2007 Signed: Arthur E. Davenport

APPENDIX H
STEPHENS' KANGAROO RAT & PACIFIC POCKET MOUSE SURVEY REPORT

Stephens' Kangaroo Rat & Pacific Pocket Mouse Survey
Range Access Roads Repair Project
Marine Corps Base Camp Pendleton, California

Prepared for:

TEC Inc.
514 Via de la Valle
Solana Beach, CA 92075

By

Arthur Davenport
Davenport Biological Services
P.O. Box 1692
Barstow, Ca 92312

December 19, 2008

INTRODUCTION

Davenport Biological Services was hired by TEC Inc., to complete a presence-absence survey for the Stephens' kangaroo rat (*Dipodomys stephensi*) and Pacific pocket mouse (*Perognathus longimembris pacificus*) at several repair sites identified in the proposed Range Access Roads Repair Project at Marine Corps Base Camp Pendleton (MCBCP) (Figure 1). The proposed action includes repairing portions of 24 training range access roads located on MCBCP (Figure 2).

Based on the initial reviews conducted by MCBCP and NAVFAC Southwest, portions of nine roads were identified to be surveyed during this study. Roads surveyed for the Stephens' kangaroo rat included the Jardine Canyon Access Road (Road No. 3), Area 25 Combat Town Access Road (Road No. 5), Range 407 (Road No. 9), Aliso Canyon Access Road (Road No. 12), Range 216 Series Access Road (Road No. 13), Juliett Training Area Access Road (Road No. 14), Roblar Road (Road No. 18), and the Range 210 Series Access Road (Road No. 22). The Pacific pocket mouse was surveyed for along the Red Beach Access Road (Road No. 8), due to the presence of suitable habitat. The Pacific pocket mouse was also surveyed for along portions of the west end of Aliso Canyon Road (Road No. 12), due to its proximity to known occupied habitat (i.e., Edson Range) (Steve Montgomery, pers. comm.). More specific project maps of each road surveyed during this study are provided (Appendix 1).

In 2007, and prior to conducting the presence-absence surveys, a reconnaissance survey was completed at each of the nine access roads (Davenport 2008). During the reconnaissance survey, the general suitability of the habitat for the Stephens' kangaroo rat and Pacific pocket mouse was assessed. In addition, the location of kangaroo rat sign and potential burrows of the Pacific pocket mouse were also documented. Trapping surveys were initiated on 19 May 2008, and concluded on 20 October 2008. Surveys included visual inspections for the presence of suitable habitat and small mammal sign (e.g., tracks, scat, and/or burrows) of the target species. Regarding the Stephens' kangaroo rat, a live trapping program was initiated when kangaroo rat sign was found within suitable habitat within the project area. Concerning the Pacific pocket mouse, live traps were set when suitable habitat was present within the project area.

SPECIES INFORMATION

Stephens' Kangaroo Rat

The Stephens' kangaroo rat was listed as an endangered species on 30 September 1988 (Federal Register, 53:38469). The historic distribution of the Stephens' kangaroo rat included San Diego County, Riverside County, and San Bernardino County, California. The Stephens' kangaroo rat appears to have been extirpated from San Bernardino County due to the loss of habit associated with urban development.

The Stephens' kangaroo rat occurs within grassland, coastal sage scrub, and chaparral habitats where vegetative cover is low and bare ground is abundant (Thomas 1975, O'Farrell 1987, O'Farrell 1989, O'Farrell 1997, USFWS 1993). A large population of Stephens' kangaroo rats was formerly present adjacent to MCBCP at Naval Weapons Station Seal Beach, Detachment Fallbrook (Detachment Fallbrook) (USFWS 1993), but this population has experienced a significant decline in recent years (SJM Biological Consultants 2005, Montgomery et al. 2008). The decline appears to be related to significant increases in vegetative annual cover due to exotic grasses (A. Davenport, pers. obs., 2008). On MCBCP, the distribution of Stephens' kangaroo rats has also declined and now appears to occur in disjunct patches of suitable habitat (A. Davenport, pers. obs.). Similar to Detachment Fallbrook, the decline appears to be related to deteriorating habitat conditions as exotic grasses dominate once occupied sites (e.g., Juliett Training Area), as

well as intervening areas between occupied sites. The extirpation of once occupied sites appears to be related to the small size, isolation of the sites from source populations, and demographic stochasticity. The threats to small isolated populations are well known and of interest to conservation biologists (Gilpin and Soulé 1986).

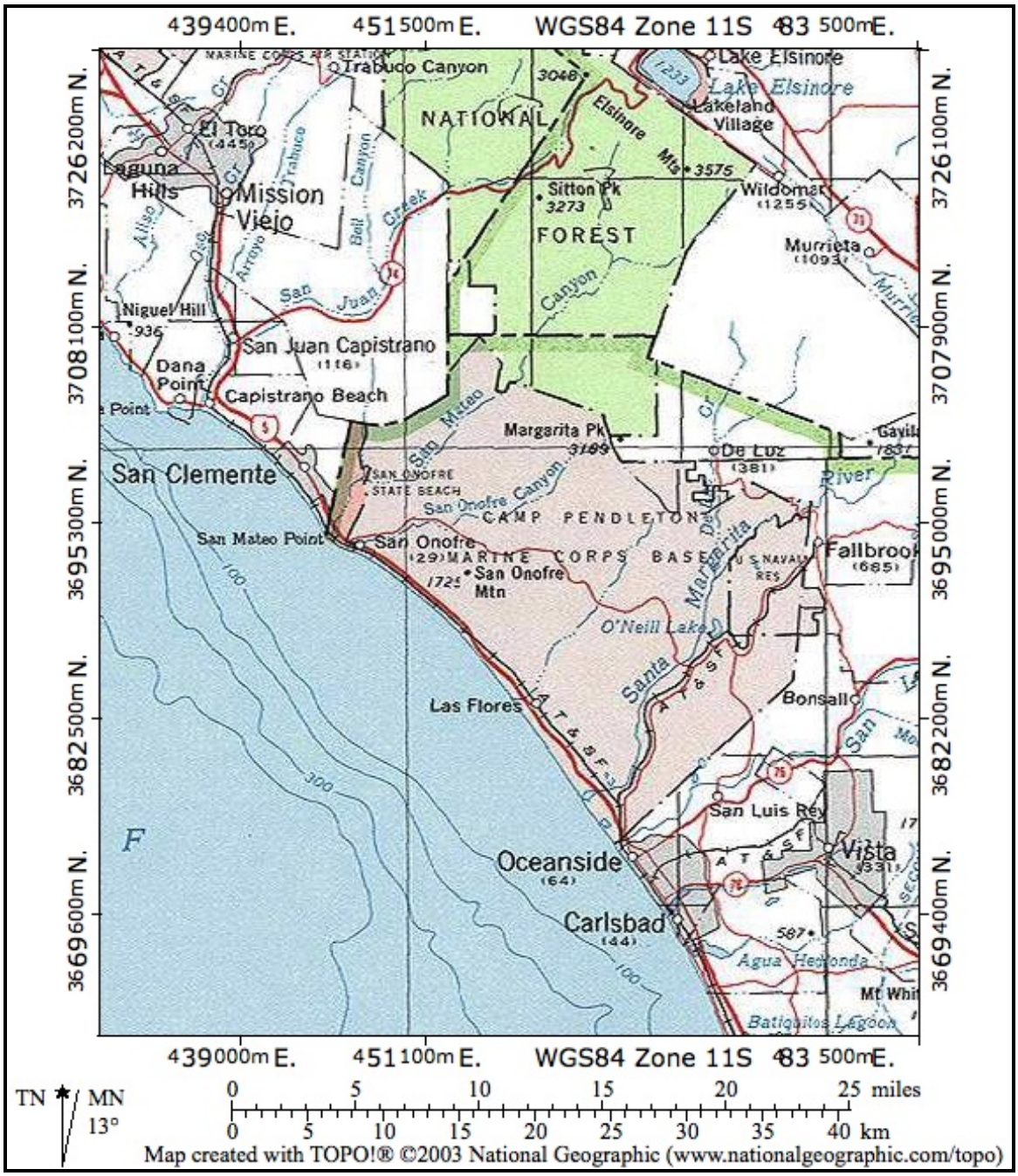

Figure 1. Geographic Location of Marine Corps Base Camp Pendleton.

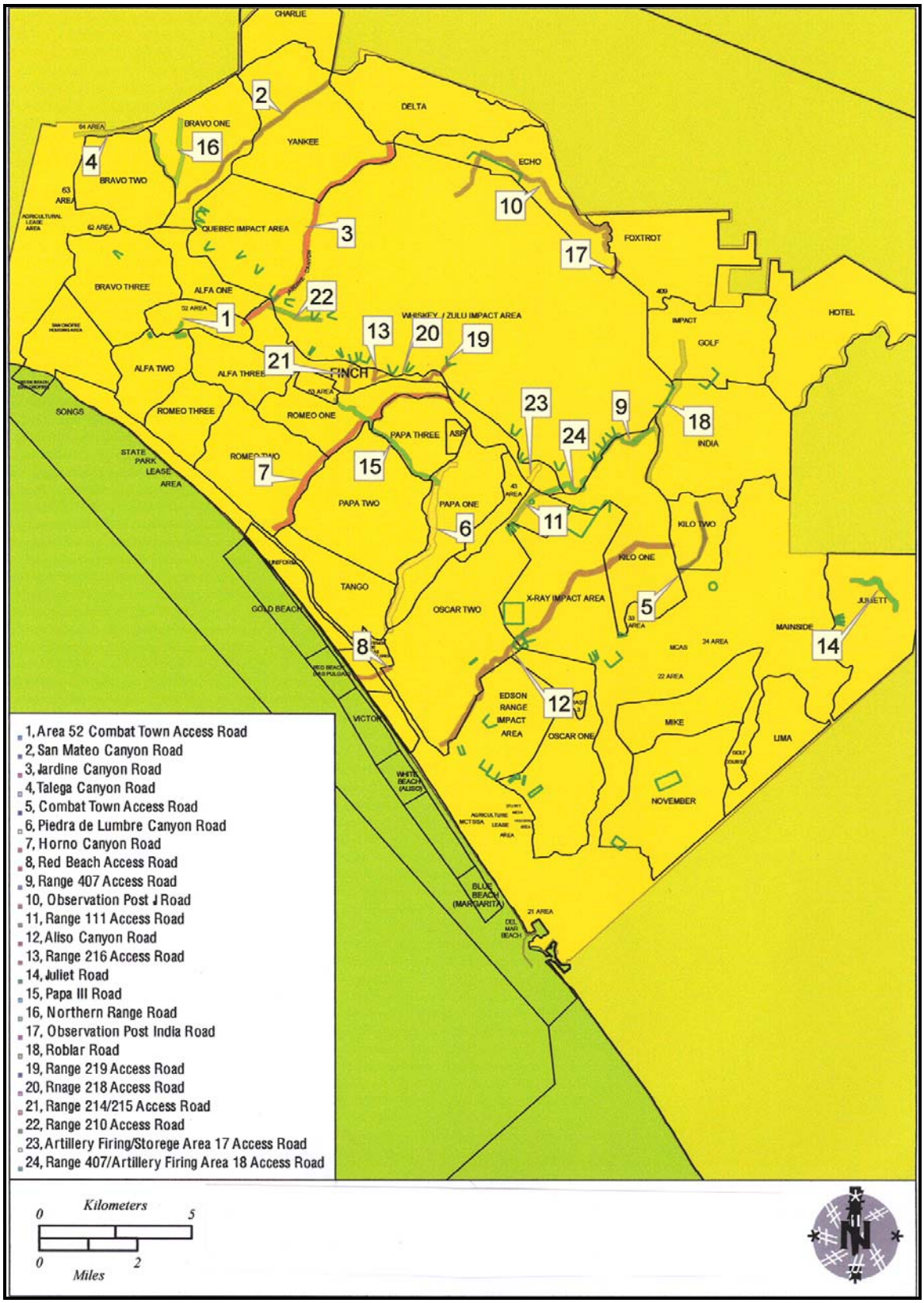

Figure 2. Roads Included in the Roads Project.

The largest remaining groups of Stephens' kangaroo rats on MCBCP appear to occur within the vicinity of the 25 Area Combat Town (Kilo 2 Training Area), the access road to Range 407 (adjacent to the Zulu Impact Area), and within the 409 Impact Area. Habitat conditions within portions of these areas appear to be maintained through frequent training exercises that keep the habitat open and prevent the establishment of large stands of exotic grasses (*Bromus* sp., *Avena* sp.), and exotic perennials such as sweet fennel (*Foeniculum vulgare*) (A. Davenport, pers. obs.).

Under some conditions, the Stephens' kangaroo rat may occur within the same area as the Dulzura kangaroo rat (*Dipodomys simulans*). The Dulzura kangaroo rat occurs throughout most of San Diego County, and occurs on MCBCP. Although the Dulzura kangaroo rat generally occurs within and adjacent to shrub dominated plant communities (e.g., coastal sage scrub), it may also occur in open habitats (suitable for Stephens' kangaroo rat) located adjacent these areas (A. Davenport, pers. obs.). As a result, live trapping is necessary to determine the identity of the kangaroo rat or rats occupying a particular area. The Stephens' kangaroo rat is active during the entire year.

Pacific Pocket Mouse

On 29 September 1994, the Pacific pocket mouse was listed as an endangered species (Federal Register 59:49752). Critical habitat has not been proposed or designated for this species. A recovery plan has been completed for this species (U.S. Fish and Wildlife Service 1998).

The Pacific pocket mouse is one of 19 subspecies of *Perognathus longimembris* (Hall, 1982). The Pacific pocket mouse is one of two *P. longimembris* that occur on the coastal plain of southern California (i.e., south of the Transverse Range and west of the Peninsular Ranges). The marginal records for the distribution of the Pacific pocket mouse are: Hyperion (El Segundo), Los Angeles Co., California and Palisades del Rey, Baja California, Mexico (Hall, 1982).

The largest known remaining population of Pacific pocket mouse occurs on MCBCP. This population is located within the Oscar 1 and Edson Range Impact Area (U.S. Fish and Wildlife Service, unpublished data; Ogden 1997; Steve Montgomery, personal communication). Two other populations of Pacific pocket mouse also occur on MCBCP in the vicinity of San Mateo Creek (LSA 1996; MBA 1997; Ogden 1997).

The Pacific pocket mouse is associated with various, coastal, plant communities. This subspecies has been observed/collected in coastal dune, coastal bluff scrub, as well as coastal sage scrub plant communities. Common attributes of the collection sites have included the presence of sandy soils and an open vegetative community. The structure of its habitat is similar to sites where a closely related subspecies, the Los Angeles pocket mouse (*Perognathus longimembris brevinasus*), has been documented. Like other little pocket mice, the Pacific pocket mouse is thought to predominantly collect and consumes seeds (e.g., grass and forbs), but will eat green vegetation as well as insects.

The Pacific pocket mouse is known to be active during the spring, summer, and fall. Based on 30 specimens held at the Museum of Vertebrate Zoology, Berkeley, California, one specimen was collected in April, seven in July, nine in August, four in September, and three in October. However, under adverse conditions, this species may become dormant until conditions improve (Meserve 1972; Kenagy 1973).

METHODS

Stephens' Kangaroo Rat

All habitat thought to be suitable for the Stephens' kangaroo rat, within each proposed project area, was visually inspected in an effort to locate burrows and/or other sign attributable to this species. Areas thought to have potential for the Stephens' kangaroo rat included all areas with low vegetative cover and the presence of bare ground. Where kangaroo rat sign was located within or immediately adjacent to a study site (i.e., within 100 meters along roads; within 15 meters adjacent to the road), live-traps were placed at all active kangaroo rat burrows. The trapping survey continued for five consecutive nights within each study area found to have kangaroo rat sign. Traps were checked near midnight and then again in the morning. All traps were closed during the day and reopened and baited each evening. Traps were baited with rolled oats. All traps used were 12 inch, Sherman®, folding live-traps. In order to determine the number of each species of kangaroo rat trapped, each kangaroo rat was marked with a red Sharpie®. With marked animals, their status as either an initial capture or recapture was recorded. The number of trap-nights were determined based on the number of traps run each night times the number of nights a site was trapped. Weather conditions were recorded during each night of trapping (Appendix 2).

Pacific Pocket Mouse

For the Red Beach Access Road, all habitat thought to be suitable for Pacific pocket mouse, within and immediately adjacent to the proposed project areas (within 50 meters along the road; 25 meters adjacent to the road), was visually inspected in an effort to locate burrows and/or other sign attributable to this species. Areas thought to have potential for the Pacific pocket mouse included the sandy edge of the riparian plant community associated with Las Flores Creek and the coastal sage scrub plant community. Where small mammal sign was located, or where the potential for their presence was thought to exist, transects were established and traps were placed at approximately five meter intervals. For the Aliso Canyon Access Road, although habitat was marginally suitable for this species, traps were set within specific project sites due to the proximity of Edson Range; an area known to be occupied by the Pacific pocket mouse. The trapping survey continued for five consecutive nights at each site thought to have potential for this species. Traps were checked near midnight and then again in the morning. All traps were closed during the day and reopened and baited each evening. Traps were baited with rolled oats. All traps used were 12 inch, Sherman®, folding live-traps. Weather conditions were recorded during each night of trapping (Appendix 2).

Mapping

All capture location data were collected using a Garmin Map 60 CSx global positioning system. The Garmin 60 Map CSx typically has a spatial accuracy of less than or equal to +/-5 meters. The spatial accuracy of this GPS unit is appropriate because individual kangaroo rats use multiple burrow openings, and the use of a particular burrow opening is not static. Thus, burrow openings that were active during this study may not be necessarily active in the future. All kangaroo rat location data were mapped using ArcGis 9.2.

The surveys were completed by under Federal Recovery Permit TE802450-5.

RESULTS

For the purposes of this report, and to remain consistent with other data being collected for this project, each road had multiple segments (identified by a frame), within which several study areas were located. The results are organized based on the road name, road number, segment, and specific location (i.e., GPS location) that Stephens' kangaroo rats were trapped. Capture locations of the Dulzura kangaroo rat are also provided. Species captured are identified by the following acronyms in the Results tables:

- Stephens' kangaroo rat (*Dipodomys stephensi*) = DIST
- Dulzura kangaroo rat (*Dipodomys simulans*) = DISI
- California pocket mouse (*Chaetodipus californicus*) = CHCA
- Deer Mouse (*Peromyscus maniculatus*) = PEMA
- Cactus Mouse (Peromyscus eremicus) = PEER
- Desert wood rat (*Neotoma lepida*) = NELE
- Big-eared wood rat (*Neotoma macrotis*) = NEMA
- Western harvest mouse (*Reithrodontomys megalotis*) = REME

Stephens' Kangaroo Rat

Jardine Canyon Access (Road No. 3)

Habitat

Suitable habitat for the Stephens' kangaroo rat was only present in segments 3-3, 3-4, and 3-9 (Figure 3). These sections contained large areas of open ground typical of areas occupied by this species. The habitat conditions within all remaining segments were unsuitable for the Stephens' kangaroo rat due to excessive vegetative cover. That is, the shrub cover was too dense and therefore unsuitable for the Stephens' kangaroo rat.

Trapping

No Stephens' kangaroo rats were captured in segments 3-3, 3-4, or 3-9. Only Dulzura kangaroo rats, California pocket mice, and deer mice were captured (Table 1). The number of trap nights used to survey this area was 320. The locations of all kangaroo rats trapped during this survey are provided (Figure 3 and Appendix 12). Representative photos of habitat conditions within areas trapped along the Jardine Canyon are provided in Appendix 3.

Table 1. Number of Each Species Captured During Survey of Road 3 (Jardine Canyon)

Segment	DIST	DISI	CHCA	PEMA	PEER	NEMA	NELE
3-3	0	2	0	3	0	0	0
3-4	0	19	0	4	0	0	0
3-9	0	2	1	1	0	0	0
Total	**0**	**23**	**8**	**7**	**0**	**0**	**0**

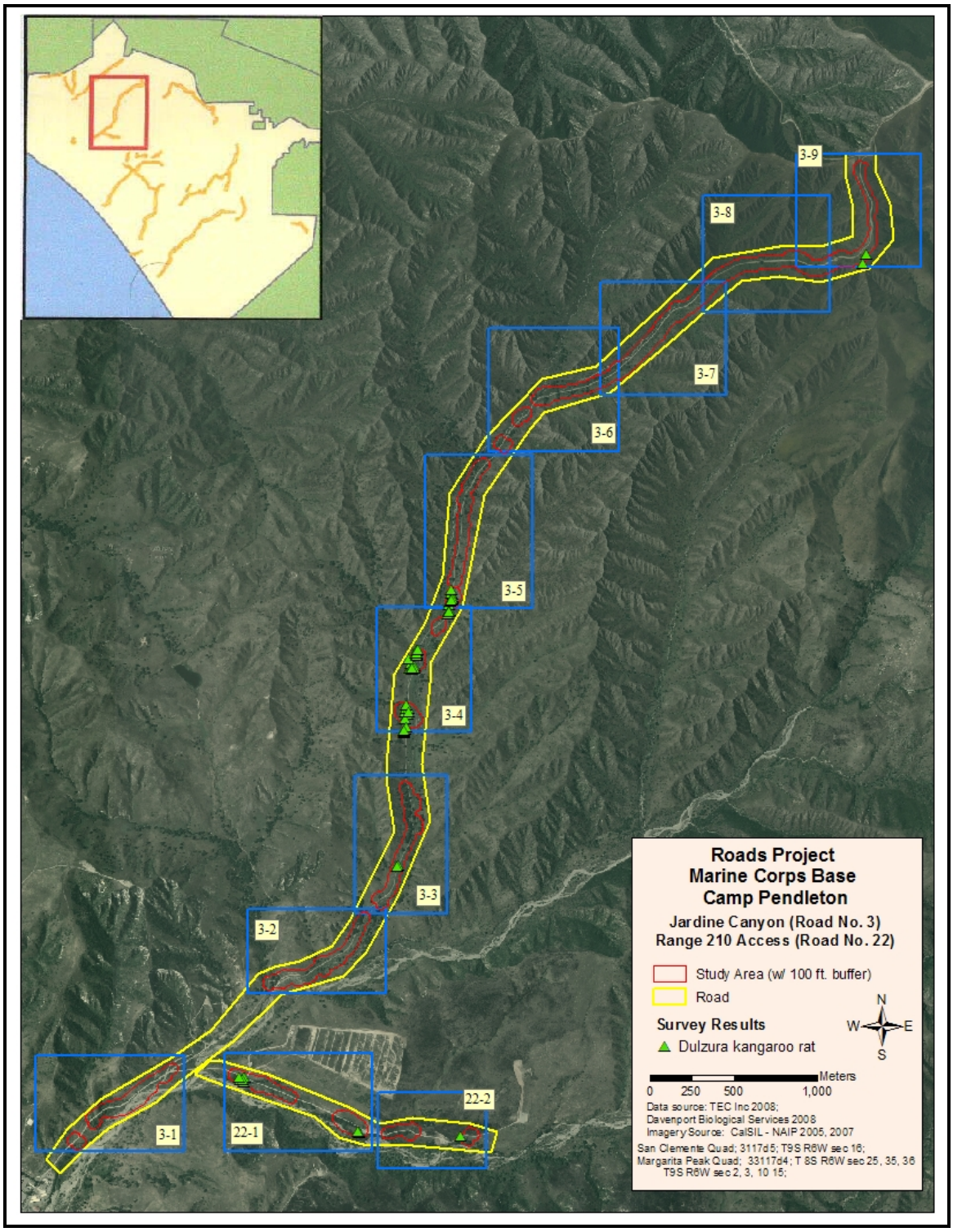

Figure 3. Jardine Canyon Road (Road No. 3)

Area 25 Combat Town Access (Road No. 5)

Habitat
Suitable habitat for the Stephens' kangaroo rat was present in segments 5-1, 5-2, and 5-3 (Figure 4). The suitable habitat was located along the edges of dirt road and within and along the edge of the parking area for 25 Area Combat Town. Coastal sage scrub and thick annual grasslands made most of the habitat adjacent to the road unsuitable for this species.

Trapping
Stephens' kangaroo rats were captured within segments 5-2. No kangaroo rat sign was detected in segment 5-1. Despite the presence of kangaroo rat burrows, no kangaroo rats were captured in segment 5-3. Species caught during this survey included Dulzura kangaroo rats, California pocket mice, deer mice, and desert wood rat (Table 2). The number of trap nights used to survey this area was 180. The locations of all kangaroo rats trapped during this survey are provided (Figure 4 and Appendix 12). Representative photos of habitat conditions where areas were trapped along the Area 25 Combat Town Access Road are provided in Appendix 4.

Table 2. Number of Each Species Captured During Survey of Road 5 (Area 25 Combat Town Access)

Segment	DIST	DISI	CHCA	PEMA	PEER	NEMA	NELE
5-2	6	1	2	16	0	0	1
Total	**6**	**1**	**2**	**16**	**0**	**0**	**1**

Range 407 (Road 9)

Habitat
Suitable habitat for the Stephens' kangaroo rat was present in segments 9-1 and 9-2 (Figure 5). The suitable habitat was located along the edges of dirt road, within and along the edge of the parking areas, and extended over 100 meters away from both sides of the road. The habitat located south of the road was dominated by non-native grasses; patches of this area remained suitable for occupation by the Stephens' kangaroo rat. The habitat located north of the road was open and generally suitable for this species.

Trapping
Stephens' kangaroo rats were captured within segments 9-1 and 9-2. Other species caught during this survey included Dulzura kangaroo rats, California pocket mice, and deer mice (Table 3). The number of trap nights used to survey this area was 300. The locations of all kangaroo rats trapped during this survey are provided (Figure 5 and Appendix 12). Representative photos of habitat conditions where traps were placed along the Range 407 Access Road are provided in Appendix 5.

Table 3. Number of Each Species Captured During Survey of Road No. 9 (Range 407 Access)

Segment	DIST	DISI	CHCA	PEMA	PEER	NEMA	NELE
9-1	17	0	0	13	0	0	0
9-2	8	6	2	0	0	0	0
Total	**25**	**6**	**2**	**13**	**0**	**0**	**0**

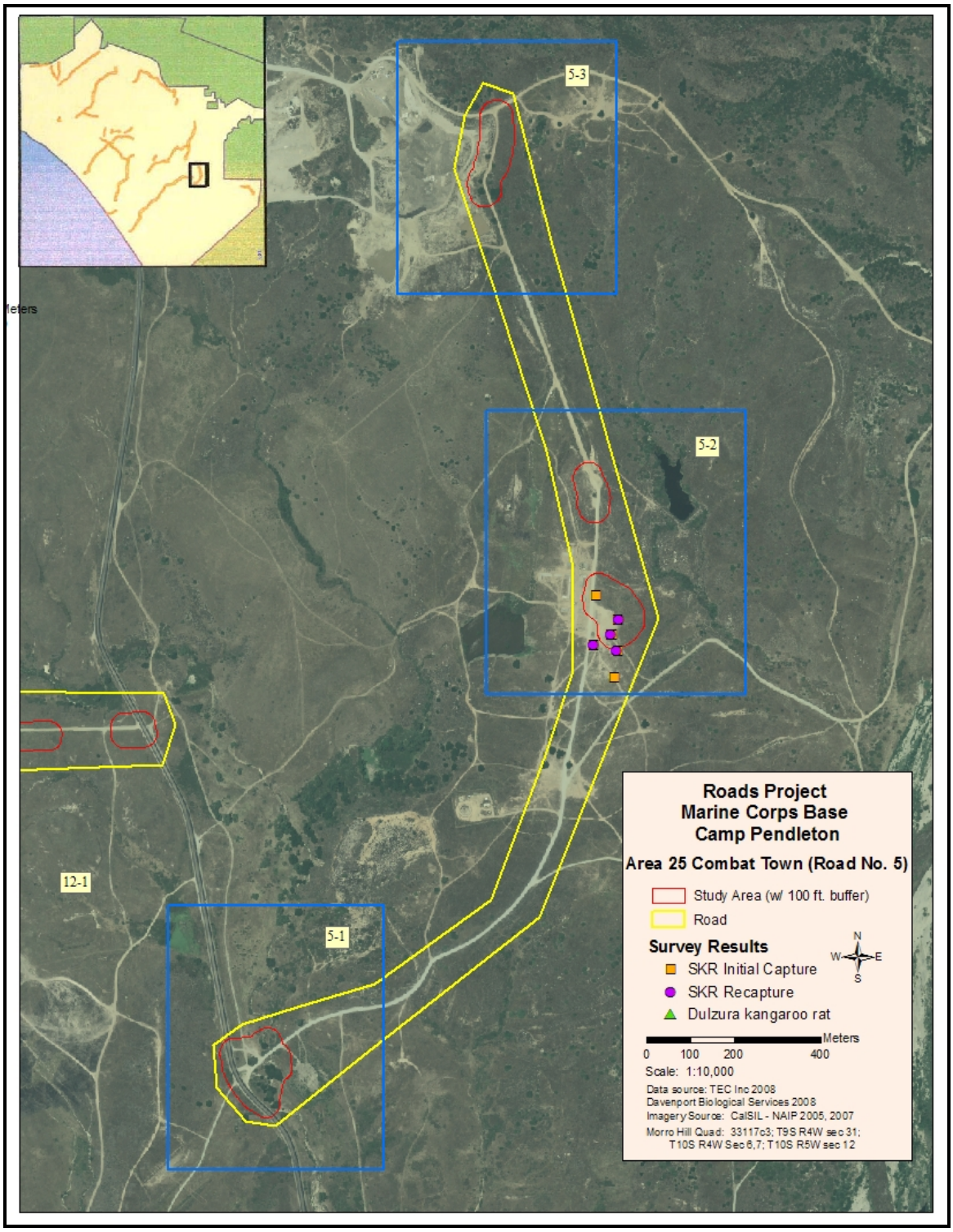

Figure 4. Area 25 Combat Town Access Road (Road No. 5).

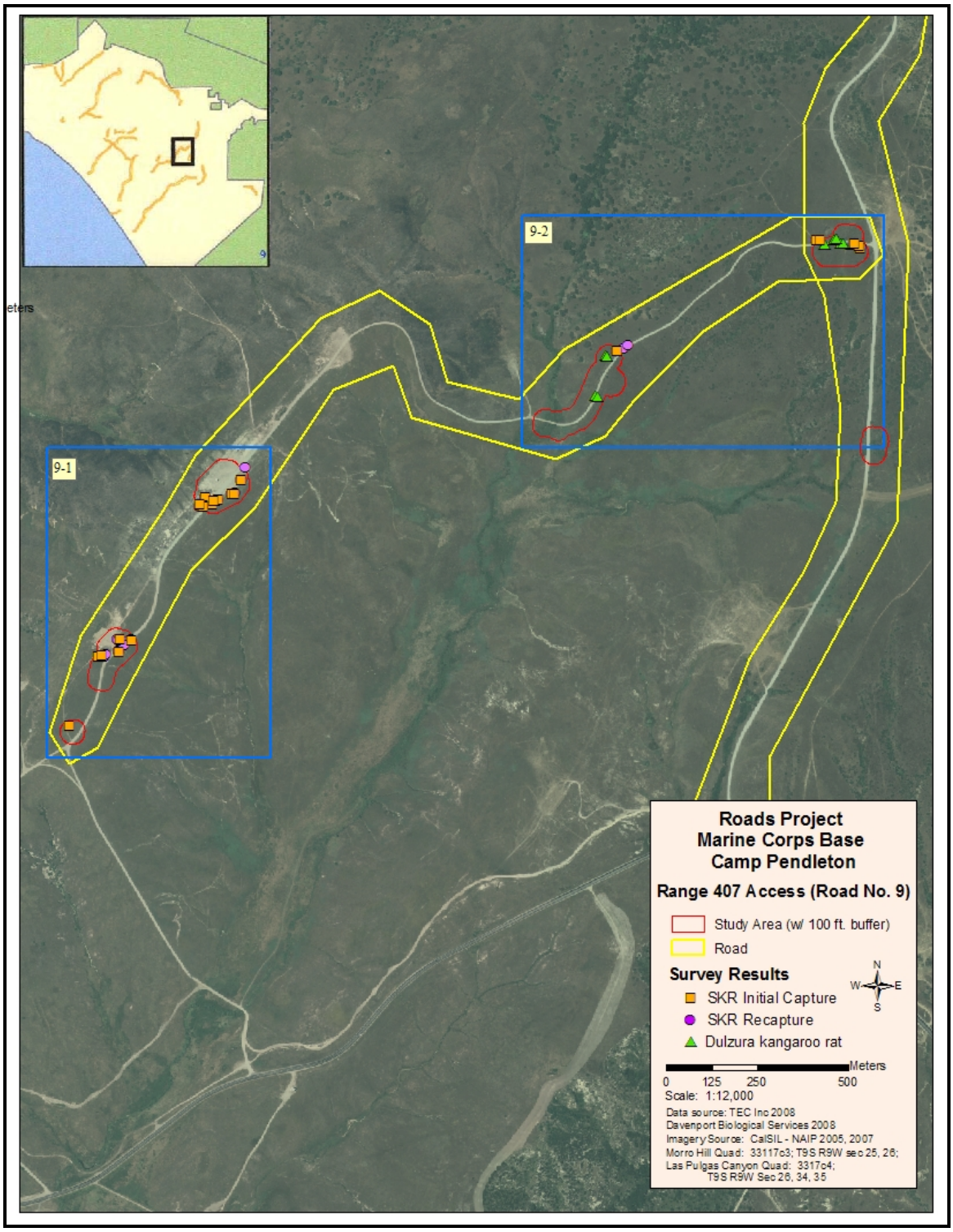

Figure 5. Range 407 Access (Road No. 9).

Aliso Canyon Access Road (Road 12).

Habitat
Suitable habitat for the Stephens' kangaroo rat was present in segments 12-1, 12-2, 12-3, and 12-6 (Figure 6). In segments 12-1 and 12-2, the suitable habitat extended 100 plus meters beyond the edges of the dirt road. In segment 12-3, the suitable habit was confined to the fire-break. In 12-6, the suitable habitat was confined to the edges of the dirt road and extended into the MOUT training facility. The habitat within all remaining sections was unsuitable for the Stephens' kangaroo rat due to the presence of thick stands of introduced annual grasses, mustards, and sweet fennel.

Trapping Results
One Stephens' kangaroo rat was captured within section 12-1, near the east end of Aliso Canyon Road. Additional species caught during this survey included Dulzura kangaroo rats, California pocket mice, and deer mice (Table 4). The number of trap nights used to sample segment 12-1, was 25; 12-2, was 50; 12-3, was 50; and 12-6 was 50. The locations of all kangaroo rats trapped during this survey are provided (Figure 6 and Appendix 12). Representative photos of habitat conditions, as well as locations where traps were placed along the Aliso Canyon Access Road are provided in Appendix 6.

Table 4. Number of Each Species Captured During Survey of Road 12 (Aliso Canyon)

Segment DIST		**DISI**	**CHCA**	**PEMA PEER**		**NEMA**	**NELE**
12-1 1		0	1	0	0	0	0
12-2 0		0	1	4	0	0	0
12-3 0		0	0	0	0	0	0
12-6 0		0	0	0	0	0	0
Total 1		**0**	**2**	**4**	**0**	**0**	**0**

Range 216 Access (Road 13)

Habitat
Suitable habitat for the Stephens' kangaroo rat was present in segment 13-1 (Figure 7). The suitable habitat was located adjacent to the road and extended 100 plus meters away from the road.

Trapping
No Stephens' kangaroo rats were captured within this project area. Despite the presence of active kangaroo rat burrows in segment 13-0 earlier in the year (A. Davenport, pers. obs.), no apparently active kangaroo rat burrows were present within segment 13-0. Only deer mice were captured (Table 5). The number of trap nights used to survey this area was 55. The locations of all kangaroo rats trapped during this survey are provided (Figure 7 and Appendix 12). Representative photos of habitat conditions, and where traps were placed along the Range 216 Series Access Road are provided in Appendix 7.

Table 5. Number of Each Species Captured During Survey of Road 13 (Range 216 Access)

Segment DIST		**DISI**	**CHCA**	**PEMA PEER**		**NEMA**	**NELE**
13-0 0		0	0	6	0	0	0
Total 0		**0**	**0**	**6**	**0**	**0**	**0**

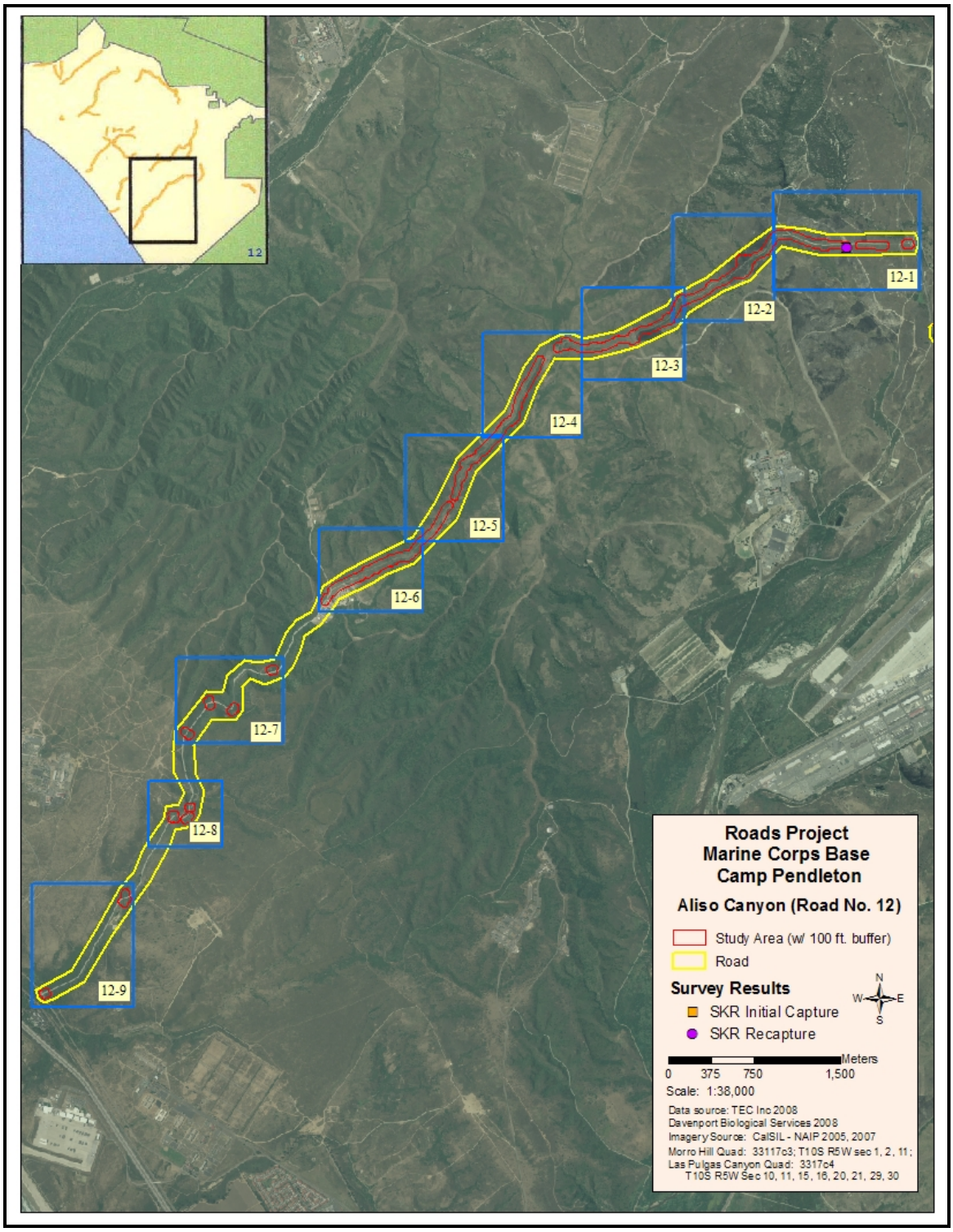

Figure 6. Aliso Canyon Road (Road No. 12)

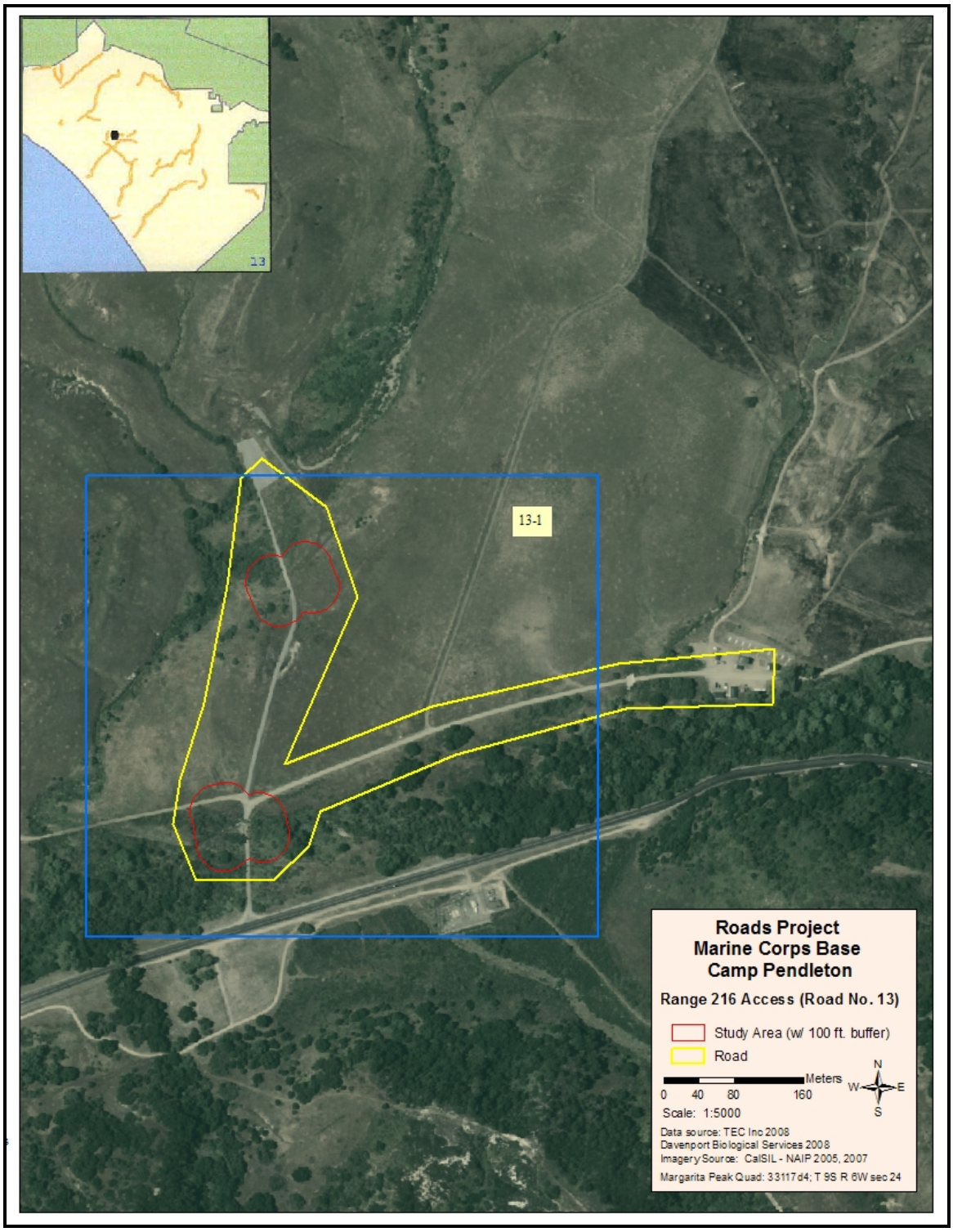

Figure 7. Range 216 Access Road (Road 13).

Juliett Training Area Access (Road 14)

Habitat
Suitable habitat for the Stephens' kangaroo rat was present in segments 14-2 and 14-3 (Figure 8). The suitable habitat was located along the edges of the dirt roads. Coastal sage scrub and thick annual grasslands made most of the adjacent habitat to the road and was unsuitable for this species. The habitat conditions within segment 14-1, was unsuitable for the Stephens' kangaroo rat due to excessive vegetative cover.

Trapping
No Stephens' kangaroo rats were captured within segments 14-2 or 14-3. Only Dulzura kangaroo rats, California pocket mice, and deer mice were captured (Table 6). The number of trap nights used to survey this area was 115. The locations of all kangaroo rats trapped during this survey are provided (Figure 8 and Appendix 12). Representative photos of habitat conditions, as well as locations where traps were placed along the Juliett Training Ares Access Road are provided in Appendix 8.

Table 6. Number of Each Species Captured During Survey of Road 14 (Juliett Training Area Access)

Section DIST	DISI	CHCA	PEMA PEER		NEMA	NELE
14-2	0	10	3 1 0		0	0
14-3	0	7	3 7 0		0	0
Total	**0**	**17**	**6 8 0**		**0**	**0**

Roblar Road (Road 18)

Habitat
Suitable habitat for the Stephens' kangaroo rat was present in segments 18-1, 18-2, 18-3, and 18-4 (Figure 9). In segment 18-1, the suitable habitat was located adjacent to the road. In 18-2, 18-3, and 18-4, the suitable habitat was present adjacent to the road and extended 100 plus meters away from the road.

Trapping
Stephens' kangaroo rats were captured within segments 18-2, 18-3, and 18-4 (Table 7). Zero trap nights were used in segment 18-1 due to the lack of kangaroo rat sign. The number of trap nights used to survey segment 18-2, was 80; 18-3, was 175; and 18-4, was 100. The locations of all kangaroo rats trapped during this survey are provided (Figure 9 and Appendix 12). Representative photos of habitat conditions, and where traps were placed along the Roblar Road are provided in Appendix 9.

Table 7. Number of Each Species Captured During Survey of Road 18 (Roblar Road)

Segment DIST	DISI	CHCA	PEMA PEER		NEMA	NELE
18-1 0	0	0	2	0 0		0
18-2 5	10	0	2	0	1	1
18-3 2	22	1	3	0	0	0
18-4 7	4	0	4	0	0	0
Total 14	**36**	**1**	**11**	**0**	**1**	**1**

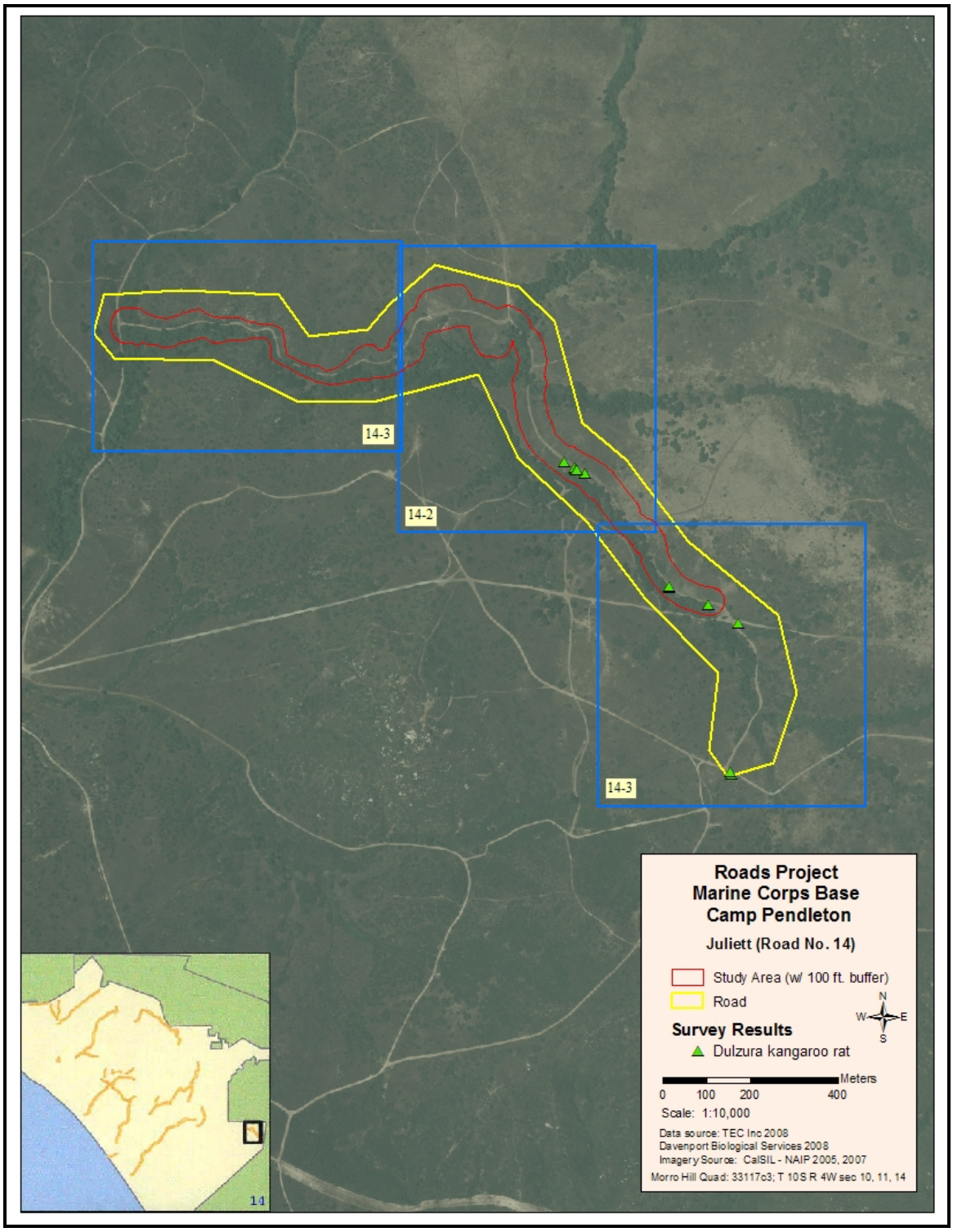

Figure 8. Juliett Training Area Access Road (Road No. 14).

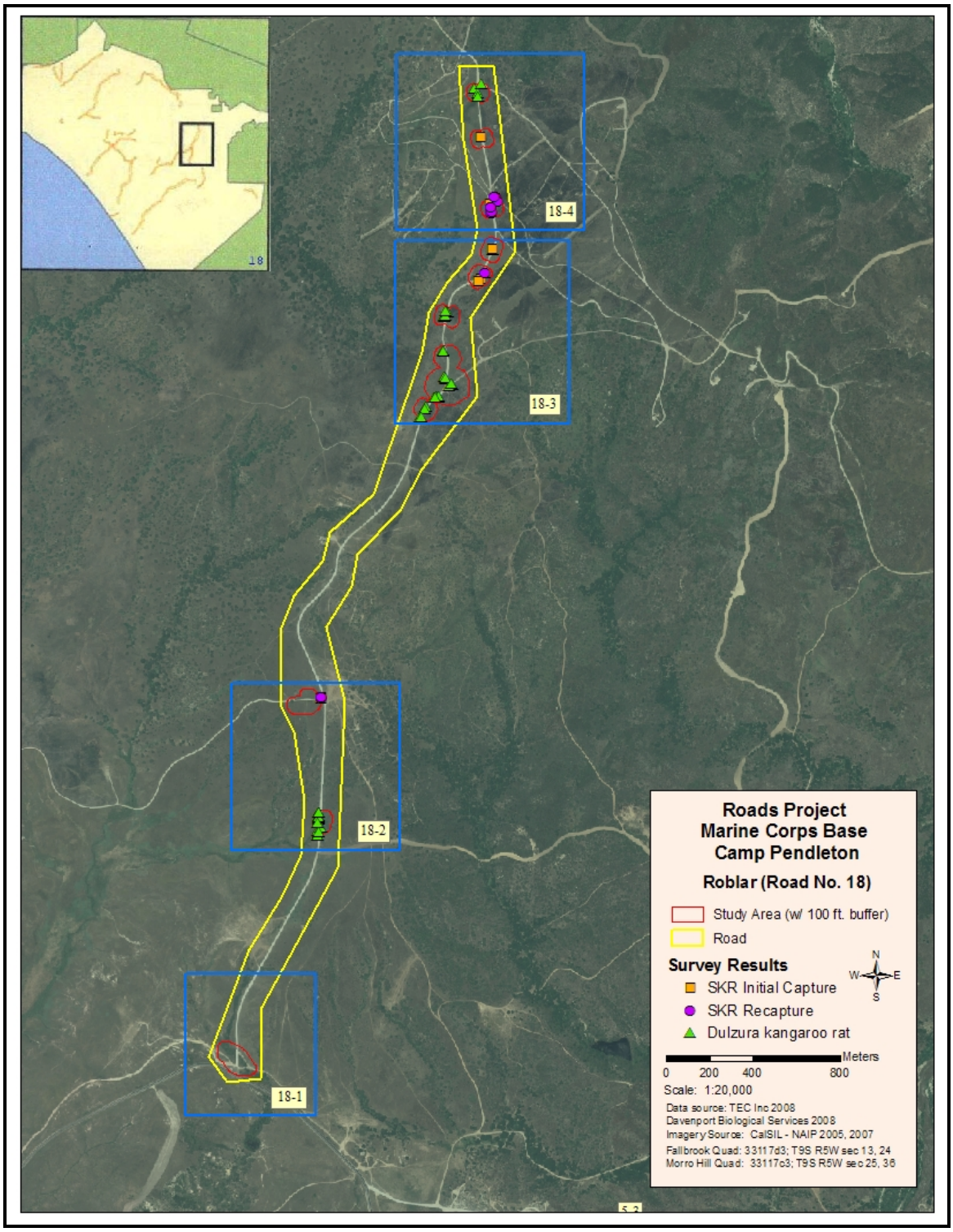

Figure 9. Roblar Road (Road No. 18).

Range 210 Access (Road 22)

Habitat
Suitable habitat for the Stephens' kangaroo rat was present in segments 22-1, and 22-2 (Figure 10). In segment 22-1, and 22-2 the suitable habitat was located adjacent to the road and extended 100 plus meters away from the road.

Trapping
No Stephens' kangaroo rats were captured within segments 22-1, or 22-2. Only Dulzura kangaroo rats, deer mice, and a cactus mouse were captured (Table 8). The number of trap nights used to survey this area was 100. The locations of all kangaroo rats trapped during this survey are provided (Figure 10 and Appendix 12). Photos of habitat conditions are provided in Appendix 10.

Table 8. Number of Each Species Captured During Survey of Road 22 (Range 210 Access)

Segment	DIST	DISI	CHCA	PEMA	PEER	NEMA	NELE
22-1	0	4	0	3	0	0	0
22-2	0	1	0	1	1	0	0
Total	**0**	**5**	**0**	**4**	**1**	**0**	**0**

Pacific Pocket Mouse

Red Beach Access (Road 8)

Habitat
Suitable habitat for the Pacific pocket mouse was present in segment 8-2 (Figure 11). The thick riparian plant community in segment 8-1 appeared unsuitable for this species.

Trapping
No Pacific pocket mice were trapped or otherwise detected within or adjacent to segment 18-2. Other rodent species caught during this survey included deer mice, and western harvest mice (Table 9). The number of trap nights used to survey this area was 375. The survey area is provided (Figure 11). Photos of habitat conditions are provided in Appendix 5.

Table 9. Number of Each Species Captured During Survey of Road 8 (Red Beach)

Segment	PPMO	DISI	CHCA	PEMA	PEER	NELE	REME
8-2	0	0	0	24	0	0	3
Total	**0**	**5**	**0**	**24**	**0**	**0**	**3**

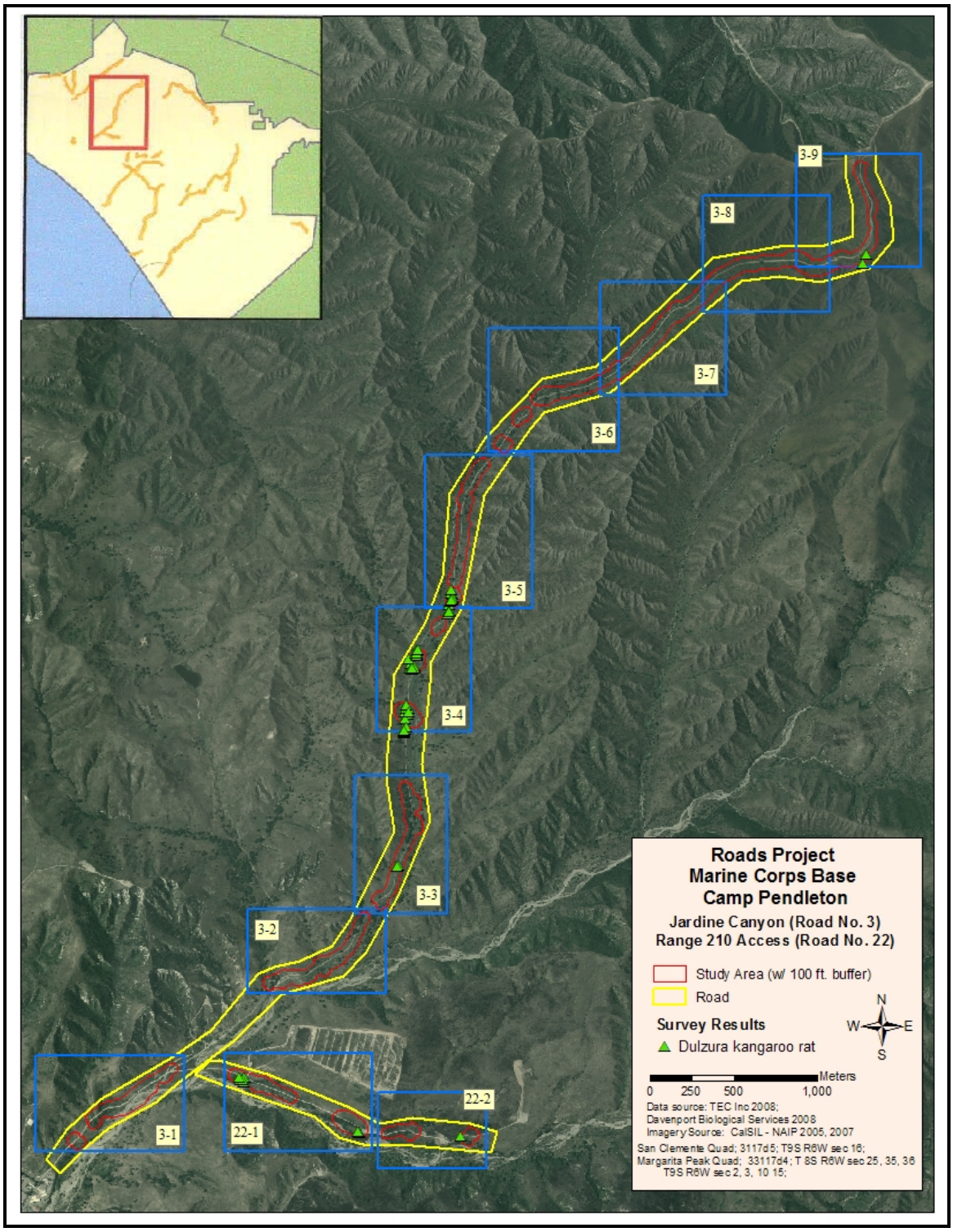

Figure 10. Range 210 Access Road (Road No. 22).

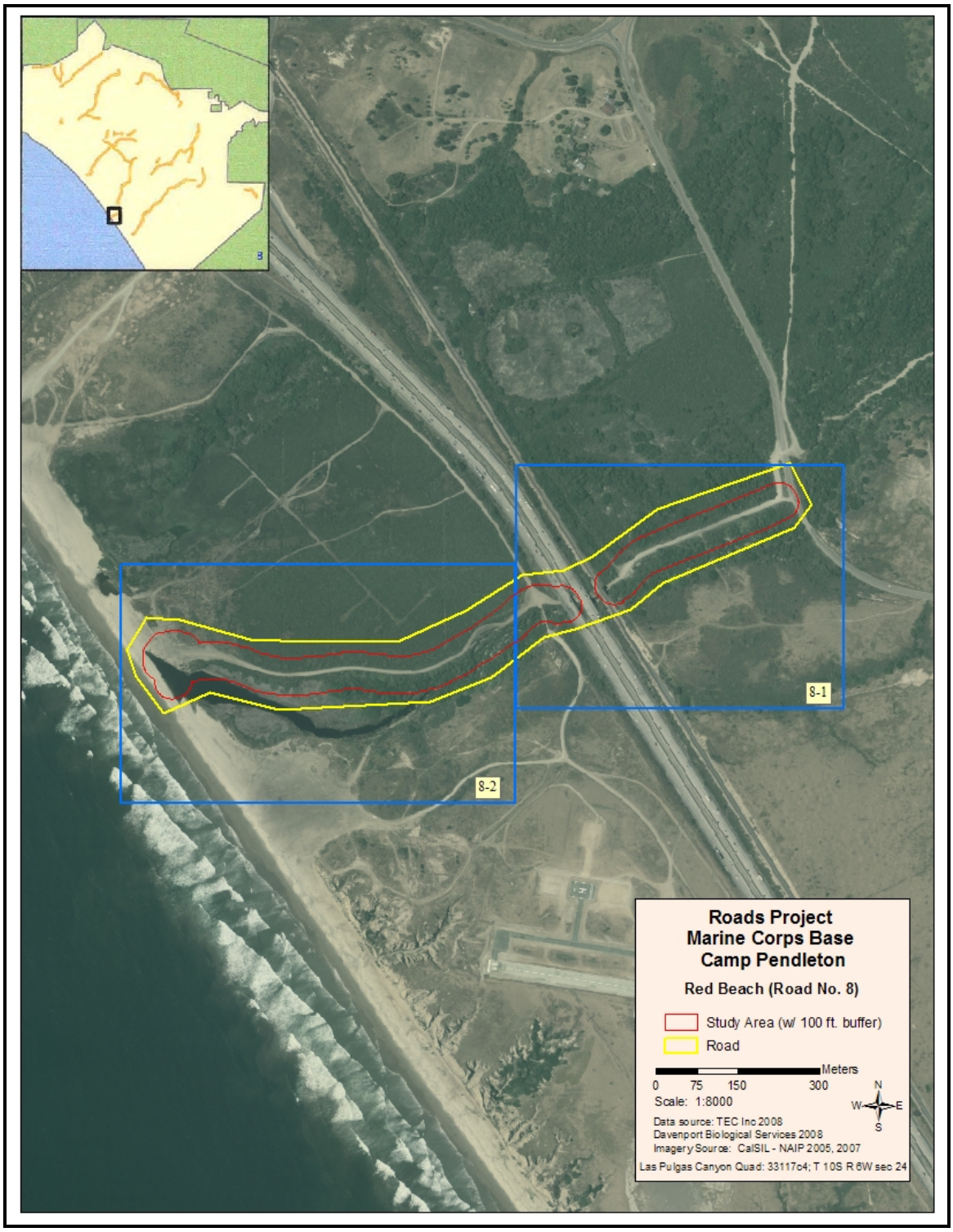

Figure 11. Red Beach (Road No. 8).

Aliso Canyon Access (Road 12)

Habitat
Marginally suitable habitat for the Pacific pocket mouse was present in segments 12-8, and 12-9 (Figure 6). In segments 12-8 and 12-9, the habitat occurred along the edge of the road. Thick coastal sage scrub separated the narrow band of suitable habitat along the road from occupied habitat in Edson Range. Most of the habitat was overgrown with a thick thatch of non-native annual grasses and sweet fennel.

Trapping Results
No Pacific pocket mice were trapped during this survey; other species caught during this survey included California pocket mice and deer mice (Table 10). The number of trap nights used to sample this area was 150.

Table 10. Number of Each Species Captured During Survey of Road 12 (Aliso Canyon)

Segment	PPMO	DISI	CHCA	PEMA	PEER	NELE	REME
12-8	0	0	6	1	0 0 0		
12-9	0	0	1	0	0 0 0		
Total	**0**	**0**	**7**	**1**	**0 0 0**		

DISCUSSION

Stephens' Kangaroo Rat

During this study, Stephens' kangaroo rats were detected in only four general areas: 1) the east end of the Aliso Canyon Access Road; 2) near the middle of the Area 25 Combat Town Access Road; 3) near the north end of Roblar Road; and 4) along the access road to Range 407, between Basilone and Roblar Roads. Regarding Aliso Canyon Access Road, the plant community located adjacent to the most of the road was currently unsuitable for the Stephens' kangaroo rat as it was dominated by dense stands of introduced annual grasses and mustards (*Brassica nigra* and *Hirschfeldia incana*). Large patches of sweet fennel also occurred in this area and were equally unsuitable for this species due to the presence of a high percentage of aerial cover and the lack of bare ground. The Stephens' kangaroo rats were located in habitat patches where aerial vegetative cover was low to non-existent and bare ground was abundant. The Stephens' kangaroo rats located near the Area 25 Combat Town were occupying open areas typical of this species. However, soils in some large areas were very compacted and lacked any vegetative cover due to heavy training uses; Stephens' kangaroo rats were largely absent from the interior of these areas. The reason for their absence was likely due to the lack of resources such as easily attainable food and readily available burrows. Along Roblar Road, the Stephens' kangaroo rats occurred in habitat typical of this species (e.g., had low percentage of aerial shrub cover). Along the access road to Range 407, Stephens' kangaroo rats also occupied open areas typical of this species. However, like the situation near the Area 25 Combat Town, Stephens' kangaroo rats were absent from the interior of areas that had been completely denuded.

The reason for the apparent absence of the Stephens' kangaroo rat at other suitable sites may be due to the small size and condition of the remaining patches of suitable habitat and the presence of intervening areas of unsuitable habitat, separating such patches. The suitable habitat areas within Jardine Canyon are grazed by bison (*Bison bison*), and occupied by Dulzura kangaroo rats. Regarding Jardine Canyon, the next adjacent patch of known occupied habitat (at least historically) is located approximately one kilometer south of the suitable habitat within the canyon (i.e., at the 210 series of ranges). It is important to note that Stephens' kangaroo rats may

no longer persist at the 210 series of ranges (A. Davenport, pers. obs., 2008). Thus, there may not be a local source population that can populate the suitable habitat within Jardine Canyon. Within the Juliett Training Area, the suitable patches of habitat were immediately adjacent to the dirt road and were occupied by Dulzura kangaroo rats. Adjacent plant communities were dominated by non-native grasses, and/or dense coastal sage scrub. The closest population of Stephens' kangaroo rats to the Juliett Training Area Access Road project now appears to be located on the Seal Beach Naval Weapons Station, Detachment Fallbrook. Most of the intervening plant community is now unsuitable for the Stephens' kangaroo rat so movement into the project area at this time, and under these conditions, seems unlikely. Regarding the general suitability of soils for the Stephens' kangaroo rat, the soils located in all survey areas were suitable for the establishment of Stephens' kangaroo rat burrows based on the presence of other rodent burrows (e.g., Botta's pocket gopher and California pocket mice).

Pacific Pocket Mouse

During this study, no Pacific pocket mice were detected. The reason for the apparent absence of the Pacific pocket mouse is unknown. However, their absence may be due to the poor condition of the habitat at the site and that which lies between occupied sites and this location. Much of the area at and adjacent to the project site had been disturbed and continues to be disturbed due to recreational and training related activities. Although there are no specific records of this species occurring within this specific area in the past, the Pacific pocket mouse is known to have occurred along the coast from northern Baja California, Mexico, to Los Angeles, California. In addition, the Pacific pocket mouse is known to have historically occupied habitat located near the mouths of rivers and streams (U.S. Fish and Wildlife Service 1994). For example, between 1931 and 1936, 71 specimens of the Pacific pocket mouse were collected near the mouth of the Margarita River (CNDDB Occurrence No. 6). The presence of dense coastal sage scrub along the bluffs, and large areas of heavy soils (i.e., has high clay content), suggests that the more consistently available connection between occupied patches was likely along the back dune margins of the immediate coast. Therefore, a historic connection between occupied patches of habitat seems most likely to have been along the immediate coast. Thus, at least on occasion, the Pacific pocket mouse likely occurred in this general area prior to the disturbance and apparent isolation of this site. Despite the presence of a currently occupied site located approximately 0.5 miles to the northwest of the study area (Oscar 1 Training Area), colonization or re-colonization of the site seems unlikely due to the presence of barriers such as the Interstate 5 Freeway, and heavy human use of the back dune portion of the beach.

CONCLUSION

Stephens' Kangaroo Rat

The Stephens' kangaroo rat was found to occur along the Range 407 Access Road, the east end of Aliso Canyon Access Road, and near the middle of the Area 25 Combat Town Access Road. Invasive exotic plants have rendered large areas of potentially suitable habitat unsuitable for this species. Control of exotic plants would likely improve the status of this species and promote its recovery.

Pacific Pocket Mouse

No Pacific pocket mice were trapped or otherwise detected during this study. Habitat management that targeted the control of exotic plants and limited habitat and soil disturbance along the back dune zone of the coast and flood plain areas near river and creek mouths could improve the status of this species and promote its recovery.

MITIGATION MEASURES

Following is a list of potential avoidance, minimization, and mitigation measures that may be suitable for this project.

Stephens' Kangaroo Rat
When project activities are in and/or adjacent to habitat occupied by SKR, all nighttime construction is prohibited. This includes transportation to and from the project site when the route passes through or adjacent to habitat occupied by the Stephens' kangaroo rat.

Avoid disturbance of occupied patches of habitat that may result in the destruction of kangaroo rat burrows. All areas to be avoided must be clearly marked on project maps and provided to the contractor. Patches of occupied habitat must also be flagged by a qualified biologist prior to the onset of construction activities. In some cases, suitable habitat and occupied sites may need to be fenced or otherwise protected from any potential impacts.

No construction within occupied SKR habitat will occur during rainy periods when burrows may be more susceptible to collapse and degradation from vehicular and foot traffic.

Have a bio-monitor present during all habitat impacting activities when working within road segments where Stephens' kangaroo rats have been documented and active kangaroo rat burrows are present.

For the Aliso Canyon, Range 407 Access Road, and 25 Area Combat Town populations, the rehabilitation of occupied and unoccupied potential habitat should be pursued. In this regard, a vegetation management plan should be developed in conjunction with a Stephens' kangaroo rat management plan. Examples of vegetation management options include the mowing of exotic grasses (e.g., *Bromus diandrus*) when their seed heads are up and still immature. All cut grasses should be windrowed and removed or otherwise collected during mowing. In addition, the aerial portion of the sweet fennel should be mechanically removed and the base spot treated with an appropriate herbicide.

For the Aliso Canyon Access Road population, determine the distribution and abundance of this population and manage accordingly (e.g., preclude habitat degrading activities at core population areas).

For all populations, preclude disturbance that would damage the burrow systems. Due to the presence of sandy and silty soils, the Aliso Canyon Access Road population's burrows are especially vulnerable to damage.

For all subpopulations of the Stephens' kangaroo rat located on Marine Corps Base Camp Pendleton, identify and manage appropriate biologically sound connections. Corridors connecting occupied patches should be occupiable by the Stephens' kangaroo rat and not merely potential movement corridors.

The qualified biologist will inspect all excavated soil not replaced within the same day within 120 ft (37 m) of occupied SKR habitat. If SKR sign is found within the temporarily stockpiled soil, the area must be left undisturbed until MCP Camp Pendleton and USFWS jointly assess the situation to determine further actions.

Guidance on specific access road repairs should be given to the project managers and equipment operators (e.g., do not create berms that may serve as habitat).

Because small mammal populations are not static temporally or spatially, compile and use all SKR survey data for Marine Corps Base Camp Pendleton in identifying areas to be potentially avoided during construction activities.

Pacific Pocket Mouse

Preclude disturbance of suitable Pacific pocket mouse habitat.

Complete systematic survey for the Pacific pocket mouse along coastal bluffs, flood plains of river and creek mouths, and back dune system in an effort to determine if there are any remaining patches of habitat occupied by this species. Incorporate the initial detection probability of this or similar species into the survey design. Based on work with the Los Angeles pocket mouse, the average initial detection probability is 0.53 (STDev = 0.32; N = 53) (Davenport 2006).

Restore historic habitat through the removal and/or management of exotic plants.

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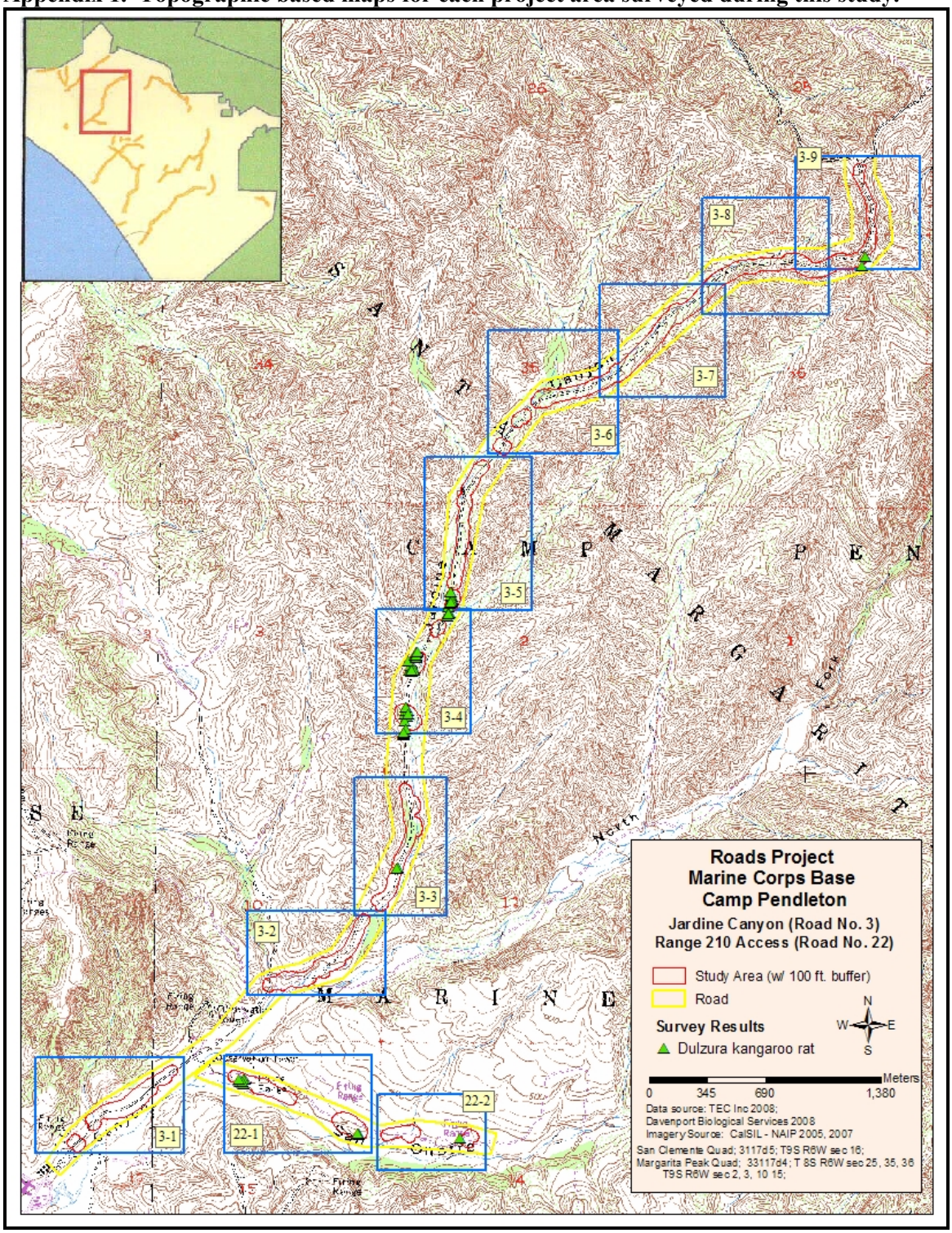
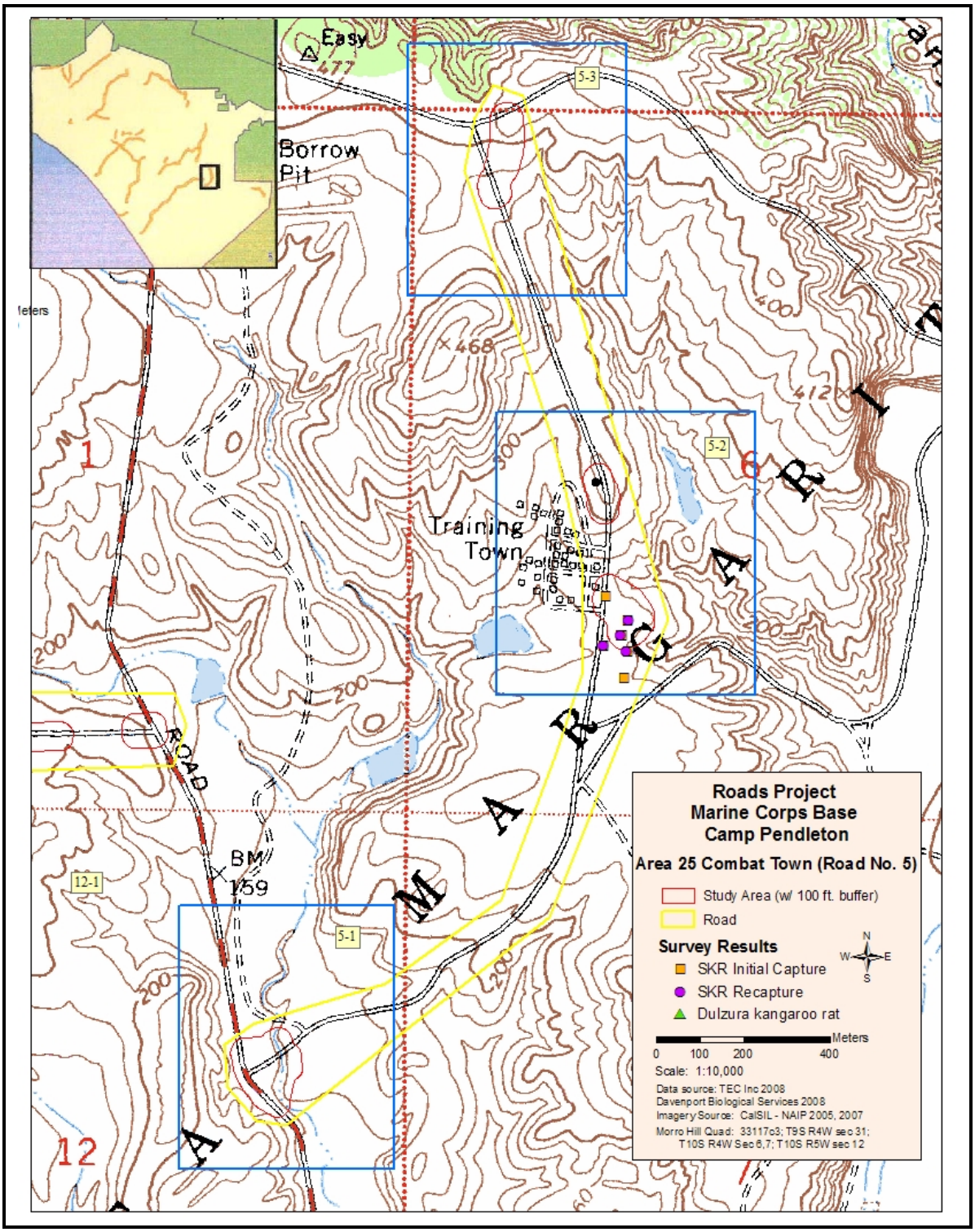
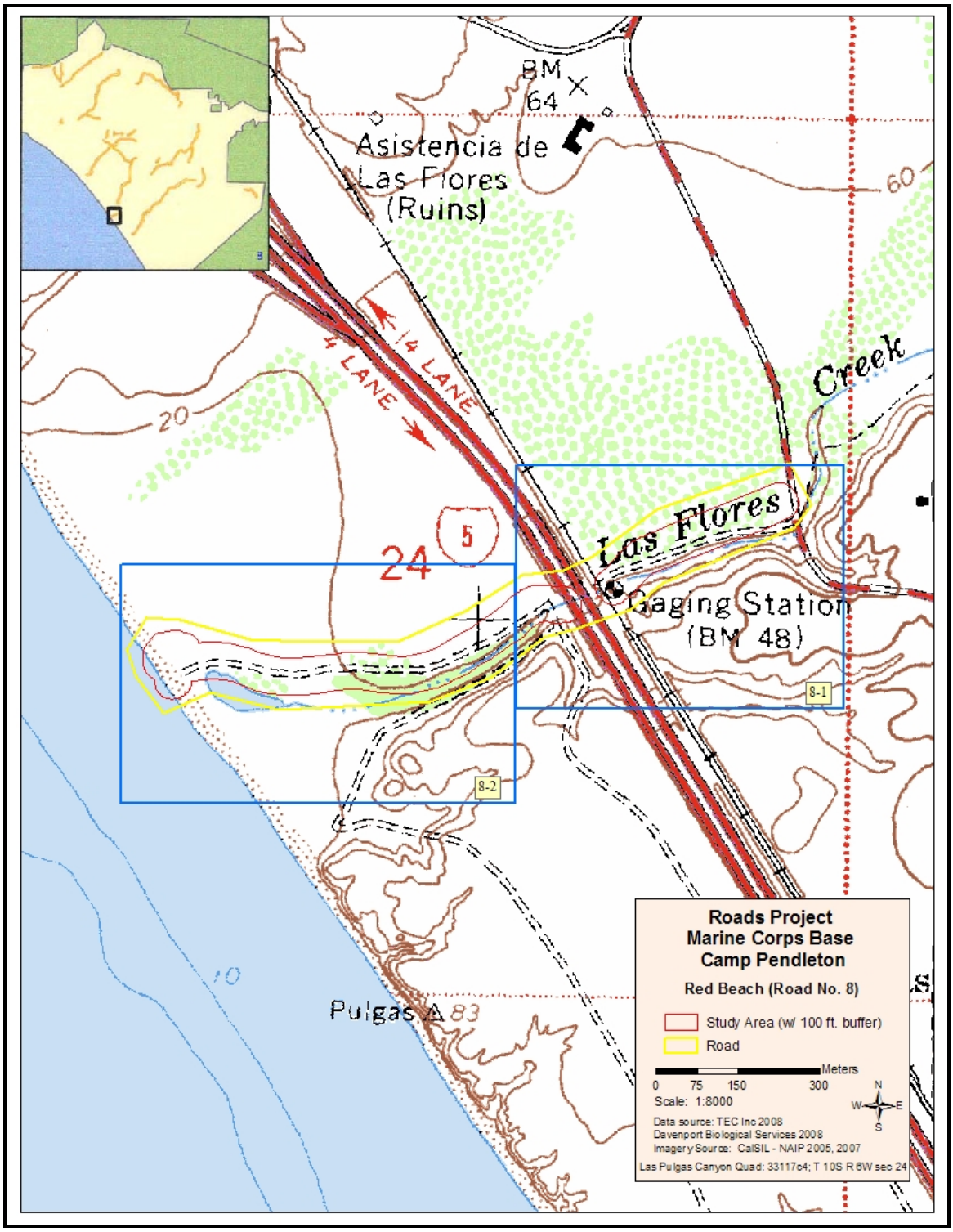
Appendix 1. Topographic based maps for each project area surveyed during this study.



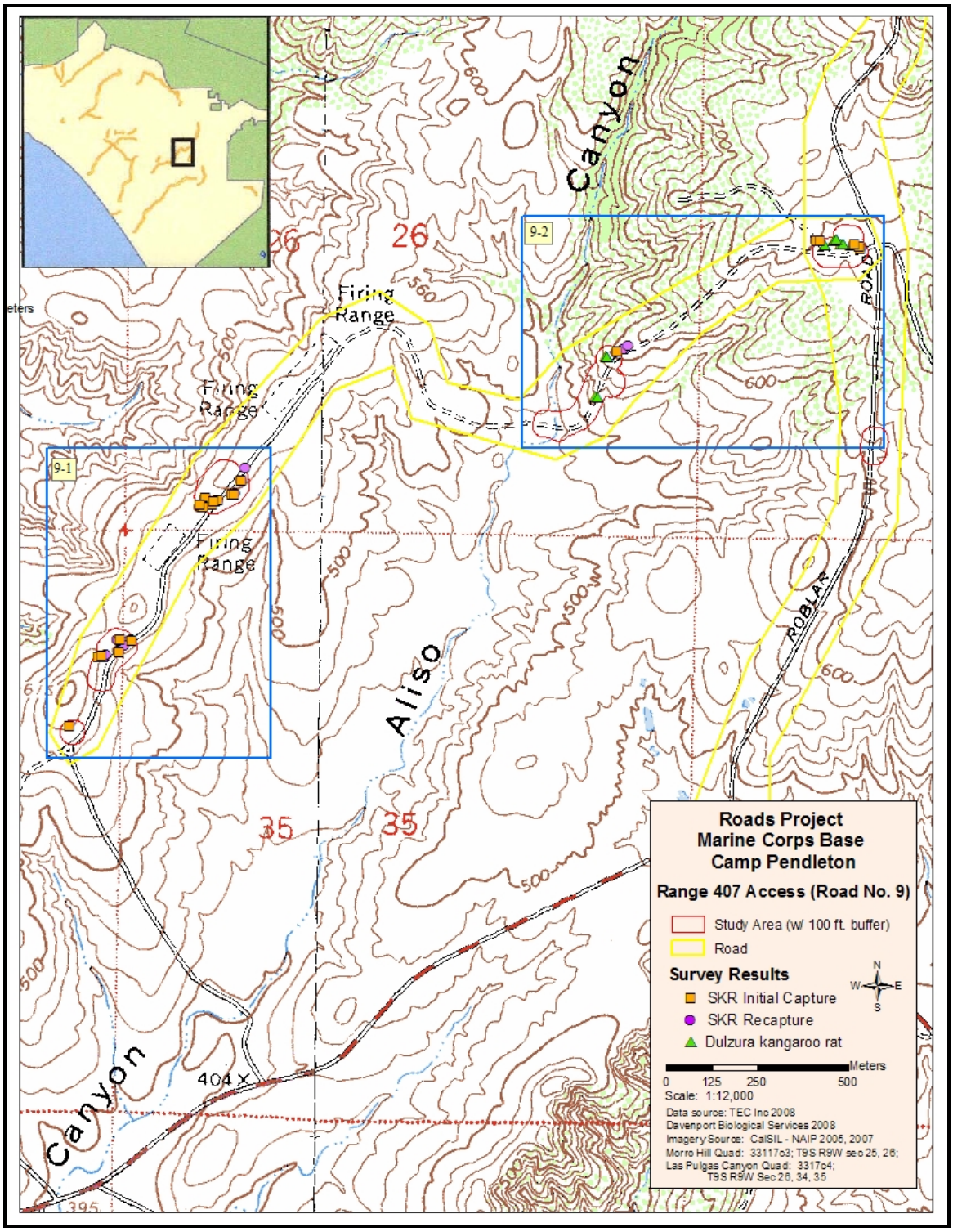
Jardine Canyon and Range 210 Series Access Roads (Road No. 3 & Road No. 22).



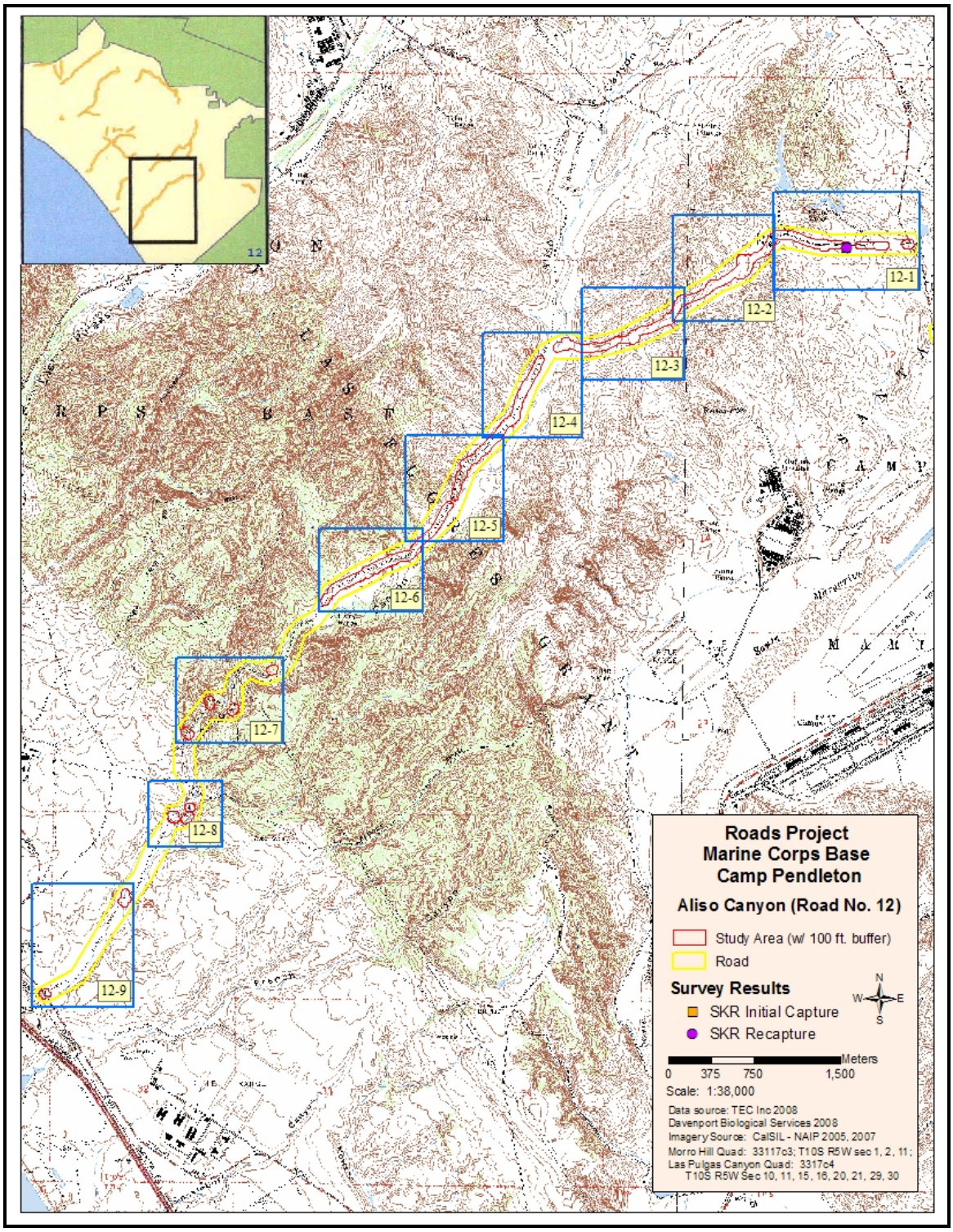
Area 25 Combat Town (Road No. 5)



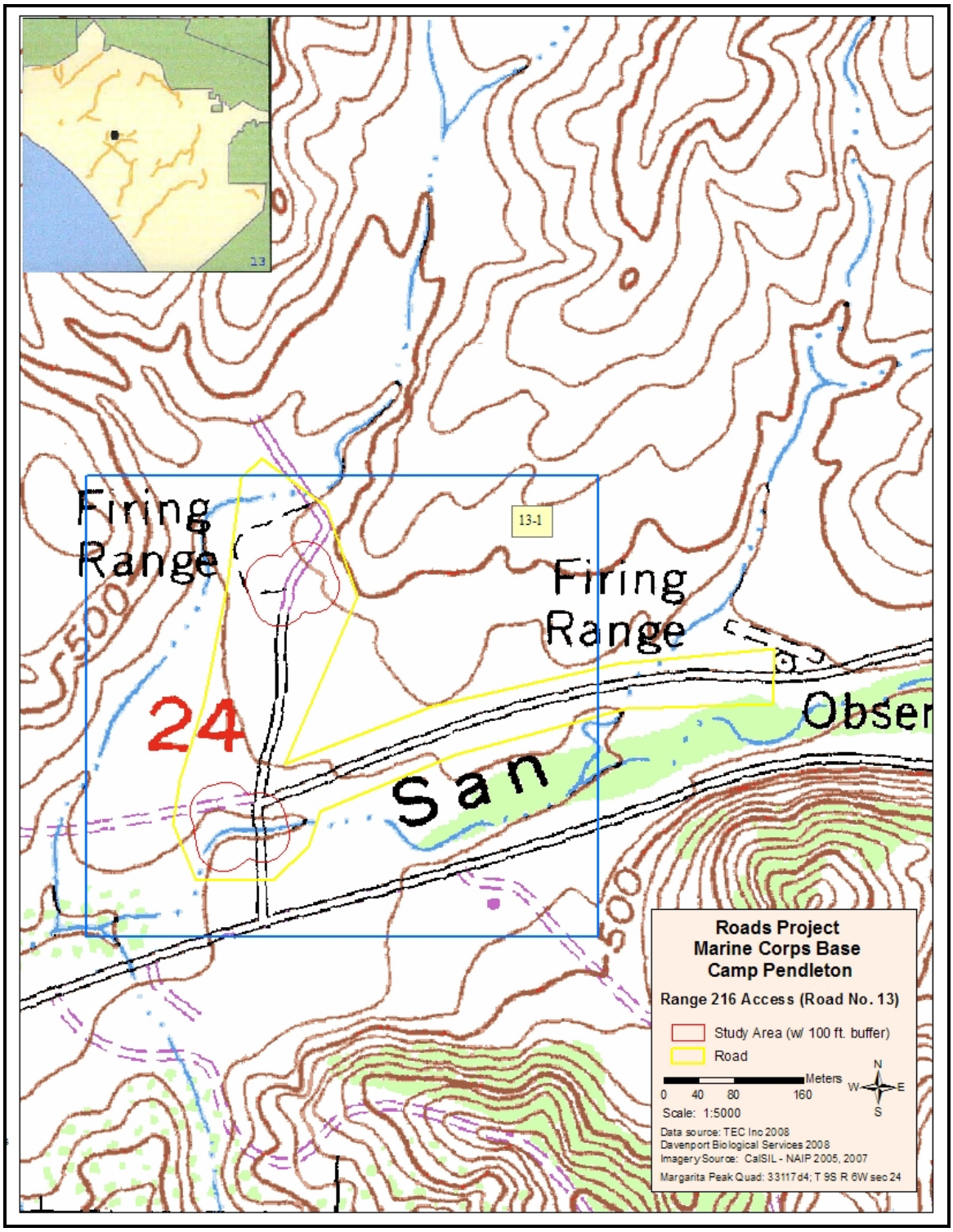
Red Beach (Road No. 8)



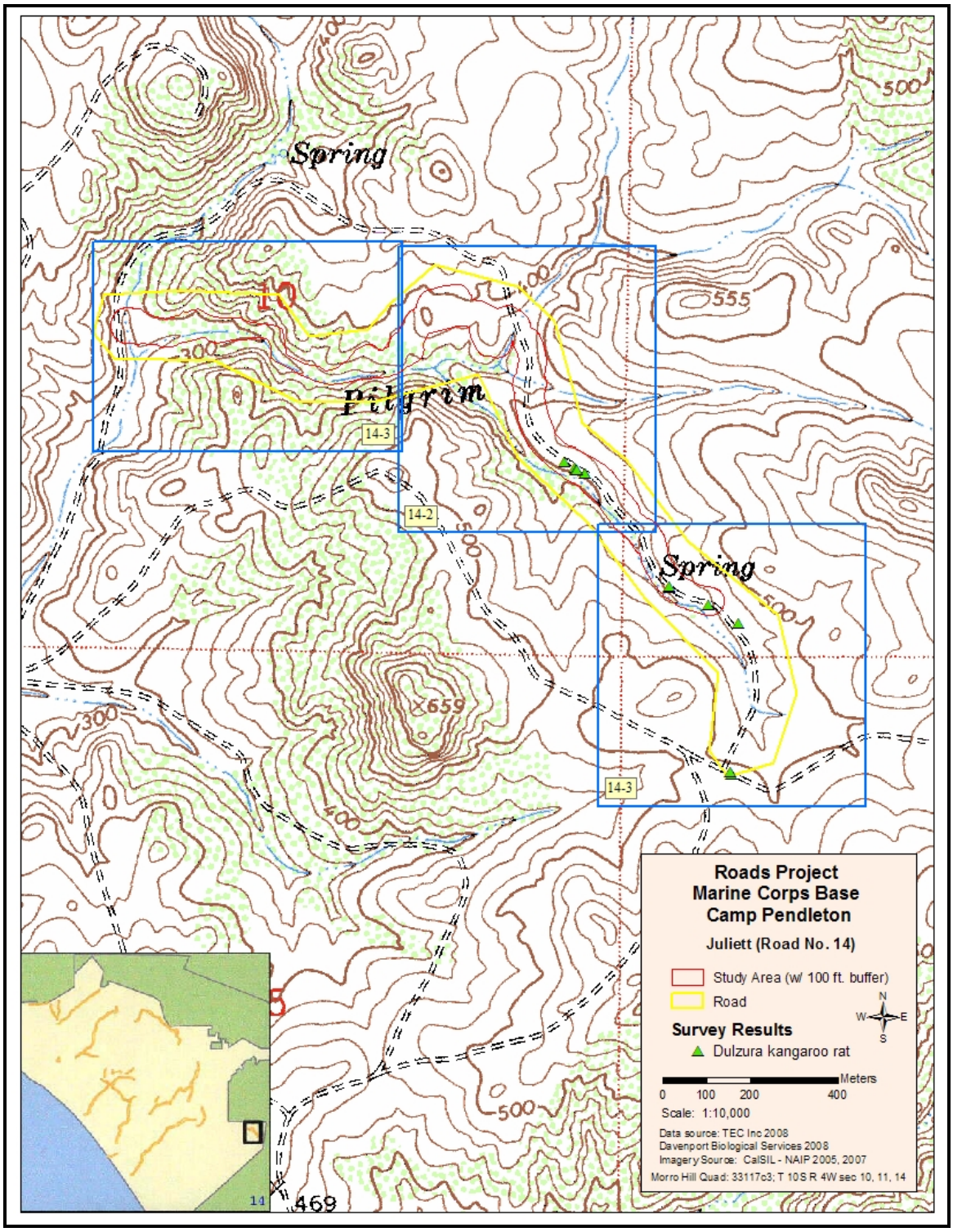
Range 407 Access Road (Road No. 9)



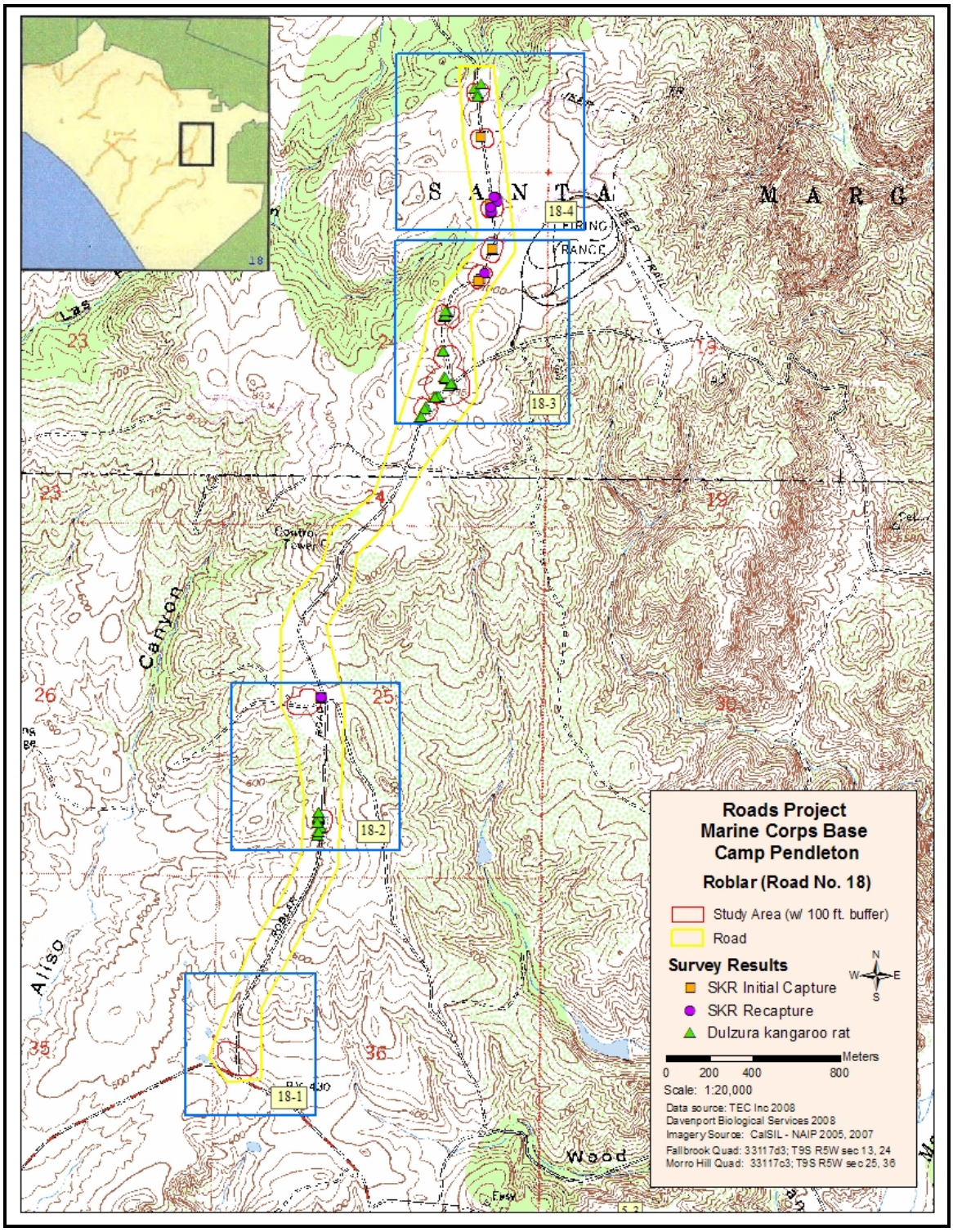
Aliso Canyon (Road No. 12)



Road 216 Series Access Road (Road No. 13)



Juliett Access Road (Road No. 14).



Roblar Road (Road No. 18)

Appendix 2. Weather data for Stephens' kangaroo rat and Pacific pocket mouse surveys.

Survey dates, time, and weather conditions during each survey event for the Stephens' kangaroo rat.

Road No.	Access Road Name	Survey Date	Time (24 Hour)	Temp. (F^o)	Wind Speed (mph)	Cloud Cover (%)
			Start/Stop	Start/Stop	Start/Stop	Start/Stop
3	Jardine Canyon	10-11 Auu 08	1700/0800	63/64	0/0	100/100
3	Jardine Canyon	11-12 Aug 08	1730/0900	73/66	0-1/0	0/20
3	Jardine Canyon	12-13 Aug 08	1715/0840	74/66	1-4/0	5/20
3	Jardine Canyon	13-14 Aug 08	1700/0835	75/66	1-2/0-1	20/0
3	Jardine Canyon	14-15 Aug 08	1700/0813	72/66	1-3/0-1	10/10
5	Area 25 Combat Town	2-3 Jun 08	1630/0800	72/61	1-5/0-1	0/100 ML
5	Area 25 Combat Town	3-4 Jun 08	1700/0800	62/59	0-1/0-1	80/100 ML
5	Area 25 Combat Town	4-5 Jun 08	1730/0830	65/60	0-1/0-1	90/60 ML
5	Area 25 Combat Town	5-6 Jun 08	1630/0800	72/60	1-3/0-1	5/0
5	Area 25 Combat Town	6-7 Jun 08	1730/0830	62/64	1-3/0-1	50/50 ML
12	Aliso Canyon	9-10 Sep 08	1500/0600	74/64	1-4/0	0/80 ML
12 A	liso Canyon	10-11 Sep 08	1800/0630	70/64	1-4/0	5/100 ML
12 A	liso Canyon	11-12 Sep 08	1810/0600	69/65	0-1/0	40/100 ML
12 A	liso Canyon	12-13 Sep 08	1830/0630	68/66	0/0-1	0/100 ML
12 A	liso Canyon	13-14 Sep 08	1900/0800	70/65	0-1/0	50/100 ML
13	Range 216 Series	18-19 Aug 08	1400/0700	78/63	0-1/0	0/100 ML
13	Range 216 Series	19-20 Aug 08	1900/0700	69/63	1-2/0	0/100 ML
13	Range 216 Series	20-21 Aug 08	1830/0700	70/62	0-1/0-1	0/100 ML
13	Range 216 Series	21-22 Aug 08	1730/0630	73/65	0-1/0	0/100 ML
13	Range 216 Series	22-23 Aug 08	1730/0830	76/65	0-1/0-1	0/100 ML
14	Juilett Training Area	2-3 Jun 08	1630/0800	72/61	1-5/0-1	0/100 ML
14	Juilett Training Area	3-4 Jun 08	1700/0800	62/59	0-1/0-1	80/100 ML
14	Juilett Training Area	4-5 Jun 08	1730/0830	65/60	0-1/0-1	90/60 ML
14	Juilett Training Area	5-6 Jun 08	1630/0800	72/60	1-3/0-1	5/0
14	Juilett Training Area	6-7 Jun 08	1730/0830	62/64	1-3/0-1	50/50 ML
22	Range 210 Series	18-19 Aug 08	1400/0700	78/63	0-1/0	0/100 ML
22	Range 210 Series	19-20 Aug 08	1900/0700	69/63	1-2/0	0/100 ML
22	Range 210 Series	20-21 Aug 08	1830/0700	70/62	0-1/0-1	0/100 ML
22	Range 210 Series	21-22 Aug 08	1730/0630	73/65	0-1/0	0/100 ML
22	Range 210 Series	22-23 Aug 08	1730/0830	76/65	0-1/0-1	0/100 ML

ML: Marine Layer

Appendix 2 (Cont.)

Table 2. Shows survey dates, time, and weather conditions during each survey event for the Pacific pocket mouse.

Road No.	Access Road Name	Survey Date	Time (24 Hour)	Temp. (F^o)	Wind Speed (mph)	Cloud Cover (%)
			Start/Stop	Start/Stop	Start/Stop	Start/Stop
8	Red Beach	19-20 May 08	1630/0700	70/64	0-1/0-2	10/100 ML
8	Red Beach	20-21 May 08	1830/0715	64/59	1-3/0-1	100/100 ML
8	Red Beach	21-22 May 08	1930/0730	63/60	1-5/1-3	5/80 ML
8	Red Beach	22-23 May 08	1830/0700	62/58	3-7/3-10	80/100 ML
8	Red Beach	23-24 May 08	1700/0930	56/53	0-2/1-3	80/80 ML
9	Range 407	15-16 Oct 08	1700/-709	86/55	1-3/1-3	10/10
9 Ran	ge 407	16-17 Oct 08	1730/0800	80/57	1-3/1-3	0/0
9 Ran	ge 407	17-18 Oct 08	1745/0745	73/51	0-1/0	20/0
9 Ran	ge 407	18-19 Oct 08	1800/0800	70/56	1-2/0	0/100 ML
9 Ran	ge 407	19-20 Oct 08	1700/0740	70/60	1-3/0	0/100 ML
12	Aliso Canyon	9-10 Sep 08	1500/0600	74/64	1-4/0	0/80 ML
12 A	liso Canyon	10-11 Sep 08	1800/0630	70/64	1-4/0	5/100 ML
12 A	liso Canyon	11-12 Sep 08	1810/0600	69/65	0-1/0	40/100 ML
12 A	liso Canyon	12-13 Sep 08	1830/0630	68/66	0/0-1	0/100 ML
12 A	liso Canyon	13-14 Sep 08	1900/0800	70/65	0-1/0	50/100 ML

ML: Marine Layer

Appendix 3. Habitat conditions along Jardine Canyon Road (Road No. 3).

Grazed by Bison. Dulzura kangaroo rats were captured here.

Grazed by Bison. Dulzura kangaroo rats were captured here.

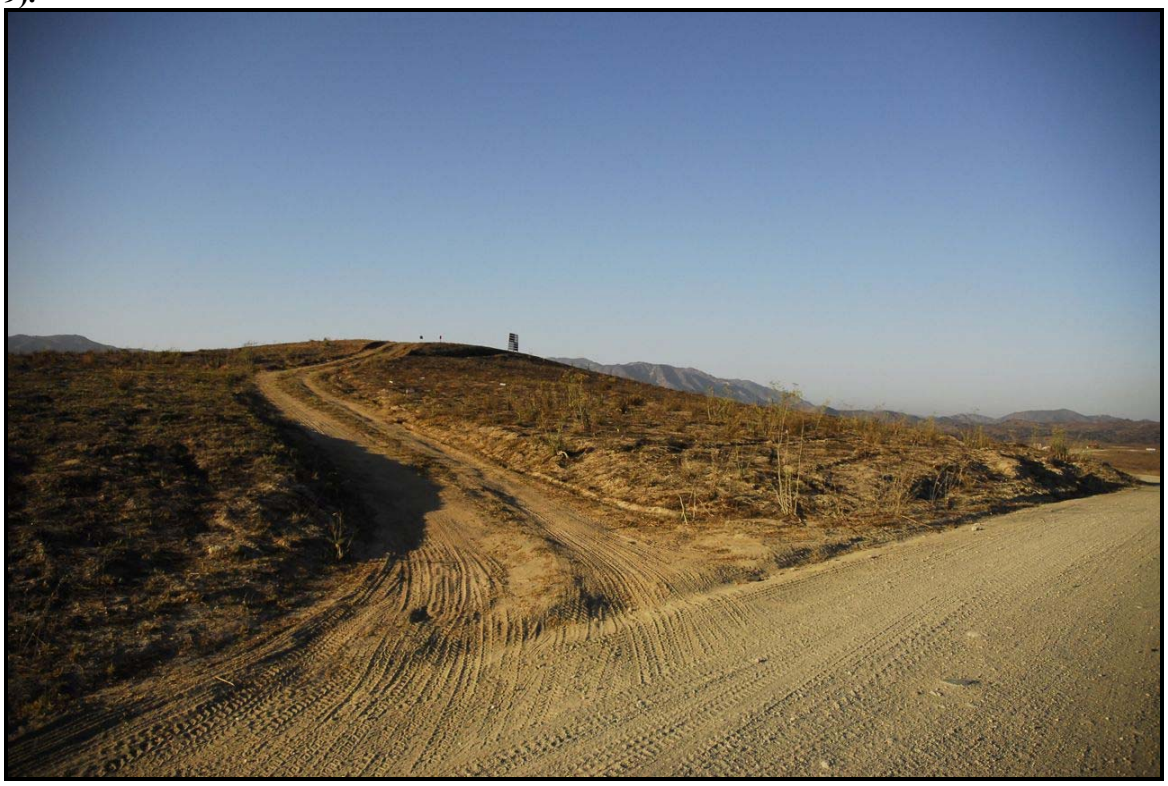
Appendix 4. Typical Habitat Conditions found along the 25 Area Combat Town Access Road (Road No. 5).

Most northern study area. Suitable for Stephens' kanagaroo rats; no kangaroo rats captured despite presence of kangaroo rat burrows.

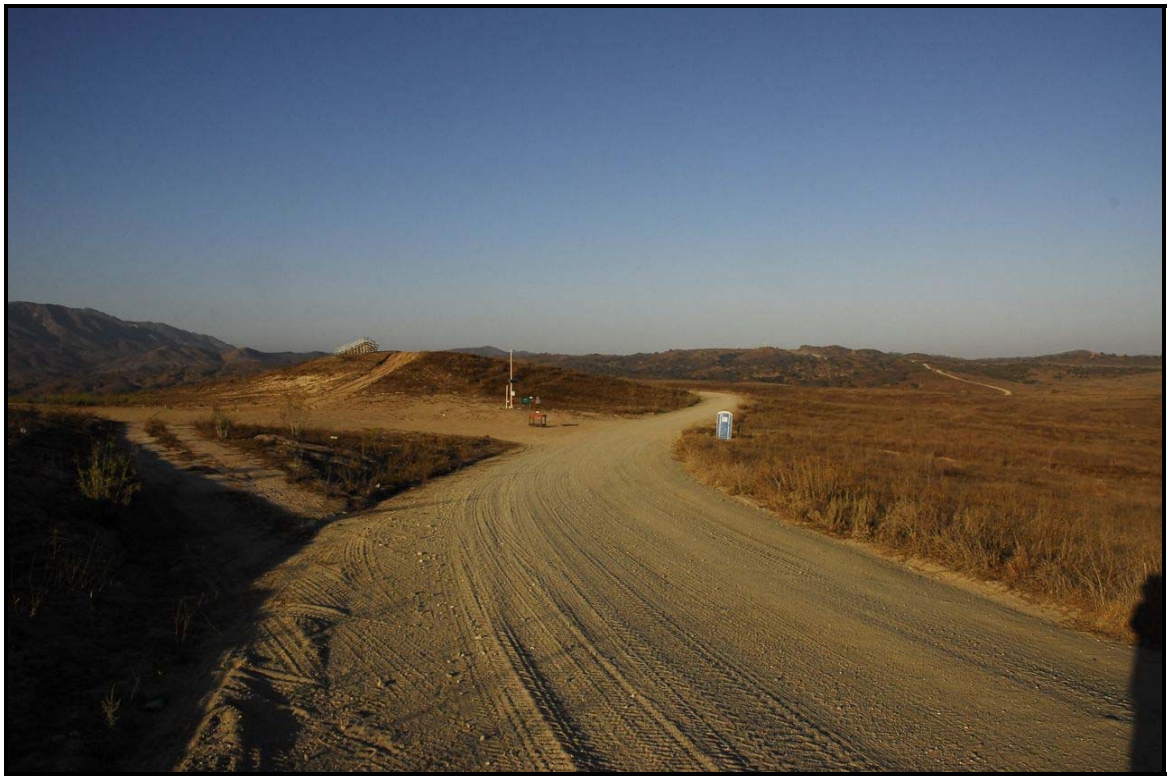
Habitat near 25 Area Combat Town. Suitable for Stephens' kangaroo rats; several captured in this area.

Appendix 5. Typical Habitat Conditions found along the Red Beach Access Road (Road No. 8).

Appendix 6. Typical Habitat Conditions found along the Range 407 Access Road (Road No. 9).



Section 9-1; Southwestern Study Area



Section 9-1; Middle Study Area

Appendix 6. Typical Habitat Conditions found along the Range 407 Access Road (Road No. 9)(Cont.)

Section 9-1; Northeastern Study Area (looking northeast)

Section 9-2; Southwestern Study Area (bottom of hill looking east)

Appendix 6. Typical Habitat Conditions found along the Range 407 Access Road (Road No. 9)(Cont.)

Section 9-2; Southwestern Study Area (top of hill; looking northeast)

Section 9-2; Northeastern Study Area (looking east)

Appendix 7. Typical Habitat Conditions found along Aliso Canyon Road (Road No. 12).

Typical habitat conditions of most of the project area along Aliso Canyon Road (14 Sep 2008). No kangaroo rat sign in this type of plant community.

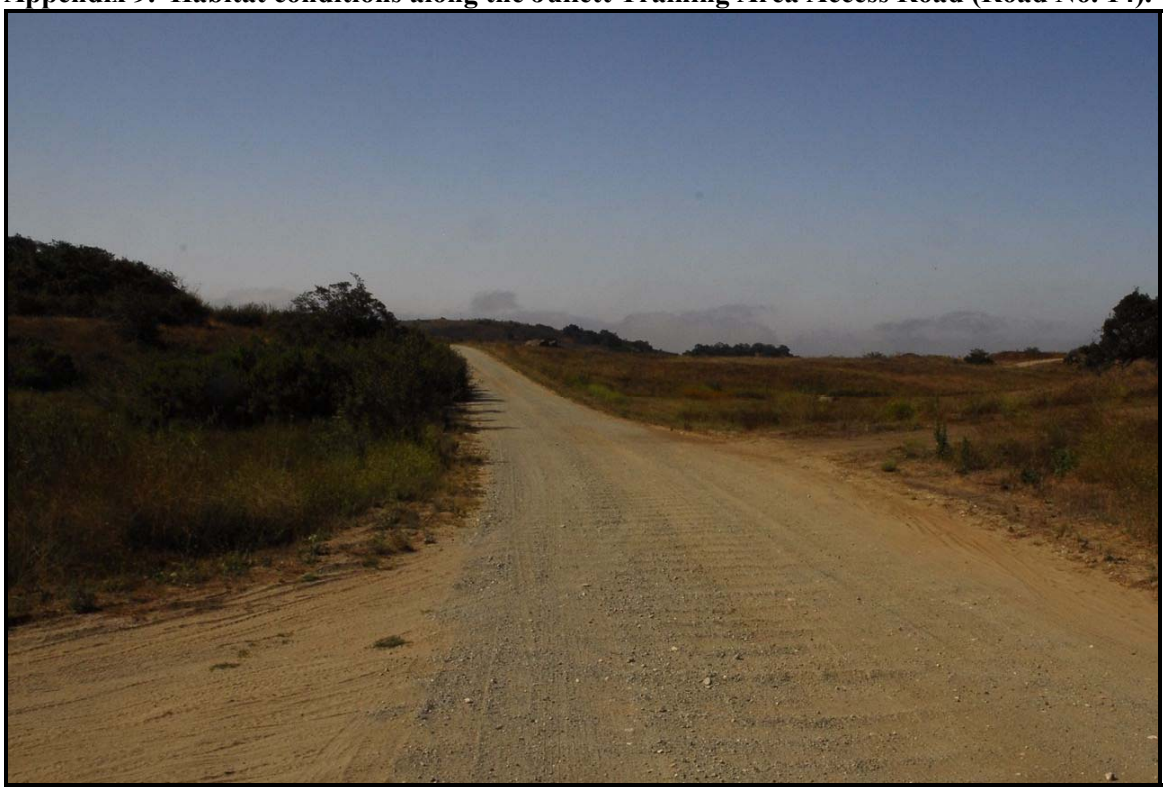
Habitat conditions within segment 12-1, at east end of Aliso Canyon Road. This area was occupied by Stephens' kangaroo rats (14 Sep 2008).

Appendix 8. Habitat conditions along the 216 Series Access Road (Road No. 13).

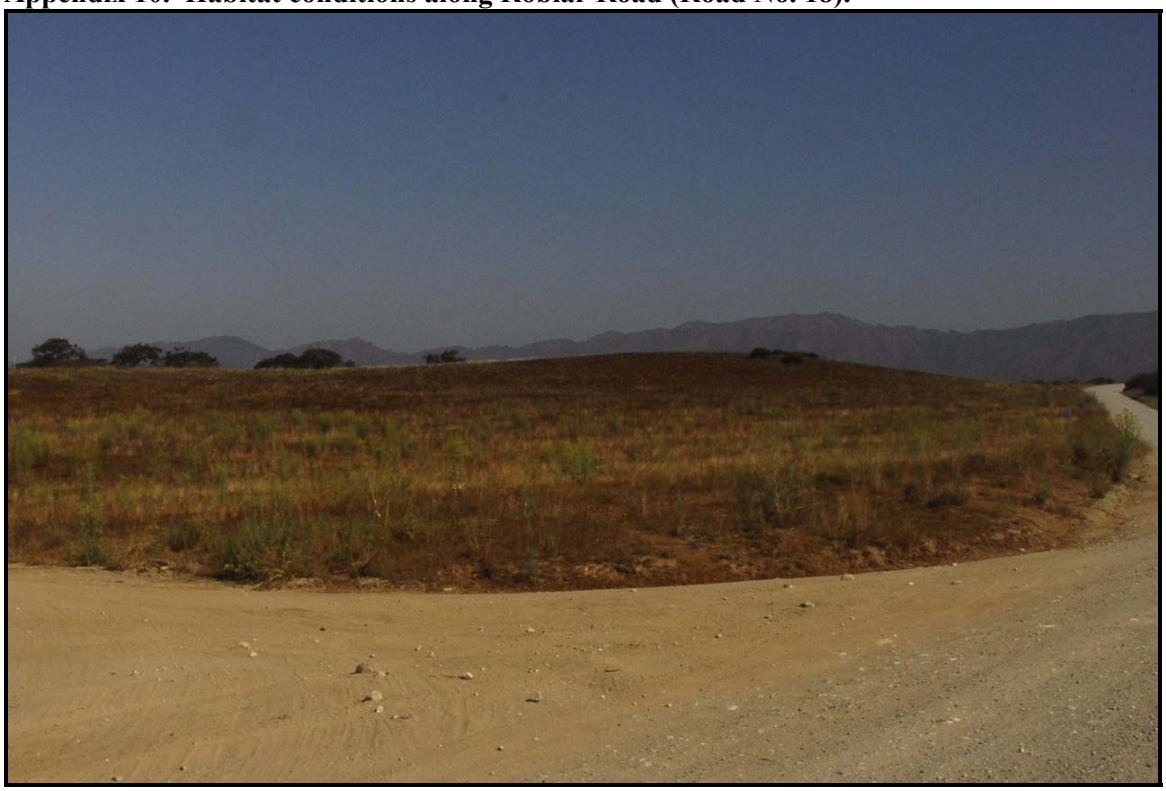
Shows thick annual vegetation in this segment. No kangaroo rats were captured or otherwise detected here.

Recently burned. Dulzura kangaroo rats were captured here.

Appendix 9. Habitat conditions along the Juliett Training Area Access Road (Road No. 14).



Appendix 10. Habitat conditions along Roblar Road (Road No. 18).



Annual vegetation had low aerial cover and many patches of bare ground; Stephens' kangaroo rats were captured here.

Annual vegetation was thicker in this area; Dulzura kangaroo rats were captured her

Appendix 11. Habitat conditions along the 210 Series Access Road (Road No. 22).

Suitable for SKR; No kangaroo rats captured or otherwise detected during presence-absence survey.

Suitable habitat for the Stephens' kangaroo rat; no kangaroo rats captured or otherwise detected.

Appendix 12. Initial and Recapture Sites of both Stephens' and Dulzura Kangaroo Rats.

Road Segm	ent	Species	Easting	Northing	New	Recapture
Jardine Canyon	3-3	DISI	454872	3696998	Yes	
Jardine Canyon	3-3	DISI	454876 3	697005	Yes	
Jardine Canyon	3-3	DISI	454919 3	697957	Yes	
Jardine Canyon	3-3 D	ISI	454869	3696998		Yes
Jardine Canyon	3-4	DISI	454930 3	697905	Yes	
Jardine Canyon	3-4	DISI	454963 3	698181	Yes	
Jardine Canyon	3-4	DISI	454941 3	698176	Yes	
Jardine Canyon	3-4	DISI	454941 3	698180	Yes	
Jardine Canyon	3-4	DISI	454943 3	698205	Yes	
Jardine Canyon	3-4	DISI	454933 3	698233	Yes	
Jardine Canyon	3-4	DISI	454975 3	698266	Yes	
Jardine Canyon	3-4 DIS	I	454910 3	697805	Yes	
Jardine Canyon	3-4 DIS	I	454910 3	697916	Yes	
Jardine Canyon	3-4 DIS	I	454919 3	697935	Yes	
Jardine Canyon	3-4 DIS	I	454934 3	697917	Yes	
Jardine Canyon	3-4 DIS	I	454953 3	698173	Yes	
Jardine Canyon	3-4 DIS	I	454946 3	698176	Yes	
Jardine Canyon	3-4 DIS	I	454964 3	698193	Yes	
Jardine Canyon	3-4 DIS	I	454981 3	698288	Yes	
Jardine Canyon	3-4 DIS	I	454913 3	697815	Yes	
Jardine Canyon	3-4 DIS	I	454919 3	697935	Yes	
Jardine Canyon	3-4 DIS	I	454919 3	697958	Yes	
Jardine Canyon	3-4 DIS	I	454908 3	697796		Yes
Jardine Canyon	3-4 DIS	I	454912 3	697874		Yes
Jardine Canyon	3-4 DIS	I	454934 3	697940		Yes
Jardine Canyon	3-4 DIS	I	454954 3	698171		Yes
Jardine Canyon	3-4 DIS	I	454976 3	698264		Yes
Jardine Canyon	3-4 DIS	I	454917 3	697830		Yes
Jardine Canyon	3-4 DIS	I	454919 3	697961		Yes
Jardine Canyon	3-4 DIS	I	454932 3	697915		Yes
Jardine Canyon	3-4 DIS	I	454950 3	698173		Yes
Jardine Canyon	3-4 DIS	I	454949 3	698177		Yes
Jardine Canyon	3-4 DIS	I	454977 3	698257		Yes
Jardine Canyon	3-4 DIS	I	454981 3	698285		Yes
Jardine Canyon	3-4 DIS	I	454963 3	698177		Yes
Jardine Canyon	3-4 DIS	I	454908 3	697800		Yes
Jardine Canyon	3-4 DIS	I	454909 3	697808		Yes
Jardine Canyon	3-4 DIS	I	454949 3	698178		Yes
Jardine Canyon	3-4 DIS	I	454950 3	698178		Yes
Jardine Canyon	3-4 DIS	I	454976 3	698267		Yes
Jardine Canyon	3-4 DIS	I	454984 3	698290		Yes
Jardine Canyon	3-5	DISI	455170 3	698516	Yes	
Jardine Canyon	3-5	DISI	455174 3	698522	Yes	
Jardine Canyon	3-5	DISI	455172 3	698557	Yes	
Jardine Canyon	3-5	DISI	455179 3	698581	Yes	
Jardine Canyon	3-5	DISI	455187 3	698599	Yes	
Jardine Canyon	3-5	DISI	455190 3	698622	Yes	
Jardine Canyon	3-5	DISI	455185 3	698625	Yes	
Jardine Canyon	3-5	DISI	455181 3	698647	Yes	

Road Segm	ent	Species	Easting	Northing	New	Recapture
Jardine Canyon	3-5 DIS	I	455168 3	698521	Yes	
Jardine Canyon	3-5 DIS	I	455177 3	698581	Yes	
Jardine Canyon	3-5 DIS	I	455169 3	698520	Yes	
Jardine Canyon	3-5 DIS	I	455186 3	698584	Yes	
Jardine Canyon	3-5 DIS	I	455166 3	698503	Yes	
Jardine Canyon	3-5 DIS	I	455187 3	698605		Yes
Jardine Canyon	3-5 D	ISI	455170	3698520		Yes
Jardine Canyon	3-5 D	ISI	455184	3698650		Yes
Jardine Canyon	3-5 D	ISI	455187	3698592		Yes
Jardine Canyon	3-5 D	ISI	455170	3698514		Yes
Jardine Canyon	3-5 D	ISI	455170	3698516		Yes
Jardine Canyon	3-5 D	ISI	455185	3698584		Yes
Jardine Canyon	3-9 D	ISI	457627	3700613	Yes	
Jardine Canyon	3-9 D	ISI	457642	3700664	Yes	
Jardine Canyon	3-9 D	ISI	457641	3700666		Yes
25 Area Combat Town	5-2	DIST	468045	3688159	Yes	
25 Area Combat Town	5-2	DIST	468051	3688220	Yes	
25 Area Combat Town	5-2	DIST	467996	3688232	Yes	
25 Area Combat Town	5-2	DIST	468035	3688257	Yes	
25 Area Combat Town	5-2	DIST	468037	3688255	Yes	
25 Area Combat Town	5-2	DIST	468052	3688290	Yes	
25 Area Combat Town	5-2	DIST	468001	3688345	Yes	
25 Area Combat Town	5-2	DIST	467995	3688231		Yes
25 Area Combat Town	5-2	DIST	468049	3688218		Yes
25 Area Combat Town	5-2	DIST	468034	3688255		Yes
25 Area Combat Town	5-2	DIST	468053	3688291		Yes
25 Area Combat Town	5-2	DISI	467993	3688588	Yes	
25 Area Combat Town	5-2	DISI	468011	3688584		Yes
25 Area Combat Town	5-2	DISI	467995	3688586		Yes
Range 407	9-1	DIST	464420	3690744	Yes	
Range 407	9-1	DIST	464476	3690758	Yes	
Range 407	9-1	DIST	464511	3690790	Yes	
Range 407	9-1	DIST	464479	3690792	Yes	
Range 407	9-1	DIST	464731	3691165	Yes	
Range 407	9-1	DIST	464747	3691177	Yes	
Range 407	9-1	DIST	464784	3691195	Yes	
Range 407	9-1	DIST	464790	3691195	Yes	
Range 407	9-1	DIST	468410	3691231	Yes	
Range 407	9-1	DIST	464710	3691183	Yes	
Range 407	9-1	DIST	464704	3691163	Yes	
Range 407	9-1	DIST	464704	3691158	Yes	
Range 407	9-1	DIST	464429	3690747	Yes	
Range 407	9-1	DIST	464696	3691166	Yes	
Range 407	9-1	DIST	464734	3691174	Yes	
Range 407	9-1	DIST	464810	3691231	Yes	
Range 407	9-1	DIST	464341	3690552	Yes	
Range 407	9-1	DIST	464475	3690760		Yes
Range 407	9-1	DIST	464509	3690791		Yes
Range 407	9-1	DIST	464480	3690791		Yes
Range 407	9-1	DIST	464746	3691176		Yes

Road Segm	ent	Species	Easting	Northing	New	Recapture
Range 407	9-1	DIST	464784	3691195		Yes
Range 407	9-1	DIST	464811	3691231		Yes
Range 407	9-1	DIST	464713	3691183		Yes
Range 407	9-1	DIST	464705	3691162		Yes
Range 407	9-1	DIST	464699	3691166		Yes
Range 407	9-1	DIST	464477	3690758		Yes
Range 407	9-1	DIST	464439	3690745		Yes
Range 407	9-1	DIST	464511	3690790		Yes
Range 407	9-1	DIST	464471	3690793		Yes
Range 407	9-1	DIST	464731	3691165		Yes
Range 407	9-1	DIST	464747	3691177		Yes
Range 407	9-1	DIST	464784	3691195		Yes
Range 407	9-1	DIST	464790	3691195		Yes
Range 407	9-1	DIST	464704	3691163		Yes
Range 407	9-1	DIST	464696	3691158		Yes
Range 407	9-1	DIST	464442	3690750		Yes
Range 407	9-1	DIST	464475	3690760		Yes
Range 407	9-1	DIST	464509	3690791		Yes
Range 407	9-1	DIST	464503	3690788		Yes
Range 407	9-1	DIST	464471	3690793		Yes
Range 407	9-1	DIST	464792	3691198		Yes
Range 407	9-1	DIST	464810	3691231		Yes
Range 407	9-1	DIST	464822	3691269		Yes
Range 407	9-1	DIST	464710	3691183		Yes
Range 407	9-1	DIST	464704	3691163		Yes
Range 407	9-1	DIST	464699	3691159		Yes
Range 407	9-1	DIST	464509	3690791		Yes
Range 407	9-1	DIST	464491	3690777		Yes
Range 407	9-1	DIST	464477	3690788		Yes
Range 407	9-1	DIST	464784	3691195		Yes
Range 407	9-1	DIST	464790	3691195		Yes
Range 407	9-1	DIST	464792	3691198		Yes
Range 407	9-1	DIST	464710	3691183		Yes
Range 407	9-2	DIST	465840	3691595	Yes	
Range 407	9-2	DIST	466507	3691882	Yes	
Range 407	9-2	DIST	466506	3691888	Yes	
Range 407	9-2	DIST	466398	3691905	Yes	
Range 407	9-2	DIST	465841	3691595	Yes	
Range 407	9-2	DIST	466491	3691894	Yes	
Range 407	9-2	DIST	466389	3691903	Yes	
Range 407	9-2	DIST	466398	3691905	Yes	
Range 407	9-2	DIST	465859	3691602		Yes
Range 407	9-2	DIST	466507	3691890		Yes
Range 407	9-2	DIST	466510	3691886		Yes
Range 407	9-2	DIST	466508	3691890		Yes
Range 407	9-2	DIST	466508	3691882		Yes
Range 407	9-2	DIST	466389	3691903		Yes
Range 407	9-2	DIST	465859	3691602		Yes
Range 407	9-2	DIST	465840	3691595		Yes
Range 407	9-2	DIST	465871	3691610		Yes
Range 407	9-2	DIST	465840	3691595		Yes
Range 407	9-2	DIST	466398	3691905		Yes

Road Segm	ent	Species	Easting	Northing	New	Recapture
Range 407	9-2	DIST	466510	3691886		Yes
Range 407	9-2	DIST	466491	3691894		Yes
Range 407	9-2	DIST	466389	3691903		Yes
Range 407	9-2	DISI	466487	3691891	Yes	
Range 407	9-2	DISI	465814	3691581	Yes	
Range 407	9-2	DISI	465783	3691472	Yes	
Range 407	9-2	DISI	466465	3691896	Yes	
Range 407	9-2	DISI	466446	3691907	Yes	
Range 407	9-2	DISI	466440	3691905	Yes	
Range 407	9-2	DISI	466491	3691894		Yes
Range 407	9-2	DISI	465813	3691581		Yes
Range 407	9-2	DISI	466456	3691895		Yes
Range 407	9-2	DISI	466414	3691891		Yes
Range 407	9-2	DISI	466446	3691907		Yes
Range 407	9-2	DISI	465790	3691469		Yes
Range 407	9-2	DISI	465814	3691581		Yes
Range 407	9-2	DISI	466458	3691896		Yes
Range 407	9-2	DISI	466414	3691891		Yes
Range 407	9-2	DISI	466440	3691905		Yes
Range 407	9-2	DISI	465814	3691581		Yes
Range 407	9-2	DISI	466465	3691896		Yes
Range 407	9-2	DISI	466440	3691905		Yes
Range 407	9-2	DISI	466446	3691907		Yes
Aliso Cyn.	12-1	DIST	466406	3687998	Yes	
Aliso Cyn.	12-1	DIST	466409	3687994		Yes
Juliett 1	4-3	DISI	474201	3686317	Yes	
Juliett 1	4-3	DISI	474257	3685929	Yes	
Juliett 1	4-3	DISI	474269	3686275	Yes	
Juliett 1	4-3	DISI	474255	3685935		Yes
Juliett 1	4-2	DISI	474111	3686357	Yes	
Juliett 1	4-2	DISI	473894	3686628	Yes	
Juliett 1	4-2	DISI	474112	3686358	Yes	
Juliett 1	4-2	DISI	473916	3686616	Yes	
Juliett 1	4-2	DISI	473893	3686629	Yes	
Juliett 1	4-2	DISI	473896	3686624		Yes
Juliett 1	4-2	DISI	473916	3686616		Yes
Juliett 1	4-2	DISI	473898	3686624		Yes
Juliett 1	4-2	DISI	473868	3686643		Yes
Roblar Road	18-2	DIST	466533	3691904	Yes	
Roblar Road	18-2	DIST	466538	3691907	Yes	
Roblar Road	18-2	DIST	466531	3691903	Yes	
Roblar Road	18-2	DIST	466538	3691908	Yes	
Roblar Road	18-2	DIST	466539	3691904	Yes	
Roblar Road	18-2	DIST	466537	3691904		Yes
Roblar Road	18-2	DIST	466537	3691906		Yes
Roblar Road	18-2	DIST	466539	3691908		Yes
Roblar Road	18-2	DISI	466528	3691380	Yes	
Roblar Road	18-2	DISI	466531	3691351	Yes	
Roblar Road	18-2	DISI	466540	3691311	Yes	
Roblar Road	18-2	DISI	466528	3691277	Yes	
Roblar Road	18-2	DISI	466528	3691380	Yes	

Road Segm	ent	Species	Easting	Northing	New	Recapture
Roblar Road	18-2	DISI	466528	3691380	Yes	
Roblar Road	18-2	DISI	466528	3691380	Yes	
Roblar Road	18-2	DISI	466530	3691363	Yes	
Roblar Road	18-2	DISI	466530	3691381	Yes	
Roblar Road	18-2	DISI	466531	3691352	Yes	
Roblar Road	18-2	DISI	466528	3691353	Yes	
Roblar Road	18-2	DISI	466531	3691362	Yes	
Roblar Road	18-2	DISI	466531	3691381		Yes
Roblar Road	18-2	DISI	466528	3691277		Yes
Roblar Road	18-2	DISI	466527	3691275		Yes
Roblar Road	18-2	DISI	466531	3691381		Yes
Roblar Road	18-2	DISI	466527	3691296		Yes
Roblar Road	18-2	DISI	466527	3691276		Yes
Roblar Road	18-2	DISI	466532	3691361		Yes
Roblar Road	18-2	DISI	466540	3691310		Yes
Roblar Road	18-2	DISI	466528	3691336		Yes
Roblar Road	18-2	DISI	466532	3691381		Yes
Roblar Road	18-2	DISI	466532	3691293		Yes
Roblar Road	18-3	DIST	467306	3693975	Yes	
Roblar Road	18-3	DIST	467255	3693837	Yes	
Roblar Road	18-3	DIST	467241	3693827	Yes	
Roblar Road	18-3	DIST	467273	3693863		Yes
Roblar Road	18-3	DISI	467270	3693861	Yes	
Roblar Road	18-3	DISI	467093	3693667	Yes	
Roblar Road	18-3	DISI	467093	3693661	Yes	
Roblar Road	18-3	DISI	467094	3693386	Yes	
Roblar Road	18-3	DISI	467056	3693294	Yes	
Roblar Road	18-3	DISI	467066	3693291	Yes	
Roblar Road	18-3	DISI	467065	3693289	Yes	
Roblar Road	18-3	DISI	467009	3693248	Yes	
Roblar Road	18-3	DISI	467103	3693679	Yes	
Roblar Road	18-3	DISI	467087	3693504	Yes	
Roblar Road	18-3	DISI	467132	3693350	Yes	
Roblar Road	18-3	DISI	467056	3693293	Yes	
Roblar Road	18-3	DISI	467048	3693291	Yes	
Roblar Road	18-3	DISI	467104	3693681	Yes	
Roblar Road	18-3	DISI	467007	3693246	Yes	
Roblar Road	18-3	DISI	466983	3693197	Yes	
Roblar Road	18-3	DISI	467103	3693682	Yes	
Roblar Road	18-3	DISI	467093	3693667	Yes	
Roblar Road	18-3	DISI	467098	3693376	Yes	
Roblar Road	18-3	DISI	467094	3693666	Yes	
Roblar Road	18-3	DISI	467113	3693345	Yes	
Roblar Road	18-3	DISI	467273	3693862		Yes
Roblar Road	18-3	DISI	467064	3693289		Yes
Roblar Road	18-3	DISI	467005	3693237		Yes
Roblar Road	18-3	DISI	467067	3693294		Yes
Roblar Road	18-3	DISI	467050	3693291		Yes
Roblar Road	18-3	DISI	467312	3693970		Yes
Roblar Road	18-3	DISI	467050	3693290		Yes
Roblar Road	18-3	DISI	466984	3693199		Yes

Road Segm	ent	Species	Easting	Northing	New	Recapture
Roblar Road	18-3	DISI	467098	3693687		Yes
Roblar Road	18-3	DISI	467088	3693501		Yes
Roblar Road	18-3	DISI	467097	3693377		Yes
Roblar Road	18-3	DISI	467126	3693352		Yes
Roblar Road	18-3	DISI	466986	3693197		Yes
Roblar Road	18-4	DIST	467322	3694206	Yes	
Roblar Road	18-4	DIST	467294	3694180	Yes	
Roblar Road	18-4	DIST	467293	3694181	Yes	
Roblar Road	18-4	DIST	467251	3694488	Yes	
Roblar Road	18-4	DIST	467323	3694206		Yes
Roblar Road	18-4	DIST	467304 3	694140		Yes
Roblar Road	18-4	DIST	467299 3	694166		Yes
Roblar Road	18-4	DIST	467318	3694210		Yes
Roblar Road	18-4	DIST	467298	3694163		Yes
Roblar Road	18-4	DIST	467301	3694138		Yes
Roblar Road	18-4	DIST	467330	3694190		Yes
Roblar Road	18-4	DIST	467298	3694164		Yes
Roblar Road	18-4	DIST	467313	3694214		Yes
Roblar Road	18-4	DIST	467303	3694141		Yes
Roblar Road	18-4	DIST	467299	3694165		Yes
Roblar Road	18-4	DISI	467223	3694709	Yes	
Roblar Road	18-4	DISI	467237	3694671	Yes	
Roblar Road	18-4	DISI	467253	3694727	Yes	
Roblar Road	18-4	DISI	467236	3694689	Yes	
Roblar Road	18-4	DISI	467238 3	694671		Yes
Roblar Road	18-4	DISI	467237 3	694672		Yes
Range 210	22-1	DISI	453961	3695714	Yes	
Range 210	22-1 D	ISI	453970	3695730	Yes	
Range 210	22-1 D	ISI	454654	3695410	Yes	
Range 210	22-1	DISI	453968	3695731	Yes	
Range 210	22-1	DISI	453964	3695702		Yes
Range 210	22-1	DISI	454657	3695408		Yes
Range 210	22-1 D	ISI	453948	3695716		Yes
Range 210	22-1 D	ISI	453962	3695714		Yes
Range 210	22-1 D	ISI	454649	3695412		Yes
Range 210	22-1 D	ISI	453939	3695730		Yes
Range 210	22-2	DISI	455262	3695387	Yes	

Appendix 13. Vertebrate animals observed within the survey area (based on direct observation and/or sign).

Reptiles	
Western Fence Lizard	*Sceloporus occidentalis*
Southern Pacific Rattlesnake	*Crotalus oroganus helleri*
Birds	
California Quail	*Callipepla californic*
Turkey Vulture	*Cathartes aura*
Red-tailed Hawk	*Buteo jamaicensis*
Mourning Dove	*Zenaida macroura*
Anna's Hummingbird	*Calypte anna*
Allen's Hummingbird	*Selasphorus sasin*
Nuttal's Woodpecker Picoides	nuttallii
Western Wood-pewee	*Contopus sordidulus*
Pacific-slope Flycatcher	*Empidonax difficillis*
Black Phoebe	*Sayornis nigricans*
Common Raven	*Corvus corax*
American Crow	*Corvus brachyrhynchos*
White-throated Swift	*Aeronautes saxatalis*
Cliff Swallow	*Petrochelidon pyrrhonota*
Northern Rough-wing Swallow	*Stelgidopteryx serripennis*
Bushtit	*Psaltriparus minimus*
Wrentit	*Chamaea fasciata*
Bewick's Wren	*Thryomanes bewickii*
Northern Mockingbird	*Mimus polyglottos*
California Thrasher	*Toxostoma redivivum*
Common Yellowthroat	*Geothlypis trichas*
Yellow-breasted Chat	*Icteria virens*
Warbling Vireo	*Vireo gilvus*
Least Bell's Vireo	*Vireo bellii pusillus*
California Towhee	*Pipilo crissalis*
Spotted Towhee	*Pipilo maculatus*
Song Sparrow	*Melospiza melodia*
White-crowned Sparrow	*Zonotrichia albicollis*
Brown-headed Cowbird	*Molothrus ater*
Great-tailed Grackle	*Quiscalus mexicanus*
American Goldfinch	*Carduelis tristis*
Lesser Goldfinch	*Carduelis psaltria*
House Finch	*Carpodacus mexicanus*
European Starling	*Sturnus vulgaris*
Mammals	
Botta's Picket Gopher	*Thomomys bottae*
California pocket mouse	*Chaetodipus californicus*
Deer Mouse	*Peromyscus maniculatus*
Cactus Mouse	*Peromyscus eremicus*
Desert wood rat	*Neotoma lepida*
Big-eared wood rat	*Neotoma macrotis*
Desert Cottontail	*Sylvilagus audoboni*
Stiped Skunk	*Mephitis mephitis*
Coyote	*Canis latrans*
Raccoon	*Procyon lotor*
California Mountain Lion	*Felis concolor*
Bison	*Bison bison*
Mule Deer	*Odocoileos hemionus*

CERTIFICATION

I hereby certify that the statements furnished above present the data and information required for this biological survey, and that the facts, statements, and information presented are true and correct to the best of my knowledge. Fieldwork conducted for this assessment was performed by Arthur E. Davenport, Davenport Biological Services

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Date: Dec 16, 2008 Signed: Arthur E. Davenport

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APPENDIX H
STEPHENS' KANGAROO RAT & PACIFIC POCKET MOUSE SURVEY REPORT

Stephens' Kangaroo Rat & Pacific Pocket Mouse Survey
Range Access Roads Repair Project
Marine Corps Base Camp Pendleton, California

Prepared for:

TEC Inc.
514 Via de la Valle
Solana Beach, CA 92075

By

Arthur Davenport
Davenport Biological Services
P.O. Box 1692
Barstow, Ca 92312

December 19, 2008

INTRODUCTION

Davenport Biological Services was hired by TEC Inc., to complete a presence-absence survey for the Stephens' kangaroo rat (*Dipodomys stephensi*) and Pacific pocket mouse (*Perognathus longimembris pacificus*) at several repair sites identified in the proposed Range Access Roads Repair Project at Marine Corps Base Camp Pendleton (MCBCP) (Figure 1). The proposed action includes repairing portions of 24 training range access roads located on MCBCP (Figure 2).

Based on the initial reviews conducted by MCBCP and NAVFAC Southwest, portions of nine roads were identified to be surveyed during this study. Roads surveyed for the Stephens' kangaroo rat included the Jardine Canyon Access Road (Road No. 3), Area 25 Combat Town Access Road (Road No. 5), Range 407 (Road No. 9), Aliso Canyon Access Road (Road No. 12), Range 216 Series Access Road (Road No. 13), Juliett Training Area Access Road (Road No. 14), Roblar Road (Road No. 18), and the Range 210 Series Access Road (Road No. 22). The Pacific pocket mouse was surveyed for along the Red Beach Access Road (Road No. 8), due to the presence of suitable habitat. The Pacific pocket mouse was also surveyed for along portions of the west end of Aliso Canyon Road (Road No. 12), due to its proximity to known occupied habitat (i.e., Edson Range) (Steve Montgomery, pers. comm.). More specific project maps of each road surveyed during this study are provided (Appendix 1).

In 2007, and prior to conducting the presence-absence surveys, a reconnaissance survey was completed at each of the nine access roads (Davenport 2008). During the reconnaissance survey, the general suitability of the habitat for the Stephens' kangaroo rat and Pacific pocket mouse was assessed. In addition, the location of kangaroo rat sign and potential burrows of the Pacific pocket mouse were also documented. Trapping surveys were initiated on 19 May 2008, and concluded on 20 October 2008. Surveys included visual inspections for the presence of suitable habitat and small mammal sign (e.g., tracks, scat, and/or burrows) of the target species. Regarding the Stephens' kangaroo rat, a live trapping program was initiated when kangaroo rat sign was found within suitable habitat within the project area. Concerning the Pacific pocket mouse, live traps were set when suitable habitat was present within the project area.

SPECIES INFORMATION

Stephens' Kangaroo Rat

The Stephens' kangaroo rat was listed as an endangered species on 30 September 1988 (Federal Register, 53:38469). The historic distribution of the Stephens' kangaroo rat included San Diego County, Riverside County, and San Bernardino County, California. The Stephens' kangaroo rat appears to have been extirpated from San Bernardino County due to the loss of habit associated with urban development.

The Stephens' kangaroo rat occurs within grassland, coastal sage scrub, and chaparral habitats where vegetative cover is low and bare ground is abundant (Thomas 1975, O'Farrell 1987, O'Farrell 1989, O'Farrell 1997, USFWS 1993). A large population of Stephens' kangaroo rats was formerly present adjacent to MCBCP at Naval Weapons Station Seal Beach, Detachment Fallbrook (Detachment Fallbrook) (USFWS 1993), but this population has experienced a significant decline in recent years (SJM Biological Consultants 2005, Montgomery et al. 2008). The decline appears to be related to significant increases in vegetative annual cover due to exotic grasses (A. Davenport, pers. obs., 2008). On MCBCP, the distribution of Stephens' kangaroo rats has also declined and now appears to occur in disjunct patches of suitable habitat (A. Davenport, pers. obs.). Similar to Detachment Fallbrook, the decline appears to be related to deteriorating habitat conditions as exotic grasses dominate once occupied sites (e.g., Juliett Training Area), as

well as intervening areas between occupied sites. The extirpation of once occupied sites appears to be related to the small size, isolation of the sites from source populations, and demographic stochasticity. The threats to small isolated populations are well known and of interest to conservation biologists (Gilpin and Soulé 1986).

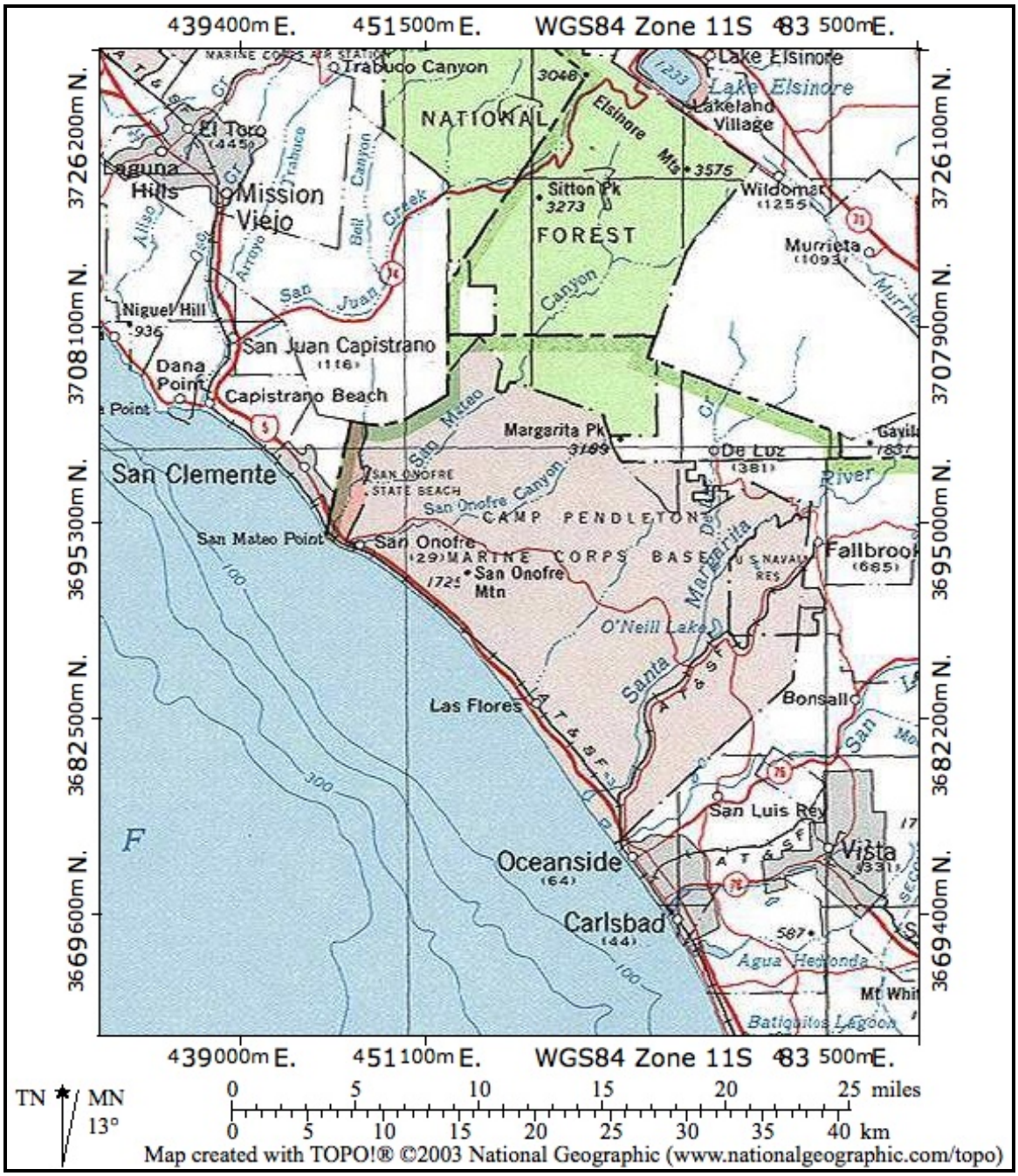

Figure 1. Geographic Location of Marine Corps Base Camp Pendleton.

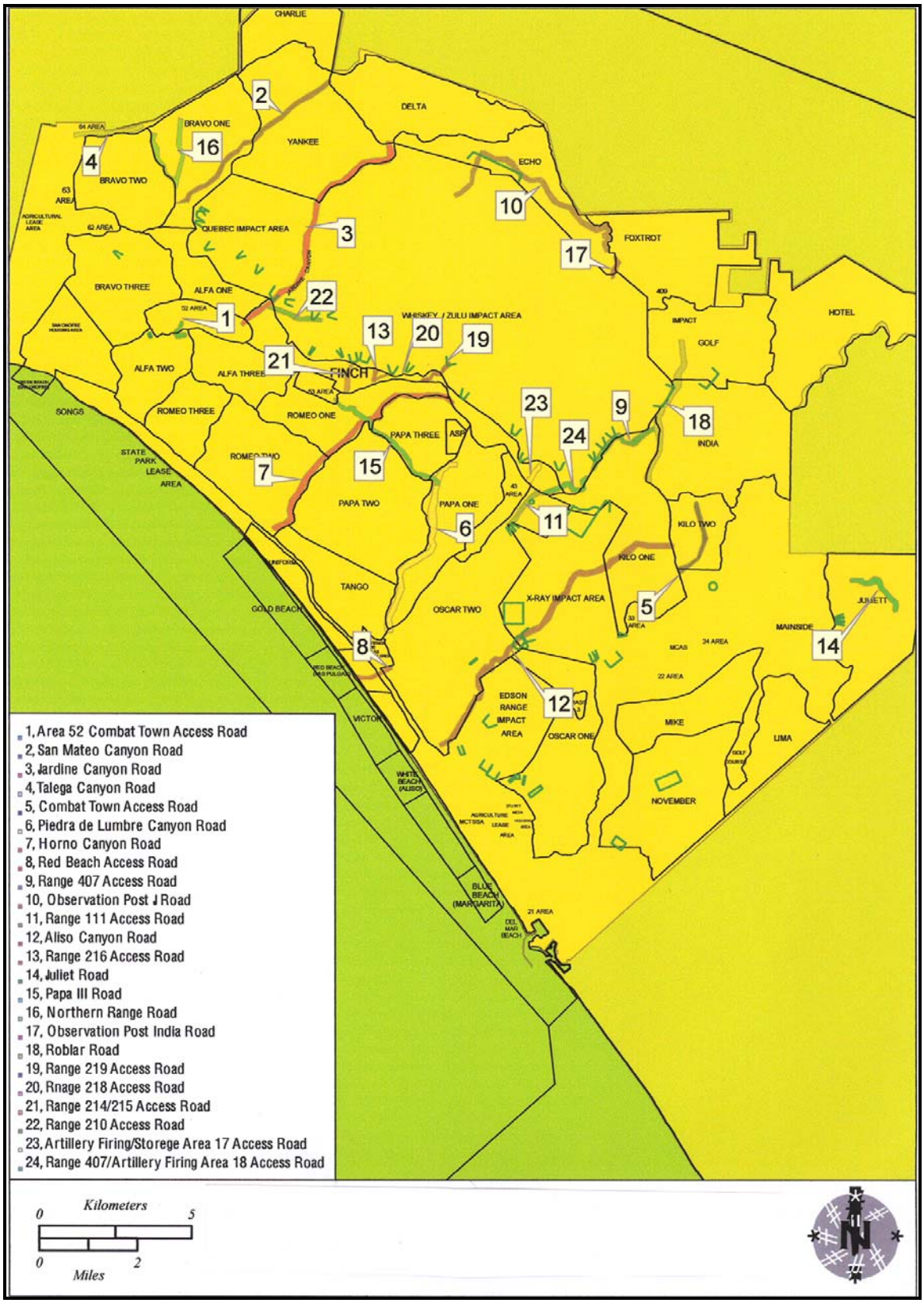

Figure 2. Roads Included in the Roads Project.

The largest remaining groups of Stephens' kangaroo rats on MCBCP appear to occur within the vicinity of the 25 Area Combat Town (Kilo 2 Training Area), the access road to Range 407 (adjacent to the Zulu Impact Area), and within the 409 Impact Area. Habitat conditions within portions of these areas appear to be maintained through frequent training exercises that keep the habitat open and prevent the establishment of large stands of exotic grasses (*Bromus* sp., *Avena* sp.), and exotic perennials such as sweet fennel (*Foeniculum vulgare*) (A. Davenport, pers. obs.).

Under some conditions, the Stephens' kangaroo rat may occur within the same area as the Dulzura kangaroo rat (*Dipodomys simulans*). The Dulzura kangaroo rat occurs throughout most of San Diego County, and occurs on MCBCP. Although the Dulzura kangaroo rat generally occurs within and adjacent to shrub dominated plant communities (e.g., coastal sage scrub), it may also occur in open habitats (suitable for Stephens' kangaroo rat) located adjacent these areas (A. Davenport, pers. obs.). As a result, live trapping is necessary to determine the identity of the kangaroo rat or rats occupying a particular area. The Stephens' kangaroo rat is active during the entire year.

Pacific Pocket Mouse

On 29 September 1994, the Pacific pocket mouse was listed as an endangered species (Federal Register 59:49752). Critical habitat has not been proposed or designated for this species. A recovery plan has been completed for this species (U.S. Fish and Wildlife Service 1998).

The Pacific pocket mouse is one of 19 subspecies of *Perognathus longimembris* (Hall, 1982). The Pacific pocket mouse is one of two *P. longimembris* that occur on the coastal plain of southern California (i.e., south of the Transverse Range and west of the Peninsular Ranges). The marginal records for the distribution of the Pacific pocket mouse are: Hyperion (El Segundo), Los Angeles Co., California and Palisades del Rey, Baja California, Mexico (Hall, 1982).

The largest known remaining population of Pacific pocket mouse occurs on MCBCP. This population is located within the Oscar 1 and Edson Range Impact Area (U.S. Fish and Wildlife Service, unpublished data; Ogden 1997; Steve Montgomery, personal communication). Two other populations of Pacific pocket mouse also occur on MCBCP in the vicinity of San Mateo Creek (LSA 1996; MBA 1997; Ogden 1997).

The Pacific pocket mouse is associated with various, coastal, plant communities. This subspecies has been observed/collected in coastal dune, coastal bluff scrub, as well as coastal sage scrub plant communities. Common attributes of the collection sites have included the presence of sandy soils and an open vegetative community. The structure of its habitat is similar to sites where a closely related subspecies, the Los Angeles pocket mouse (*Perognathus longimembris brevinasus*), has been documented. Like other little pocket mice, the Pacific pocket mouse is thought to predominantly collect and consumes seeds (e.g., grass and forbs), but will eat green vegetation as well as insects.

The Pacific pocket mouse is known to be active during the spring, summer, and fall. Based on 30 specimens held at the Museum of Vertebrate Zoology, Berkeley, California, one specimen was collected in April, seven in July, nine in August, four in September, and three in October. However, under adverse conditions, this species may become dormant until conditions improve (Meserve 1972; Kenagy 1973).

METHODS

Stephens' Kangaroo Rat

All habitat thought to be suitable for the Stephens' kangaroo rat, within each proposed project area, was visually inspected in an effort to locate burrows and/or other sign attributable to this species. Areas thought to have potential for the Stephens' kangaroo rat included all areas with low vegetative cover and the presence of bare ground. Where kangaroo rat sign was located within or immediately adjacent to a study site (i.e., within 100 meters along roads; within 15 meters adjacent to the road), live-traps were placed at all active kangaroo rat burrows. The trapping survey continued for five consecutive nights within each study area found to have kangaroo rat sign. Traps were checked near midnight and then again in the morning. All traps were closed during the day and reopened and baited each evening. Traps were baited with rolled oats. All traps used were 12 inch, Sherman®, folding live-traps. In order to determine the number of each species of kangaroo rat trapped, each kangaroo rat was marked with a red Sharpie®. With marked animals, their status as either an initial capture or recapture was recorded. The number of trap-nights were determined based on the number of traps run each night times the number of nights a site was trapped. Weather conditions were recorded during each night of trapping (Appendix 2).

Pacific Pocket Mouse

For the Red Beach Access Road, all habitat thought to be suitable for Pacific pocket mouse, within and immediately adjacent to the proposed project areas (within 50 meters along the road; 25 meters adjacent to the road), was visually inspected in an effort to locate burrows and/or other sign attributable to this species. Areas thought to have potential for the Pacific pocket mouse included the sandy edge of the riparian plant community associated with Las Flores Creek and the coastal sage scrub plant community. Where small mammal sign was located, or where the potential for their presence was thought to exist, transects were established and traps were placed at approximately five meter intervals. For the Aliso Canyon Access Road, although habitat was marginally suitable for this species, traps were set within specific project sites due to the proximity of Edson Range; an area known to be occupied by the Pacific pocket mouse. The trapping survey continued for five consecutive nights at each site thought to have potential for this species. Traps were checked near midnight and then again in the morning. All traps were closed during the day and reopened and baited each evening. Traps were baited with rolled oats. All traps used were 12 inch, Sherman®, folding live-traps. Weather conditions were recorded during each night of trapping (Appendix 2).

Mapping

All capture location data were collected using a Garmin Map 60 CSx global positioning system. The Garmin 60 Map CSx typically has a spatial accuracy of less than or equal to +/-5 meters. The spatial accuracy of this GPS unit is appropriate because individual kangaroo rats use multiple burrow openings, and the use of a particular burrow opening is not static. Thus, burrow openings that were active during this study may not be necessarily active in the future. All kangaroo rat location data were mapped using ArcGis 9.2.

The surveys were completed by under Federal Recovery Permit TE802450-5.

RESULTS

For the purposes of this report, and to remain consistent with other data being collected for this project, each road had multiple segments (identified by a frame), within which several study areas were located. The results are organized based on the road name, road number, segment, and specific location (i.e., GPS location) that Stephens' kangaroo rats were trapped. Capture locations of the Dulzura kangaroo rat are also provided. Species captured are identified by the following acronyms in the Results tables:

- Stephens' kangaroo rat (*Dipodomys stephensi*) = DIST
- Dulzura kangaroo rat (*Dipodomys simulans*) = DISI
- California pocket mouse (*Chaetodipus californicus*) = CHCA
- Deer Mouse (*Peromyscus maniculatus*) = PEMA
- Cactus Mouse (Peromyscus eremicus) = PEER
- Desert wood rat (*Neotoma lepida*) = NELE
- Big-eared wood rat (*Neotoma macrotis*) = NEMA
- Western harvest mouse (*Reithrodontomys megalotis*) = REME

Stephens' Kangaroo Rat

Jardine Canyon Access (Road No. 3)

Habitat

Suitable habitat for the Stephens' kangaroo rat was only present in segments 3-3, 3-4, and 3-9 (Figure 3). These sections contained large areas of open ground typical of areas occupied by this species. The habitat conditions within all remaining segments were unsuitable for the Stephens' kangaroo rat due to excessive vegetative cover. That is, the shrub cover was too dense and therefore unsuitable for the Stephens' kangaroo rat.

Trapping

No Stephens' kangaroo rats were captured in segments 3-3, 3-4, or 3-9. Only Dulzura kangaroo rats, California pocket mice, and deer mice were captured (Table 1). The number of trap nights used to survey this area was 320. The locations of all kangaroo rats trapped during this survey are provided (Figure 3 and Appendix 12). Representative photos of habitat conditions within areas trapped along the Jardine Canyon are provided in Appendix 3.

Table 1. Number of Each Species Captured During Survey of Road 3 (Jardine Canyon)

Segment	DIST	DISI	CHCA	PEMA	PEER	NEMA	NELE
3-3	0	2	0	3	0	0	0
3-4	0	19	0	4	0	0	0
3-9	0	2	1	1	0	0	0
Total	**0**	**23**	**8**	**7**	**0**	**0**	**0**

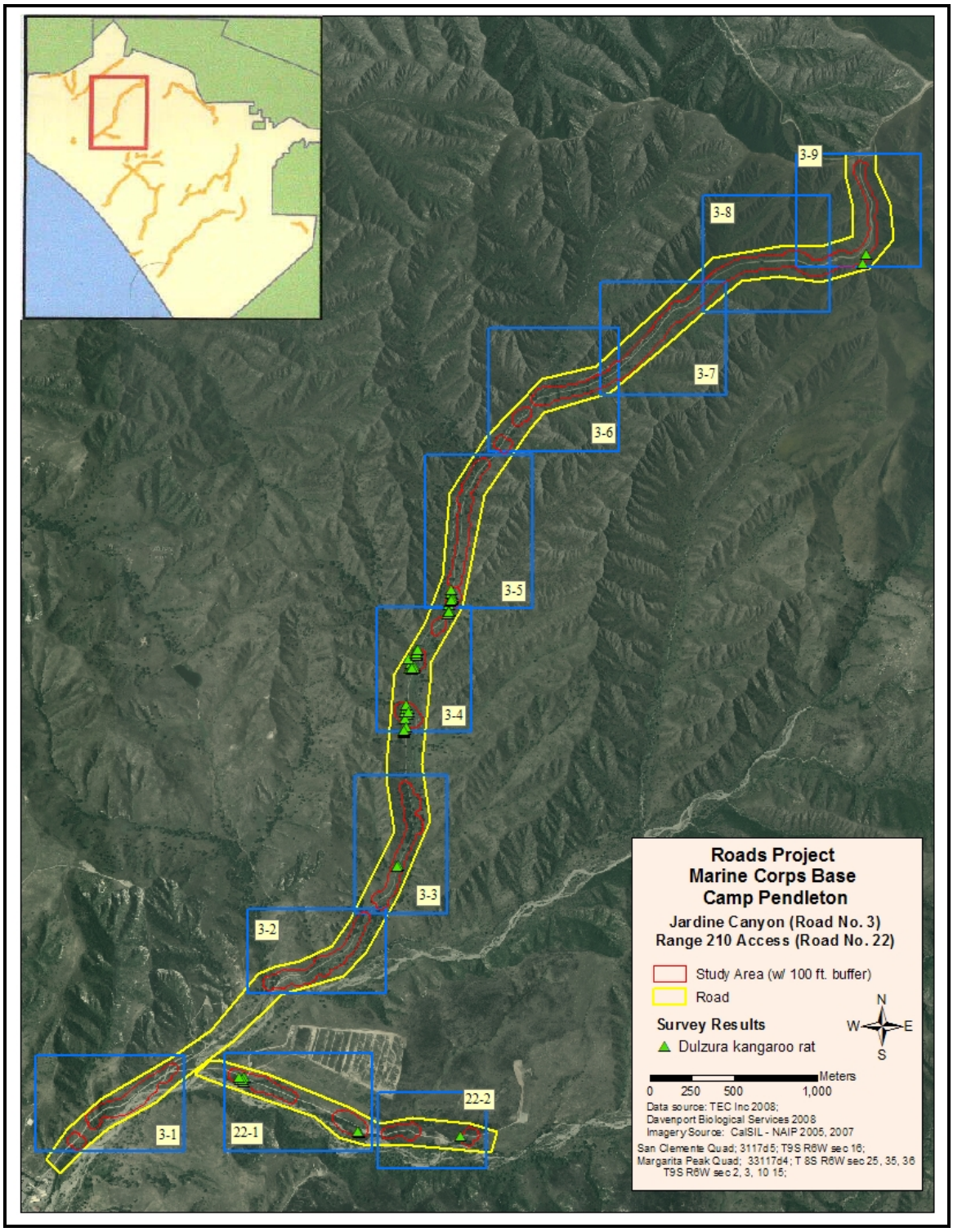

Figure 3. Jardine Canyon Road (Road No. 3)

Area 25 Combat Town Access (Road No. 5)

Habitat
Suitable habitat for the Stephens' kangaroo rat was present in segments 5-1, 5-2, and 5-3 (Figure 4). The suitable habitat was located along the edges of dirt road and within and along the edge of the parking area for 25 Area Combat Town. Coastal sage scrub and thick annual grasslands made most of the habitat adjacent to the road unsuitable for this species.

Trapping
Stephens' kangaroo rats were captured within segments 5-2. No kangaroo rat sign was detected in segment 5-1. Despite the presence of kangaroo rat burrows, no kangaroo rats were captured in segment 5-3. Species caught during this survey included Dulzura kangaroo rats, California pocket mice, deer mice, and desert wood rat (Table 2). The number of trap nights used to survey this area was 180. The locations of all kangaroo rats trapped during this survey are provided (Figure 4 and Appendix 12). Representative photos of habitat conditions where areas were trapped along the Area 25 Combat Town Access Road are provided in Appendix 4.

Table 2. Number of Each Species Captured During Survey of Road 5 (Area 25 Combat Town Access)

Segment	DIST	DISI	CHCA	PEMA	PEER	NEMA	NELE
5-2	6	1	2	16	0	0	1
Total	**6**	**1**	**2**	**16**	**0**	**0**	**1**

Range 407 (Road 9)

Habitat
Suitable habitat for the Stephens' kangaroo rat was present in segments 9-1 and 9-2 (Figure 5). The suitable habitat was located along the edges of dirt road, within and along the edge of the parking areas, and extended over 100 meters away from both sides of the road. The habitat located south of the road was dominated by non-native grasses; patches of this area remained suitable for occupation by the Stephens' kangaroo rat. The habitat located north of the road was open and generally suitable for this species.

Trapping
Stephens' kangaroo rats were captured within segments 9-1 and 9-2. Other species caught during this survey included Dulzura kangaroo rats, California pocket mice, and deer mice (Table 3). The number of trap nights used to survey this area was 300. The locations of all kangaroo rats trapped during this survey are provided (Figure 5 and Appendix 12). Representative photos of habitat conditions where traps were placed along the Range 407 Access Road are provided in Appendix 5.

Table 3. Number of Each Species Captured During Survey of Road No. 9 (Range 407 Access)

Segment	DIST	DISI	CHCA	PEMA	PEER	NEMA	NELE
9-1	17	0	0	13	0	0	0
9-2	8	6	2	0	0	0	0
Total	**25**	**6**	**2**	**13**	**0**	**0**	**0**

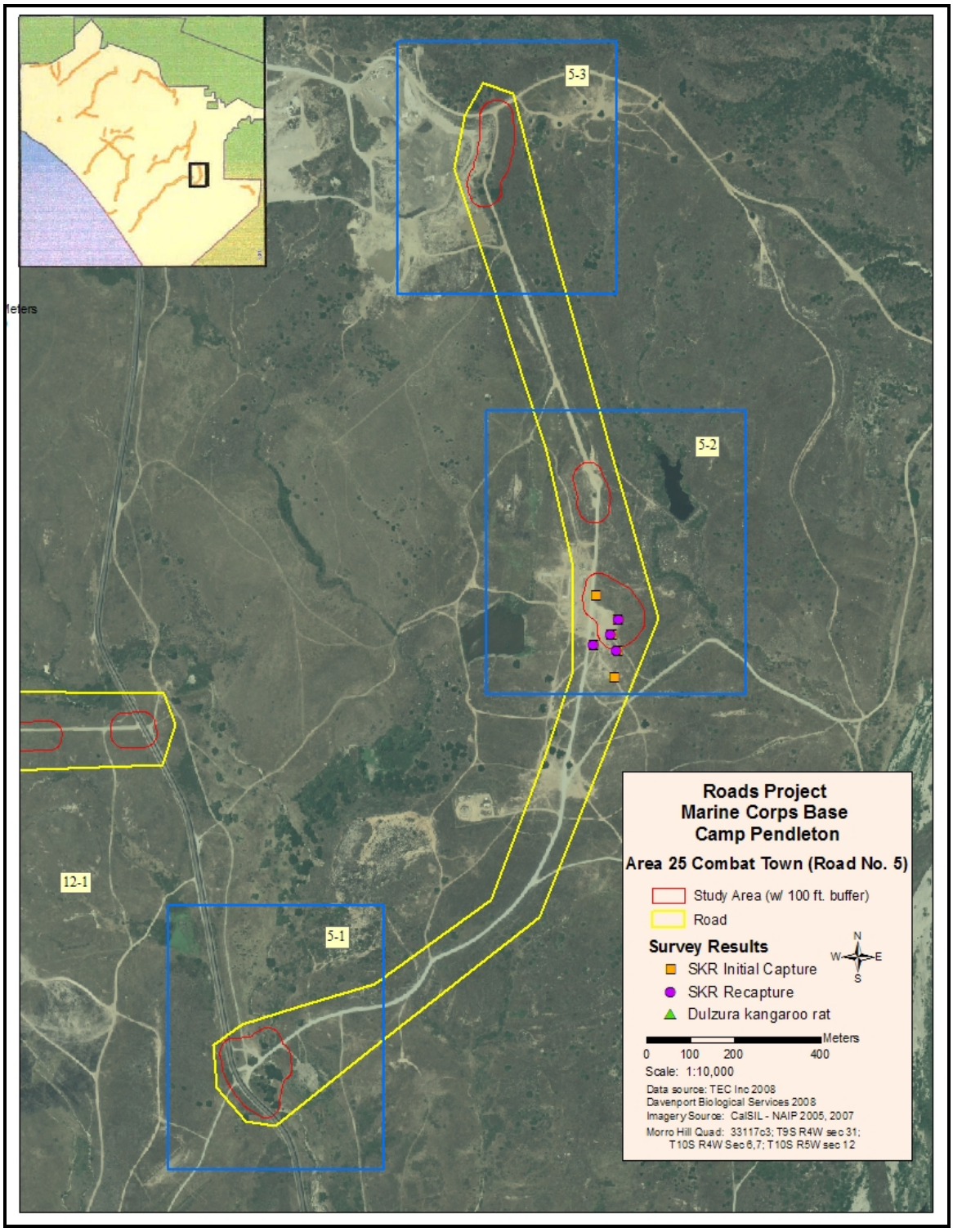

Figure 4. Area 25 Combat Town Access Road (Road No. 5).

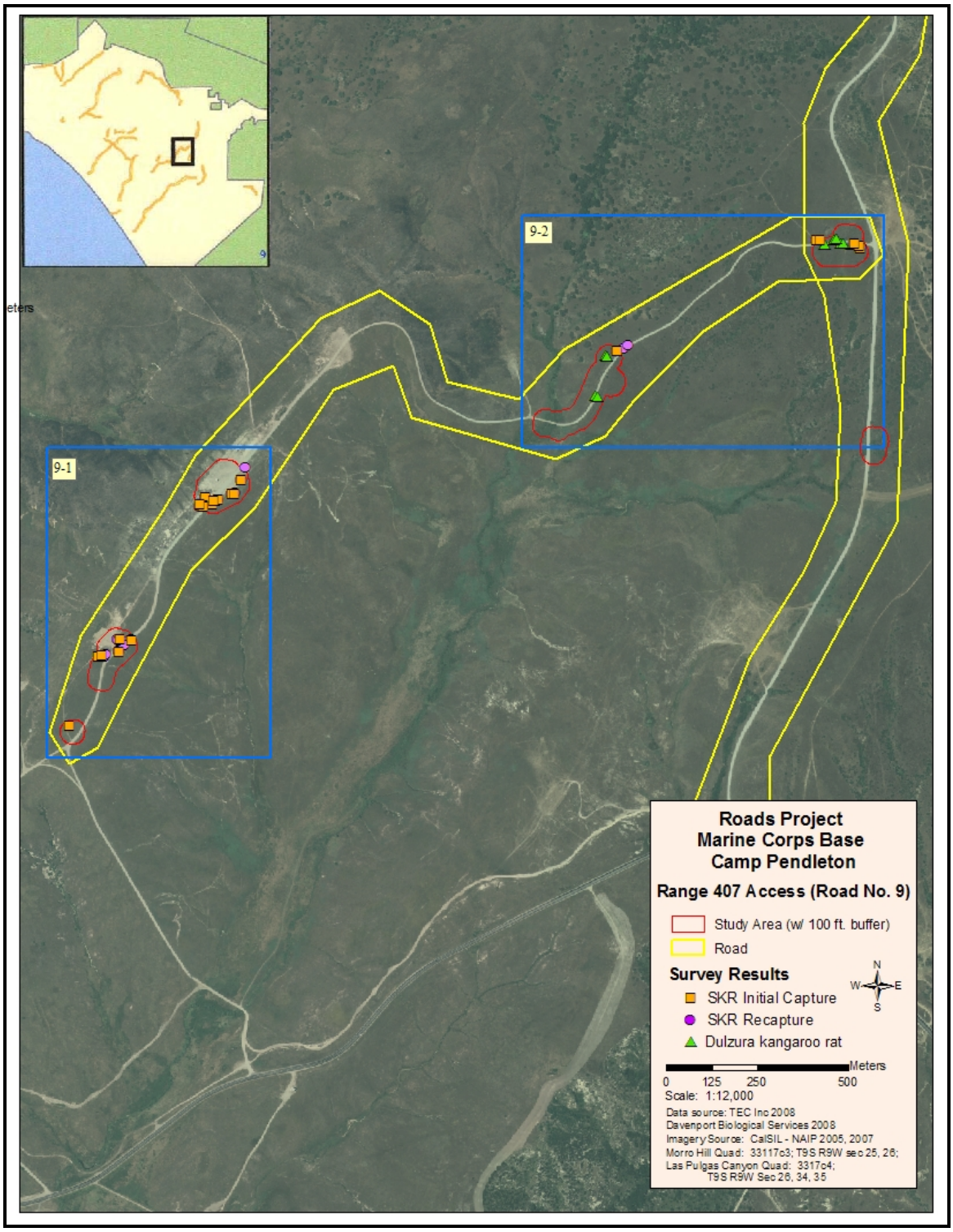

Figure 5. Range 407 Access (Road No. 9).

Aliso Canyon Access Road (Road 12).

Habitat
Suitable habitat for the Stephens' kangaroo rat was present in segments 12-1, 12-2, 12-3, and 12-6 (Figure 6). In segments 12-1 and 12-2, the suitable habitat extended 100 plus meters beyond the edges of the dirt road. In segment 12-3, the suitable habit was confined to the fire-break. In 12-6, the suitable habitat was confined to the edges of the dirt road and extended into the MOUT training facility. The habitat within all remaining sections was unsuitable for the Stephens' kangaroo rat due to the presence of thick stands of introduced annual grasses, mustards, and sweet fennel.

Trapping Results
One Stephens' kangaroo rat was captured within section 12-1, near the east end of Aliso Canyon Road. Additional species caught during this survey included Dulzura kangaroo rats, California pocket mice, and deer mice (Table 4). The number of trap nights used to sample segment 12-1, was 25; 12-2, was 50; 12-3, was 50; and 12-6 was 50. The locations of all kangaroo rats trapped during this survey are provided (Figure 6 and Appendix 12). Representative photos of habitat conditions, as well as locations where traps were placed along the Aliso Canyon Access Road are provided in Appendix 6.

Table 4. Number of Each Species Captured During Survey of Road 12 (Aliso Canyon)

Segment DIST		**DISI**	**CHCA**	**PEMA PEER**		**NEMA**	**NELE**
12-1 1		0	1	0	0	0	0
12-2 0		0	1	4	0	0	0
12-3 0		0	0	0	0	0	0
12-6 0		0	0	0	0	0	0
Total 1		**0**	**2**	**4**	**0**	**0**	**0**

Range 216 Access (Road 13)

Habitat
Suitable habitat for the Stephens' kangaroo rat was present in segment 13-1 (Figure 7). The suitable habitat was located adjacent to the road and extended 100 plus meters away from the road.

Trapping
No Stephens' kangaroo rats were captured within this project area. Despite the presence of active kangaroo rat burrows in segment 13-0 earlier in the year (A. Davenport, pers. obs.), no apparently active kangaroo rat burrows were present within segment 13-0. Only deer mice were captured (Table 5). The number of trap nights used to survey this area was 55. The locations of all kangaroo rats trapped during this survey are provided (Figure 7 and Appendix 12). Representative photos of habitat conditions, and where traps were placed along the Range 216 Series Access Road are provided in Appendix 7.

Table 5. Number of Each Species Captured During Survey of Road 13 (Range 216 Access)

Segment DIST		**DISI**	**CHCA**	**PEMA PEER**		**NEMA**	**NELE**
13-0 0		0	0	6	0	0	0
Total 0		**0**	**0**	**6**	**0**	**0**	**0**

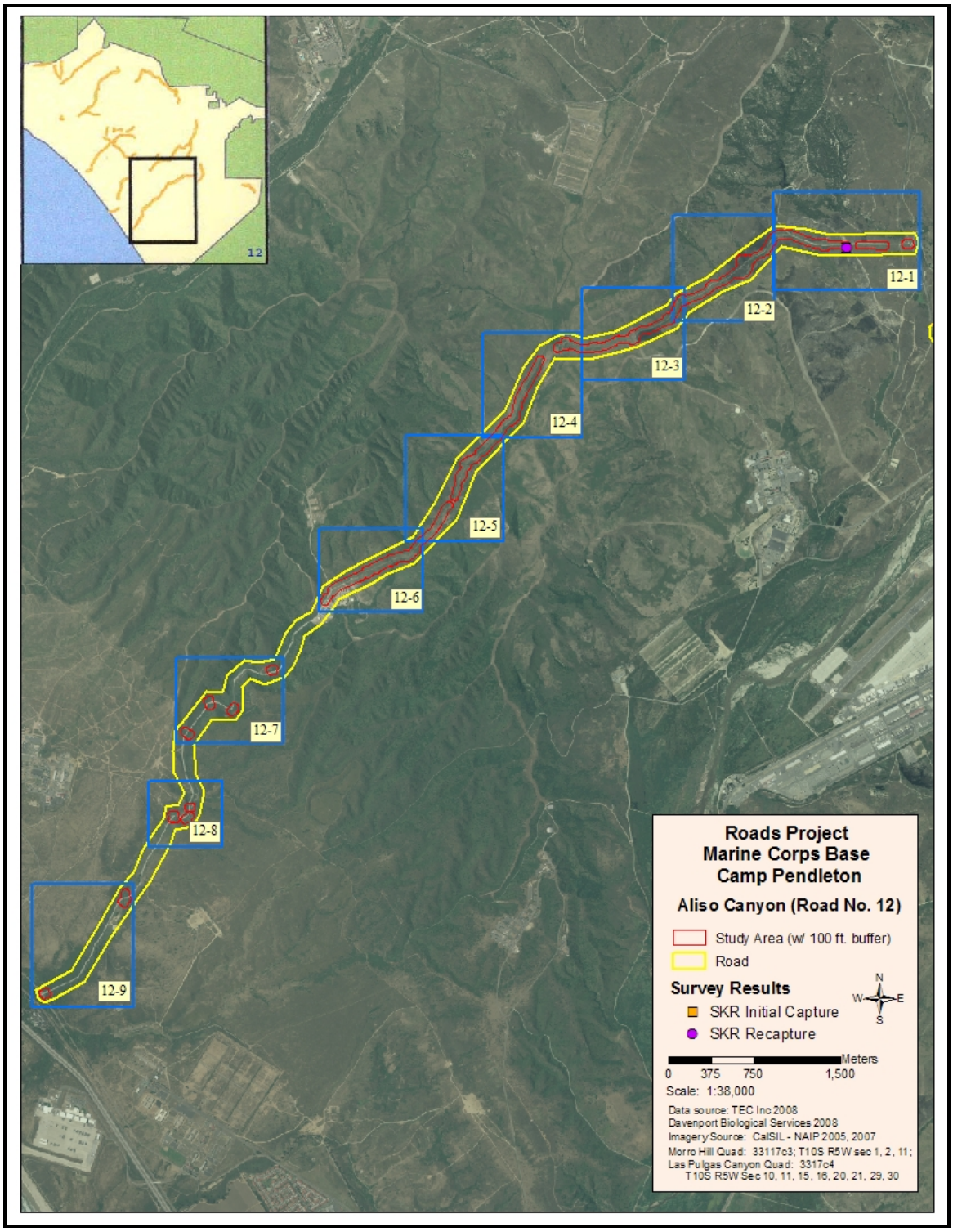

Figure 6. Aliso Canyon Road (Road No. 12)

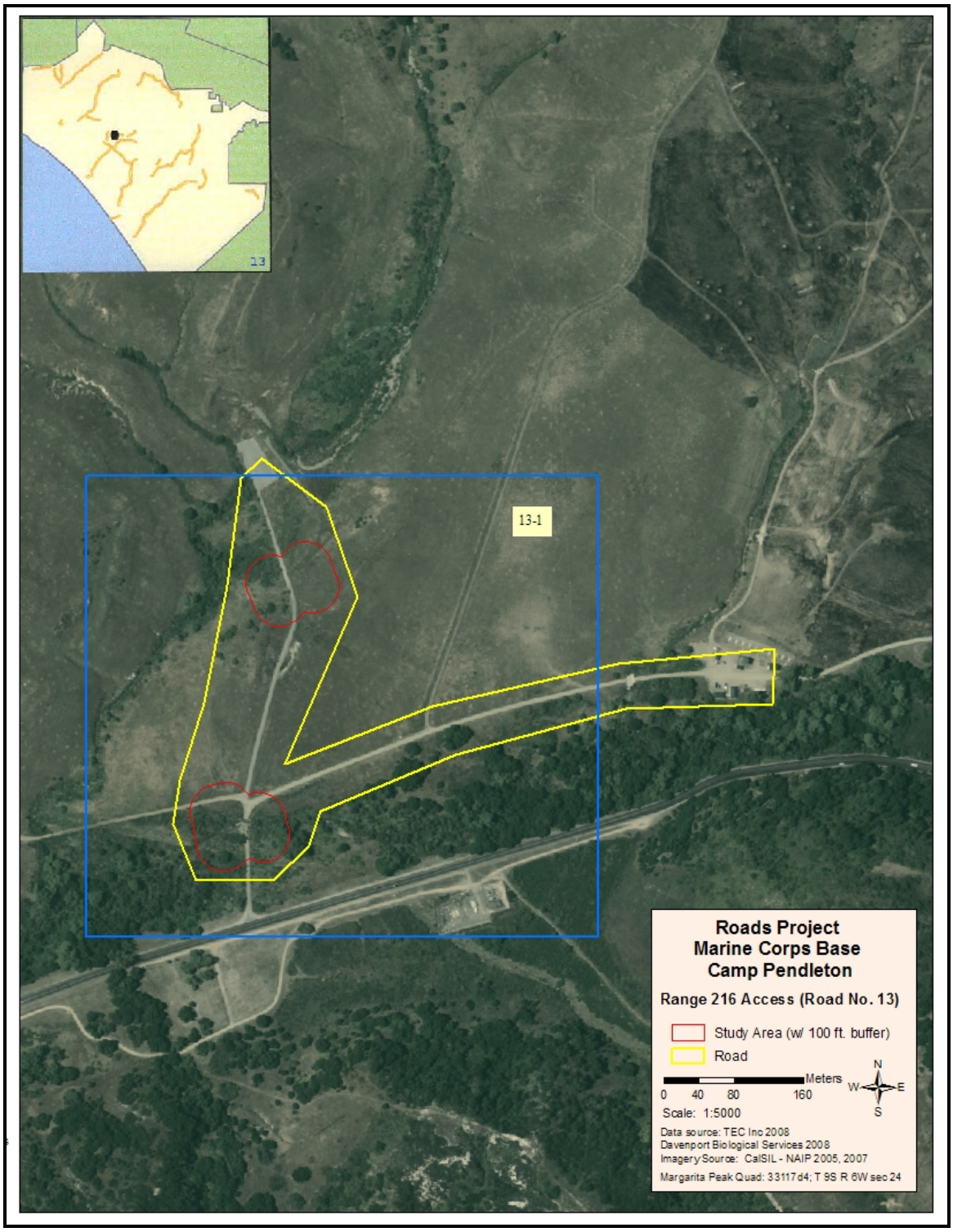

Figure 7. Range 216 Access Road (Road 13).

Juliett Training Area Access (Road 14)

Habitat
Suitable habitat for the Stephens' kangaroo rat was present in segments 14-2 and 14-3 (Figure 8). The suitable habitat was located along the edges of the dirt roads. Coastal sage scrub and thick annual grasslands made most of the adjacent habitat to the road and was unsuitable for this species. The habitat conditions within segment 14-1, was unsuitable for the Stephens' kangaroo rat due to excessive vegetative cover.

Trapping
No Stephens' kangaroo rats were captured within segments 14-2 or 14-3. Only Dulzura kangaroo rats, California pocket mice, and deer mice were captured (Table 6). The number of trap nights used to survey this area was 115. The locations of all kangaroo rats trapped during this survey are provided (Figure 8 and Appendix 12). Representative photos of habitat conditions, as well as locations where traps were placed along the Juliett Training Ares Access Road are provided in Appendix 8.

Table 6. Number of Each Species Captured During Survey of Road 14 (Juliett Training Area Access)

Section DIST	DISI	CHCA	PEMA PEER		NEMA	NELE
14-2	0	10	3 1 0		0	0
14-3	0	7	3 7 0		0	0
Total	**0**	**17**	**6 8 0**		**0**	**0**

Roblar Road (Road 18)

Habitat
Suitable habitat for the Stephens' kangaroo rat was present in segments 18-1, 18-2, 18-3, and 18-4 (Figure 9). In segment 18-1, the suitable habitat was located adjacent to the road. In 18-2, 18-3, and 18-4, the suitable habitat was present adjacent to the road and extended 100 plus meters away from the road.

Trapping
Stephens' kangaroo rats were captured within segments 18-2, 18-3, and 18-4 (Table 7). Zero trap nights were used in segment 18-1 due to the lack of kangaroo rat sign. The number of trap nights used to survey segment 18-2, was 80; 18-3, was 175; and 18-4, was 100. The locations of all kangaroo rats trapped during this survey are provided (Figure 9 and Appendix 12). Representative photos of habitat conditions, and where traps were placed along the Roblar Road are provided in Appendix 9.

Table 7. Number of Each Species Captured During Survey of Road 18 (Roblar Road)

Segment DIST	DISI	CHCA	PEMA PEER		NEMA	NELE
18-1 0	0	0	2	0 0		0
18-2 5	10	0	2	0	1	1
18-3 2	22	1	3	0	0	0
18-4 7	4	0	4	0	0	0
Total 14	**36**	**1**	**11**	**0**	**1**	**1**

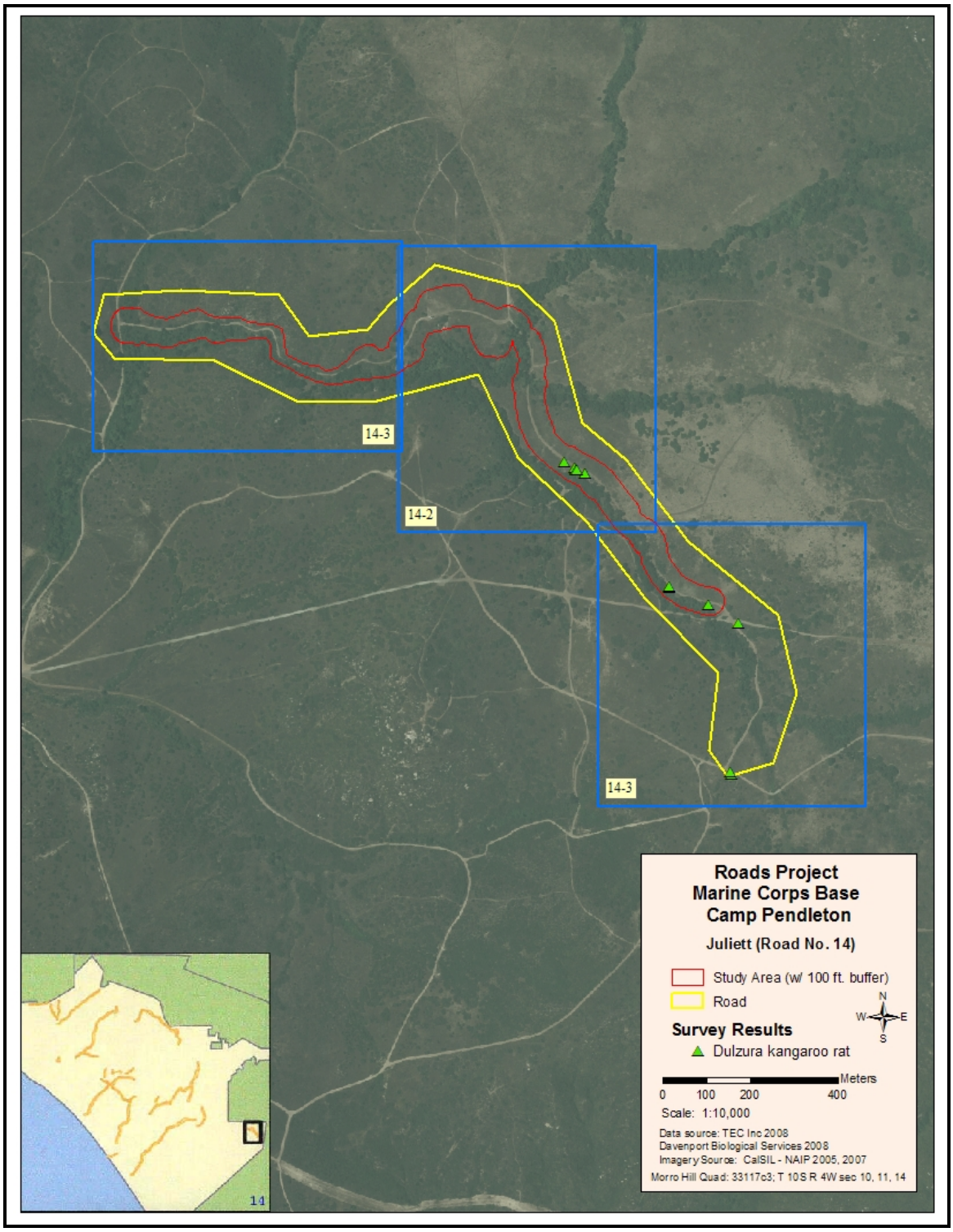

Figure 8. Juliett Training Area Access Road (Road No. 14).

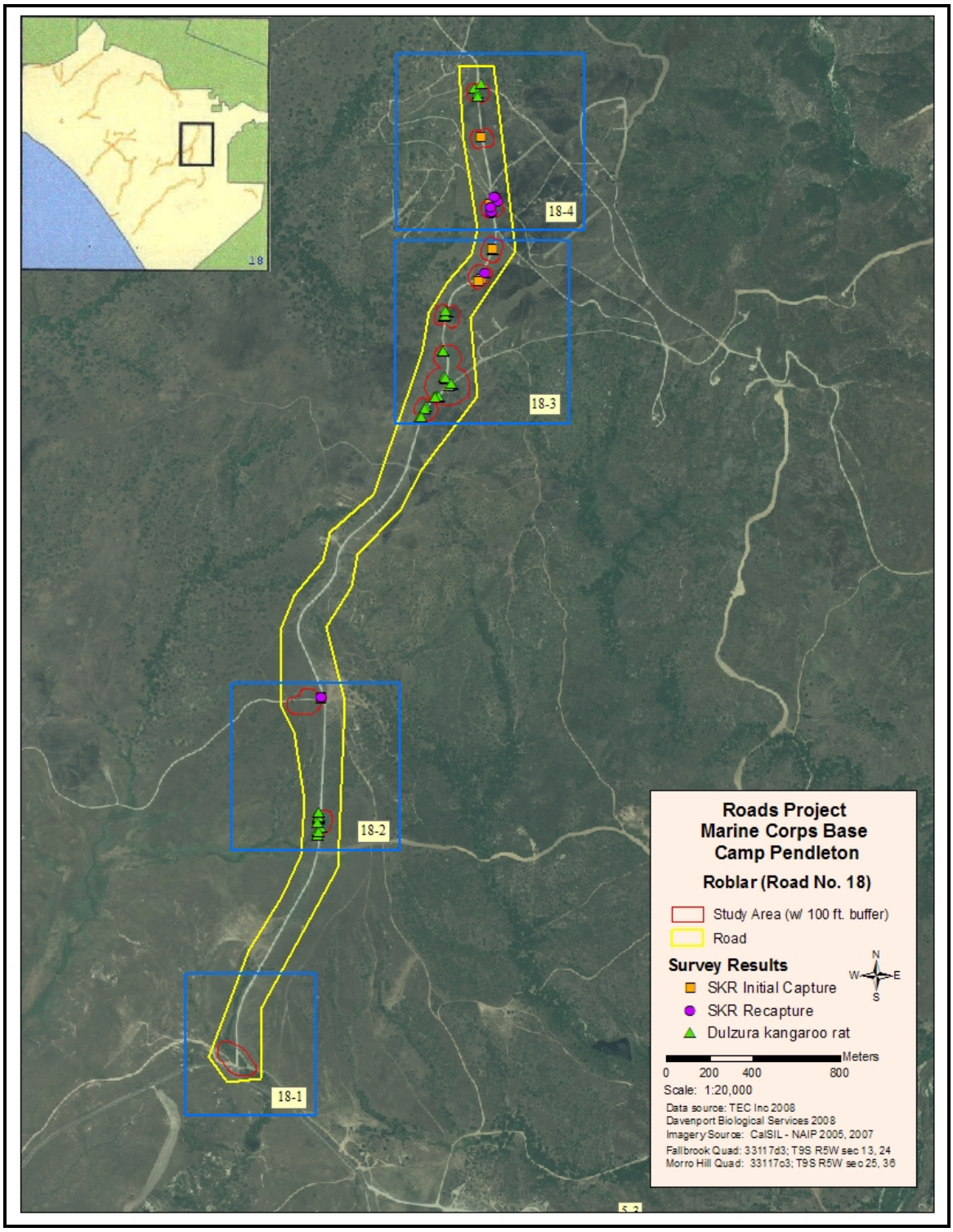

Figure 9. Roblar Road (Road No. 18).

Range 210 Access (Road 22)

Habitat
Suitable habitat for the Stephens' kangaroo rat was present in segments 22-1, and 22-2 (Figure 10). In segment 22-1, and 22-2 the suitable habitat was located adjacent to the road and extended 100 plus meters away from the road.

Trapping
No Stephens' kangaroo rats were captured within segments 22-1, or 22-2. Only Dulzura kangaroo rats, deer mice, and a cactus mouse were captured (Table 8). The number of trap nights used to survey this area was 100. The locations of all kangaroo rats trapped during this survey are provided (Figure 10 and Appendix 12). Photos of habitat conditions are provided in Appendix 10.

Table 8. Number of Each Species Captured During Survey of Road 22 (Range 210 Access)

Segment	DIST	DISI	CHCA	PEMA	PEER	NEMA	NELE
22-1	0	4	0	3	0	0	0
22-2	0	1	0	1	1	0	0
Total	**0**	**5**	**0**	**4**	**1**	**0**	**0**

Pacific Pocket Mouse

Red Beach Access (Road 8)

Habitat
Suitable habitat for the Pacific pocket mouse was present in segment 8-2 (Figure 11). The thick riparian plant community in segment 8-1 appeared unsuitable for this species.

Trapping
No Pacific pocket mice were trapped or otherwise detected within or adjacent to segment 18-2. Other rodent species caught during this survey included deer mice, and western harvest mice (Table 9). The number of trap nights used to survey this area was 375. The survey area is provided (Figure 11). Photos of habitat conditions are provided in Appendix 5.

Table 9. Number of Each Species Captured During Survey of Road 8 (Red Beach)

Segment	PPMO	DISI	CHCA	PEMA	PEER	NELE	REME
8-2	0	0	0	24	0	0	3
Total	**0**	**5**	**0**	**24**	**0**	**0**	**3**

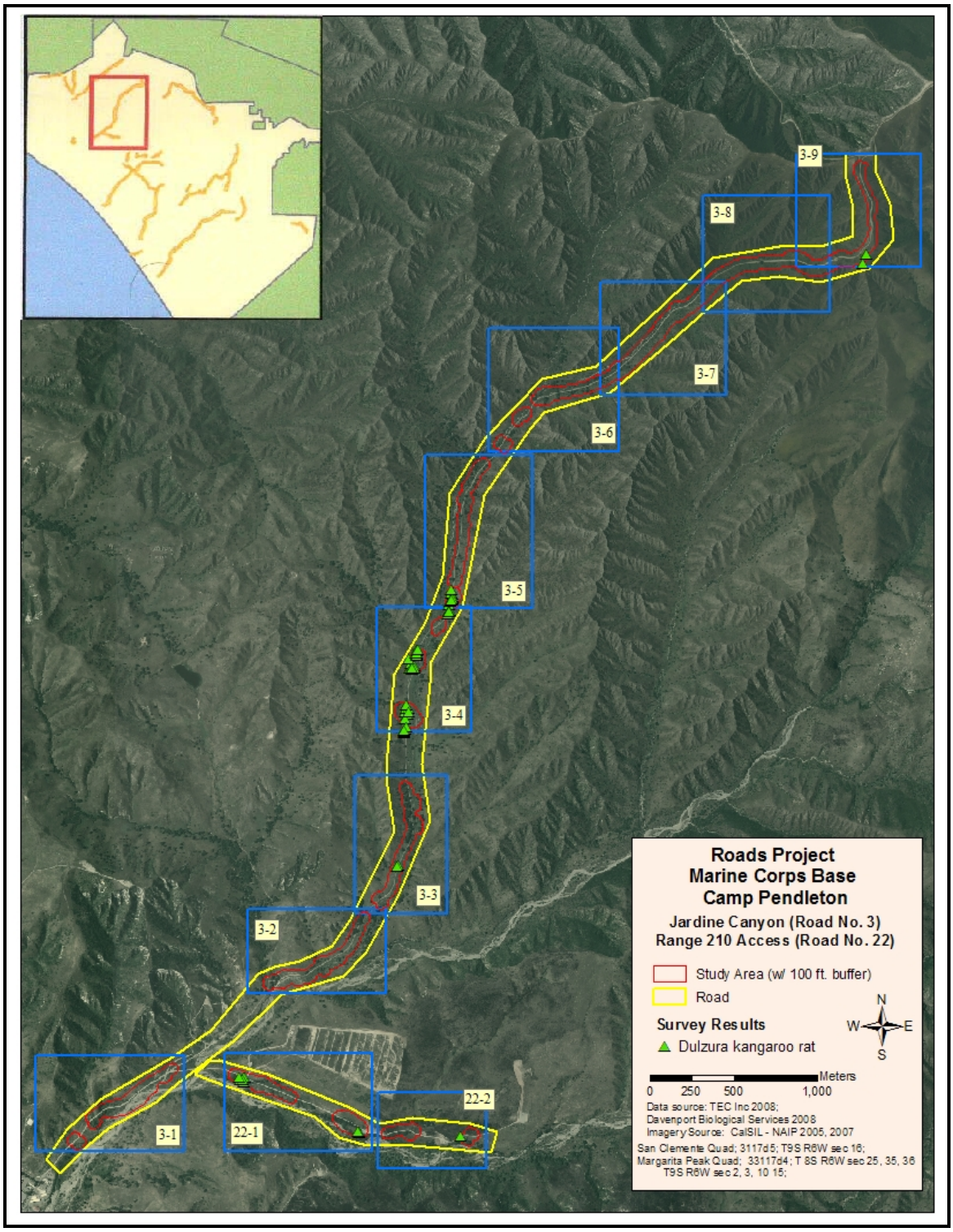

Figure 10. Range 210 Access Road (Road No. 22).

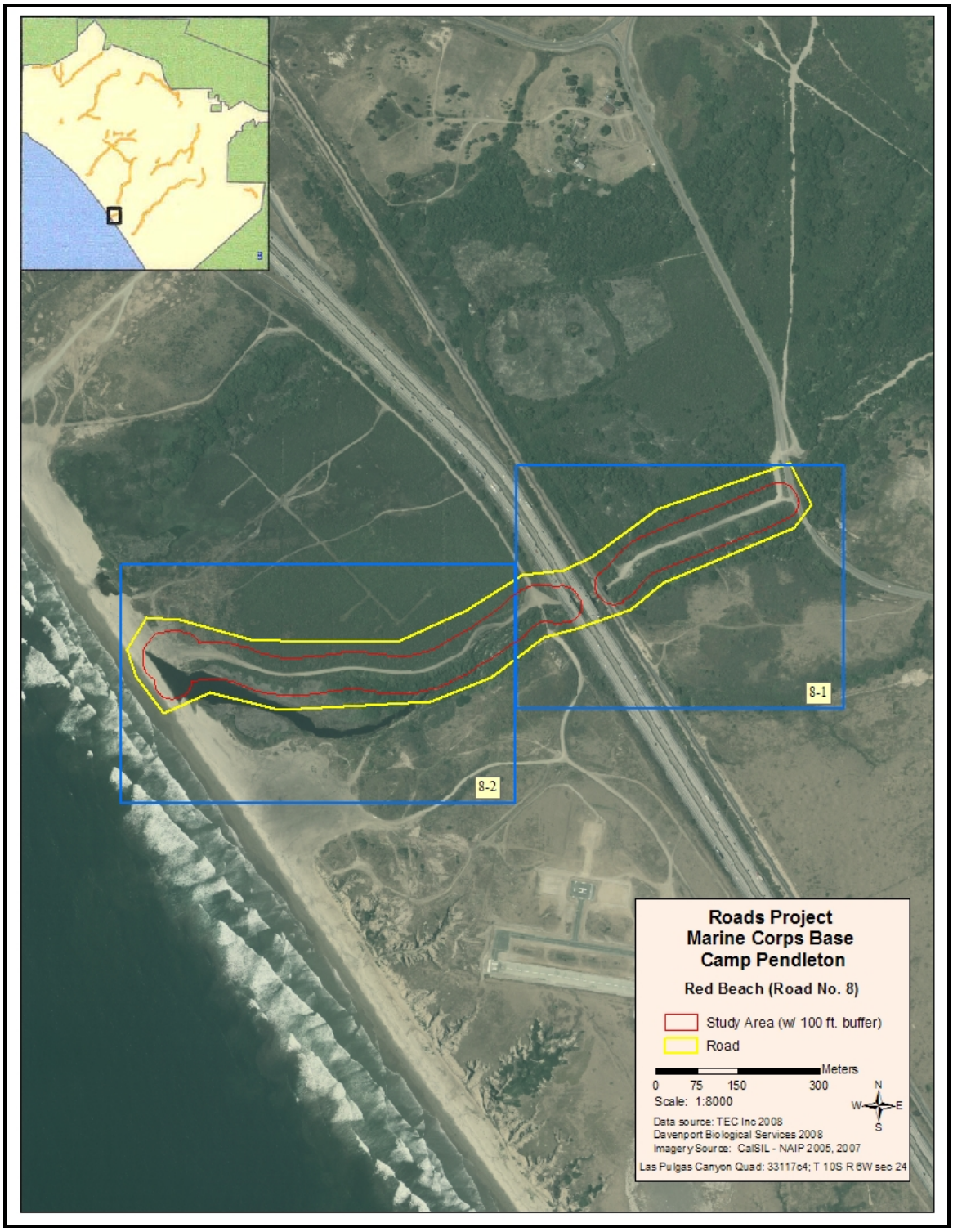

Figure 11. Red Beach (Road No. 8).

Aliso Canyon Access (Road 12)

Habitat
Marginally suitable habitat for the Pacific pocket mouse was present in segments 12-8, and 12-9 (Figure 6). In segments 12-8 and 12-9, the habitat occurred along the edge of the road. Thick coastal sage scrub separated the narrow band of suitable habitat along the road from occupied habitat in Edson Range. Most of the habitat was overgrown with a thick thatch of non-native annual grasses and sweet fennel.

Trapping Results
No Pacific pocket mice were trapped during this survey; other species caught during this survey included California pocket mice and deer mice (Table 10). The number of trap nights used to sample this area was 150.

Table 10. Number of Each Species Captured During Survey of Road 12 (Aliso Canyon)

Segment	PPMO	DISI	CHCA	PEMA	PEER	NELE	REME
12-8	0	0	6	1	0 0 0		
12-9	0	0	1	0	0 0 0		
Total	**0**	**0**	**7**	**1**	**0 0 0**		

DISCUSSION

Stephens' Kangaroo Rat

During this study, Stephens' kangaroo rats were detected in only four general areas: 1) the east end of the Aliso Canyon Access Road; 2) near the middle of the Area 25 Combat Town Access Road; 3) near the north end of Roblar Road; and 4) along the access road to Range 407, between Basilone and Roblar Roads. Regarding Aliso Canyon Access Road, the plant community located adjacent to the most of the road was currently unsuitable for the Stephens' kangaroo rat as it was dominated by dense stands of introduced annual grasses and mustards (*Brassica nigra* and *Hirschfeldia incana*). Large patches of sweet fennel also occurred in this area and were equally unsuitable for this species due to the presence of a high percentage of aerial cover and the lack of bare ground. The Stephens' kangaroo rats were located in habitat patches where aerial vegetative cover was low to non-existent and bare ground was abundant. The Stephens' kangaroo rats located near the Area 25 Combat Town were occupying open areas typical of this species. However, soils in some large areas were very compacted and lacked any vegetative cover due to heavy training uses; Stephens' kangaroo rats were largely absent from the interior of these areas. The reason for their absence was likely due to the lack of resources such as easily attainable food and readily available burrows. Along Roblar Road, the Stephens' kangaroo rats occurred in habitat typical of this species (e.g., had low percentage of aerial shrub cover). Along the access road to Range 407, Stephens' kangaroo rats also occupied open areas typical of this species. However, like the situation near the Area 25 Combat Town, Stephens' kangaroo rats were absent from the interior of areas that had been completely denuded.

The reason for the apparent absence of the Stephens' kangaroo rat at other suitable sites may be due to the small size and condition of the remaining patches of suitable habitat and the presence of intervening areas of unsuitable habitat, separating such patches. The suitable habitat areas within Jardine Canyon are grazed by bison (*Bison bison*), and occupied by Dulzura kangaroo rats. Regarding Jardine Canyon, the next adjacent patch of known occupied habitat (at least historically) is located approximately one kilometer south of the suitable habitat within the canyon (i.e., at the 210 series of ranges). It is important to note that Stephens' kangaroo rats may

no longer persist at the 210 series of ranges (A. Davenport, pers. obs., 2008). Thus, there may not be a local source population that can populate the suitable habitat within Jardine Canyon. Within the Juliett Training Area, the suitable patches of habitat were immediately adjacent to the dirt road and were occupied by Dulzura kangaroo rats. Adjacent plant communities were dominated by non-native grasses, and/or dense coastal sage scrub. The closest population of Stephens' kangaroo rats to the Juliett Training Area Access Road project now appears to be located on the Seal Beach Naval Weapons Station, Detachment Fallbrook. Most of the intervening plant community is now unsuitable for the Stephens' kangaroo rat so movement into the project area at this time, and under these conditions, seems unlikely. Regarding the general suitability of soils for the Stephens' kangaroo rat, the soils located in all survey areas were suitable for the establishment of Stephens' kangaroo rat burrows based on the presence of other rodent burrows (e.g., Botta's pocket gopher and California pocket mice).

Pacific Pocket Mouse

During this study, no Pacific pocket mice were detected. The reason for the apparent absence of the Pacific pocket mouse is unknown. However, their absence may be due to the poor condition of the habitat at the site and that which lies between occupied sites and this location. Much of the area at and adjacent to the project site had been disturbed and continues to be disturbed due to recreational and training related activities. Although there are no specific records of this species occurring within this specific area in the past, the Pacific pocket mouse is known to have occurred along the coast from northern Baja California, Mexico, to Los Angeles, California. In addition, the Pacific pocket mouse is known to have historically occupied habitat located near the mouths of rivers and streams (U.S. Fish and Wildlife Service 1994). For example, between 1931 and 1936, 71 specimens of the Pacific pocket mouse were collected near the mouth of the Margarita River (CNDDB Occurrence No. 6). The presence of dense coastal sage scrub along the bluffs, and large areas of heavy soils (i.e., has high clay content), suggests that the more consistently available connection between occupied patches was likely along the back dune margins of the immediate coast. Therefore, a historic connection between occupied patches of habitat seems most likely to have been along the immediate coast. Thus, at least on occasion, the Pacific pocket mouse likely occurred in this general area prior to the disturbance and apparent isolation of this site. Despite the presence of a currently occupied site located approximately 0.5 miles to the northwest of the study area (Oscar 1 Training Area), colonization or re-colonization of the site seems unlikely due to the presence of barriers such as the Interstate 5 Freeway, and heavy human use of the back dune portion of the beach.

CONCLUSION

Stephens' Kangaroo Rat

The Stephens' kangaroo rat was found to occur along the Range 407 Access Road, the east end of Aliso Canyon Access Road, and near the middle of the Area 25 Combat Town Access Road. Invasive exotic plants have rendered large areas of potentially suitable habitat unsuitable for this species. Control of exotic plants would likely improve the status of this species and promote its recovery.

Pacific Pocket Mouse

No Pacific pocket mice were trapped or otherwise detected during this study. Habitat management that targeted the control of exotic plants and limited habitat and soil disturbance along the back dune zone of the coast and flood plain areas near river and creek mouths could improve the status of this species and promote its recovery.

MITIGATION MEASURES

Following is a list of potential avoidance, minimization, and mitigation measures that may be suitable for this project.

Stephens' Kangaroo Rat
When project activities are in and/or adjacent to habitat occupied by SKR, all nighttime construction is prohibited. This includes transportation to and from the project site when the route passes through or adjacent to habitat occupied by the Stephens' kangaroo rat.

Avoid disturbance of occupied patches of habitat that may result in the destruction of kangaroo rat burrows. All areas to be avoided must be clearly marked on project maps and provided to the contractor. Patches of occupied habitat must also be flagged by a qualified biologist prior to the onset of construction activities. In some cases, suitable habitat and occupied sites may need to be fenced or otherwise protected from any potential impacts.

No construction within occupied SKR habitat will occur during rainy periods when burrows may be more susceptible to collapse and degradation from vehicular and foot traffic.

Have a bio-monitor present during all habitat impacting activities when working within road segments where Stephens' kangaroo rats have been documented and active kangaroo rat burrows are present.

For the Aliso Canyon, Range 407 Access Road, and 25 Area Combat Town populations, the rehabilitation of occupied and unoccupied potential habitat should be pursued. In this regard, a vegetation management plan should be developed in conjunction with a Stephens' kangaroo rat management plan. Examples of vegetation management options include the mowing of exotic grasses (e.g., *Bromus diandrus*) when their seed heads are up and still immature. All cut grasses should be windrowed and removed or otherwise collected during mowing. In addition, the aerial portion of the sweet fennel should be mechanically removed and the base spot treated with an appropriate herbicide.

For the Aliso Canyon Access Road population, determine the distribution and abundance of this population and manage accordingly (e.g., preclude habitat degrading activities at core population areas).

For all populations, preclude disturbance that would damage the burrow systems. Due to the presence of sandy and silty soils, the Aliso Canyon Access Road population's burrows are especially vulnerable to damage.

For all subpopulations of the Stephens' kangaroo rat located on Marine Corps Base Camp Pendleton, identify and manage appropriate biologically sound connections. Corridors connecting occupied patches should be occupiable by the Stephens' kangaroo rat and not merely potential movement corridors.

The qualified biologist will inspect all excavated soil not replaced within the same day within 120 ft (37 m) of occupied SKR habitat. If SKR sign is found within the temporarily stockpiled soil, the area must be left undisturbed until MCP Camp Pendleton and USFWS jointly assess the situation to determine further actions.

Guidance on specific access road repairs should be given to the project managers and equipment operators (e.g., do not create berms that may serve as habitat).

Because small mammal populations are not static temporally or spatially, compile and use all SKR survey data for Marine Corps Base Camp Pendleton in identifying areas to be potentially avoided during construction activities.

Pacific Pocket Mouse

Preclude disturbance of suitable Pacific pocket mouse habitat.

Complete systematic survey for the Pacific pocket mouse along coastal bluffs, flood plains of river and creek mouths, and back dune system in an effort to determine if there are any remaining patches of habitat occupied by this species. Incorporate the initial detection probability of this or similar species into the survey design. Based on work with the Los Angeles pocket mouse, the average initial detection probability is 0.53 (STDev = 0.32; N = 53) (Davenport 2006).

Restore historic habitat through the removal and/or management of exotic plants.

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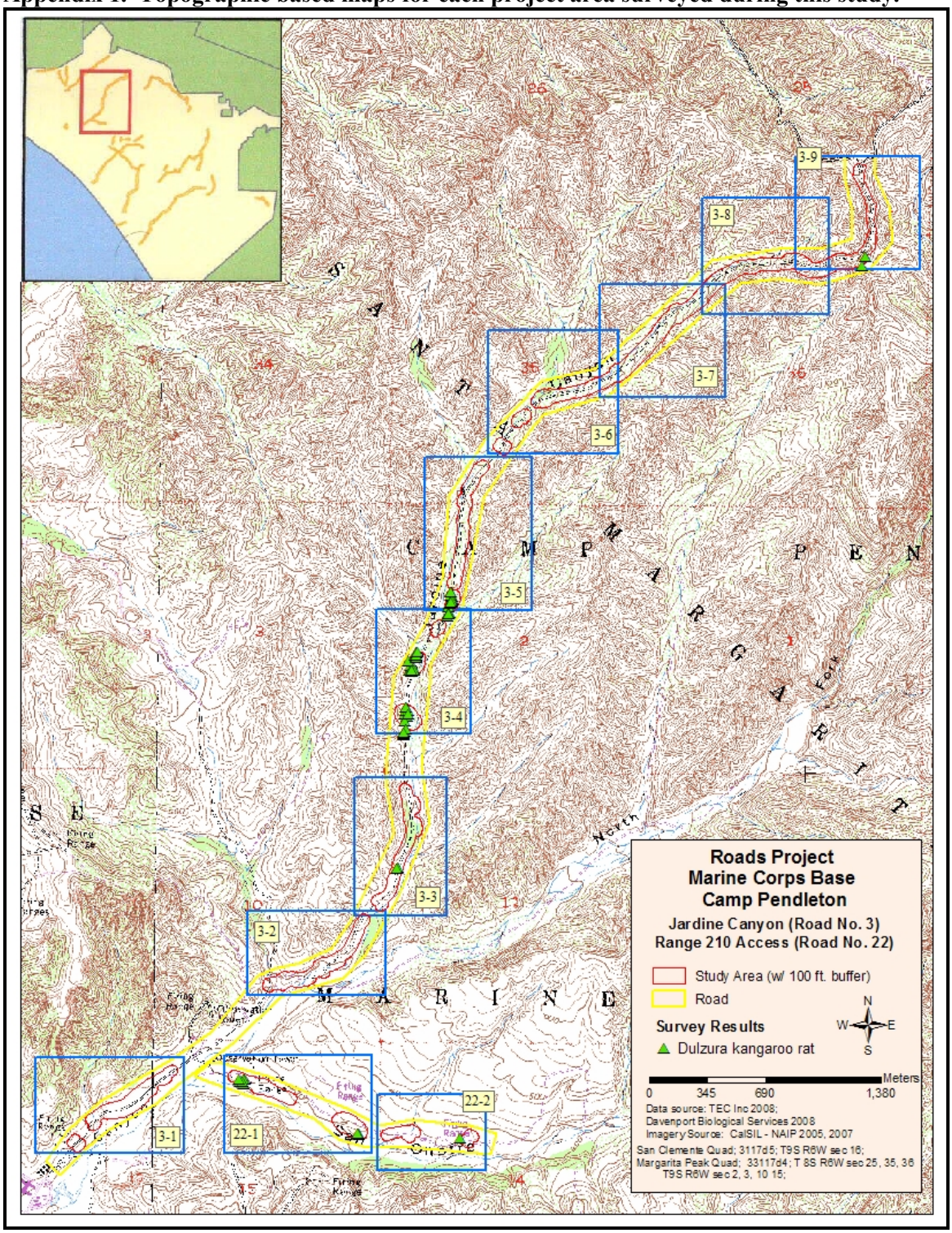
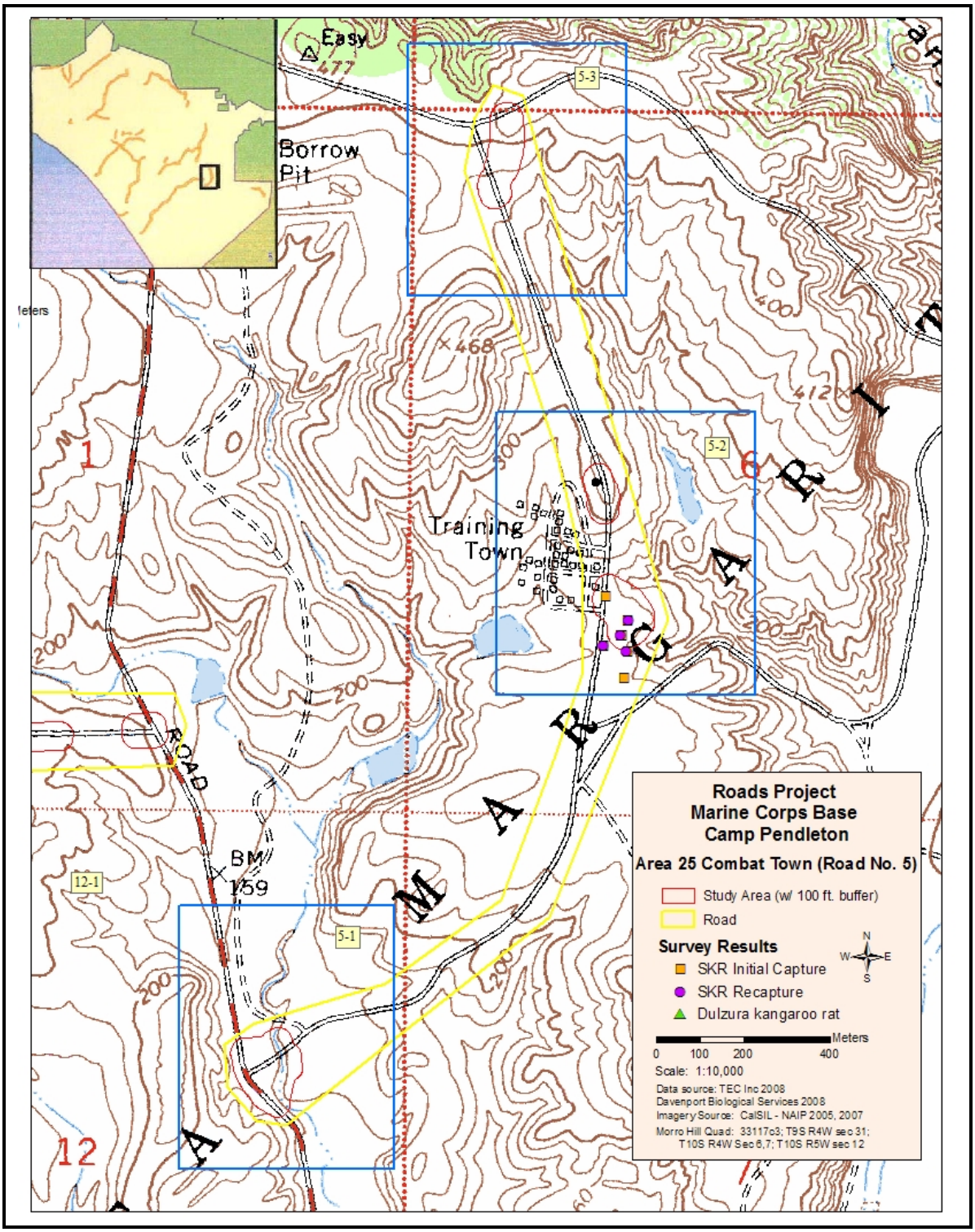
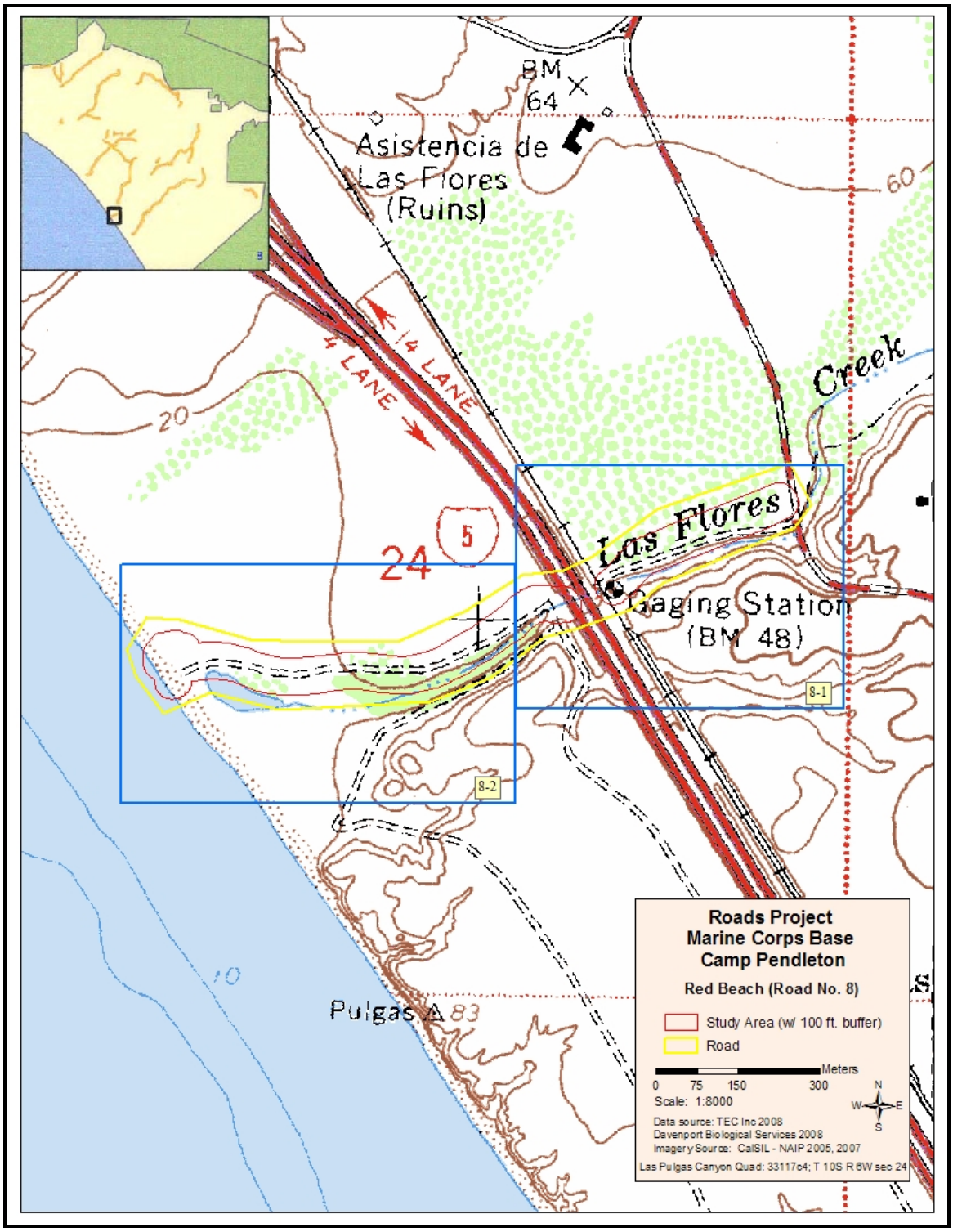
Appendix 1. Topographic based maps for each project area surveyed during this study.



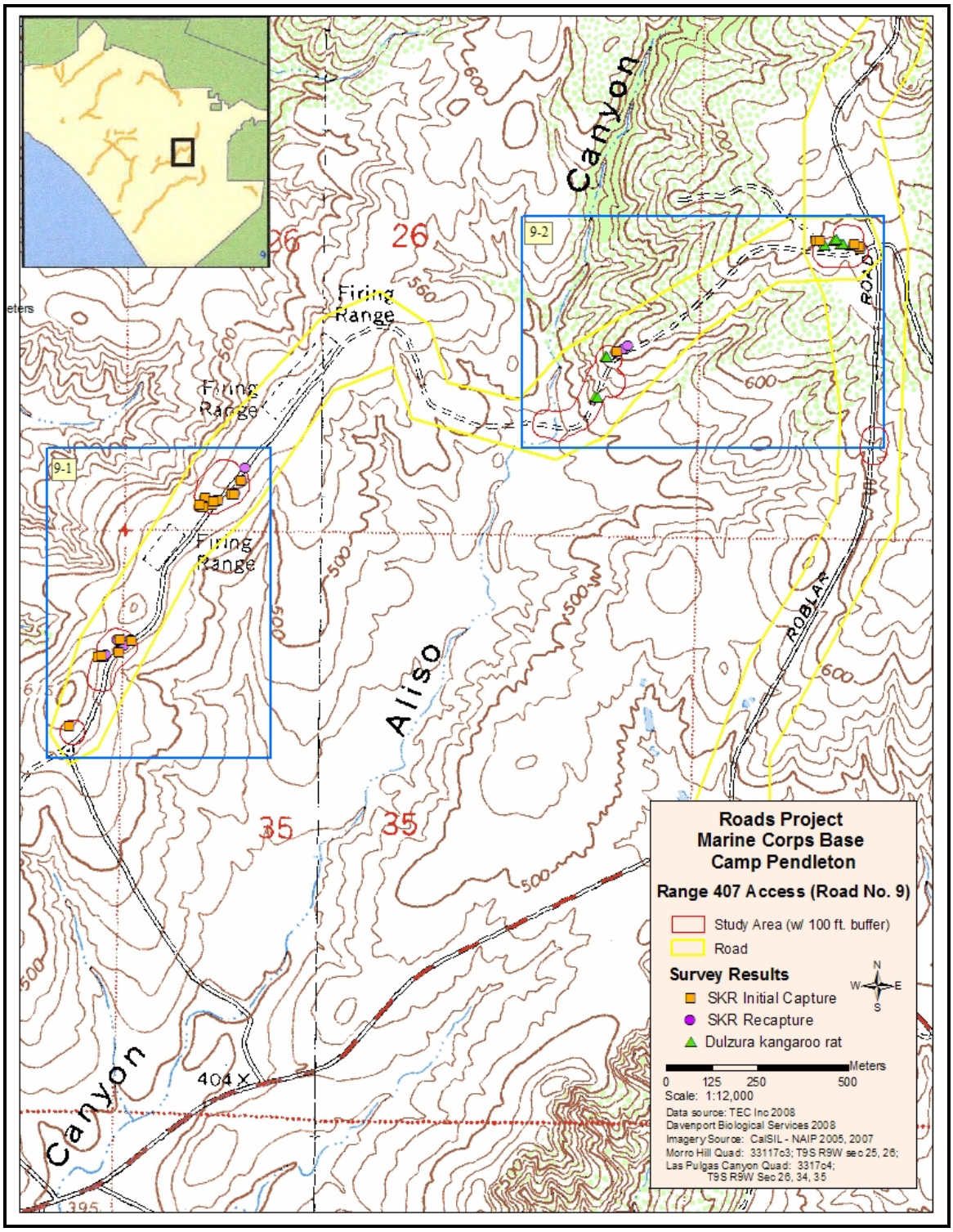
Jardine Canyon and Range 210 Series Access Roads (Road No. 3 & Road No. 22).



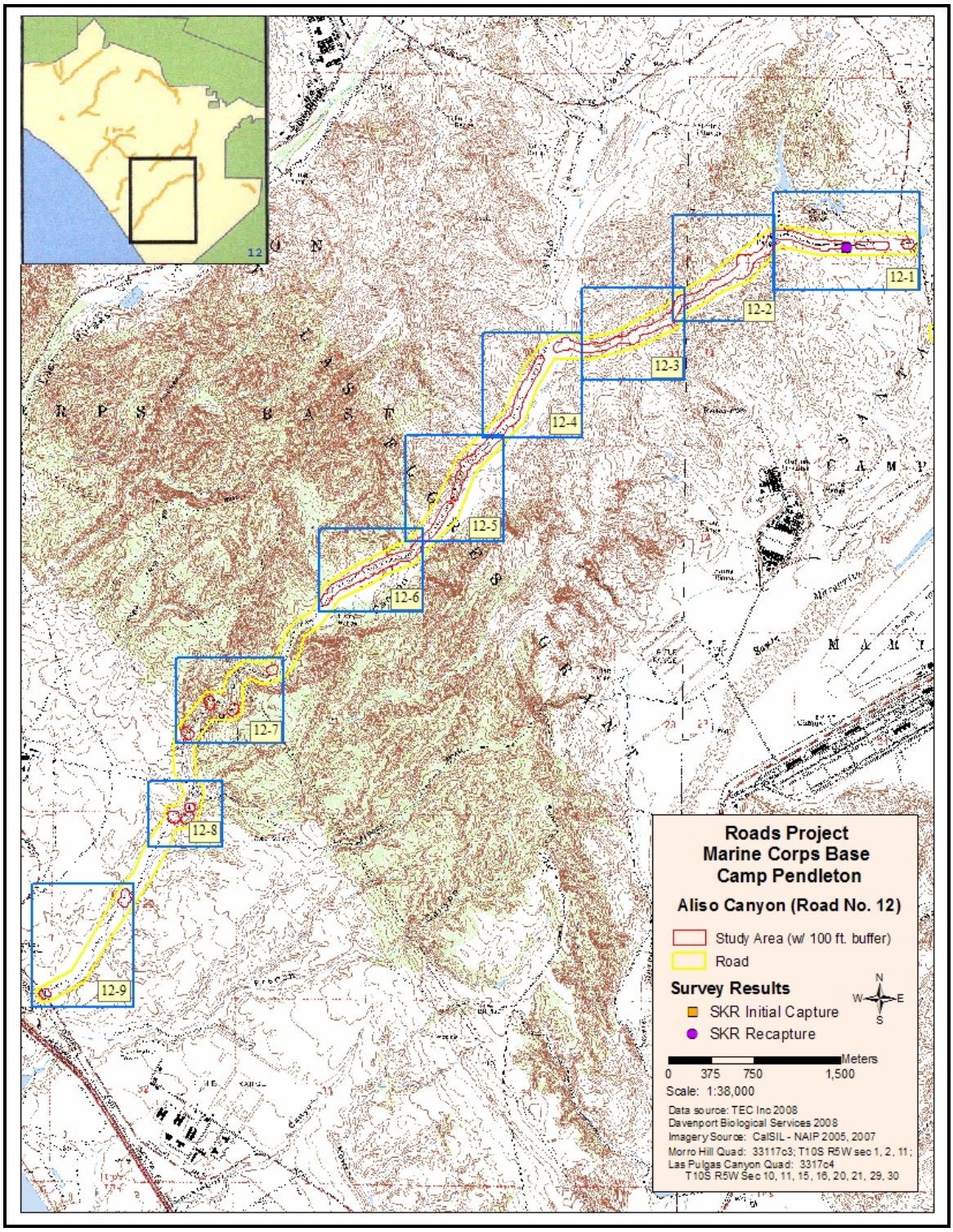
Area 25 Combat Town (Road No. 5)



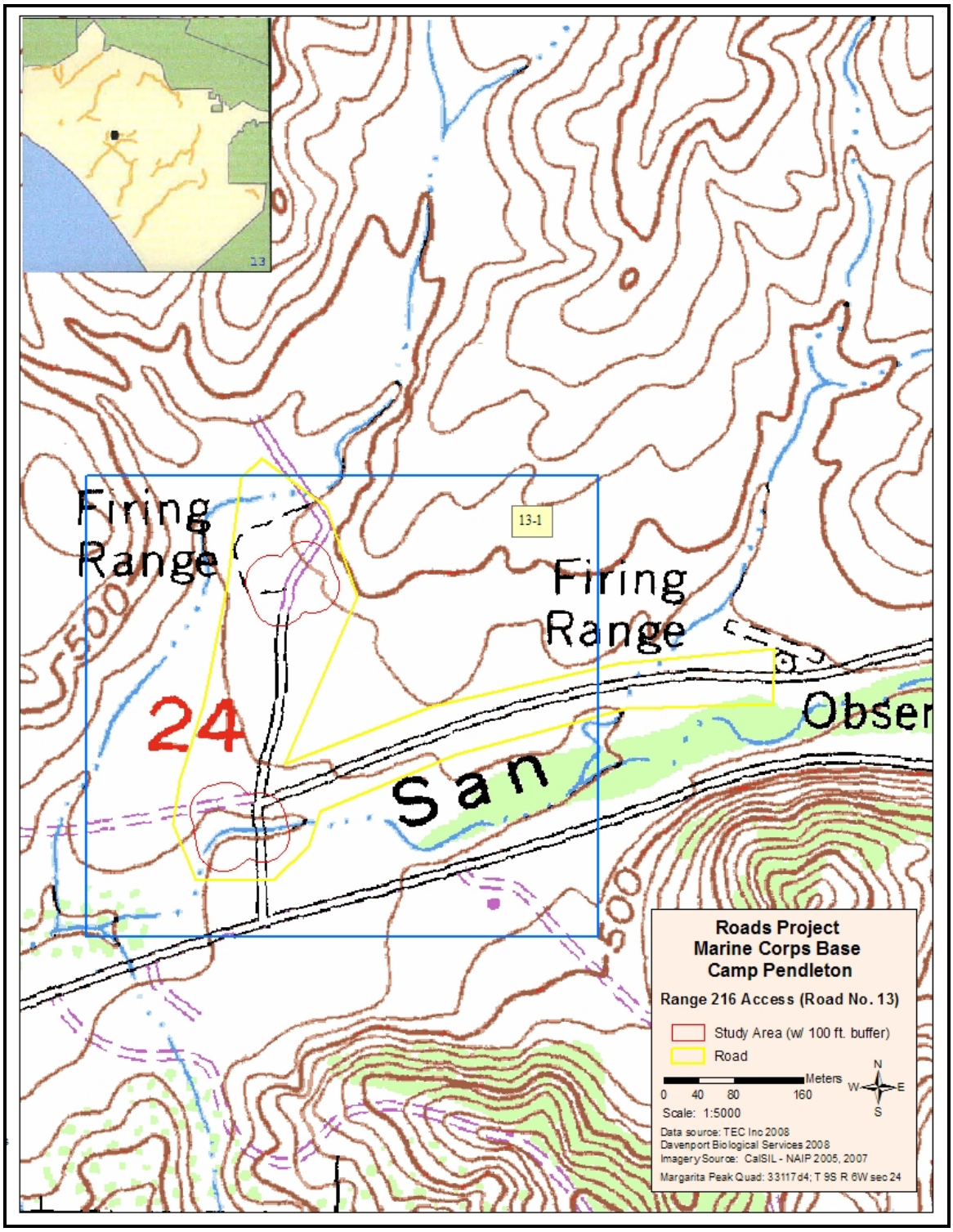
Red Beach (Road No. 8)



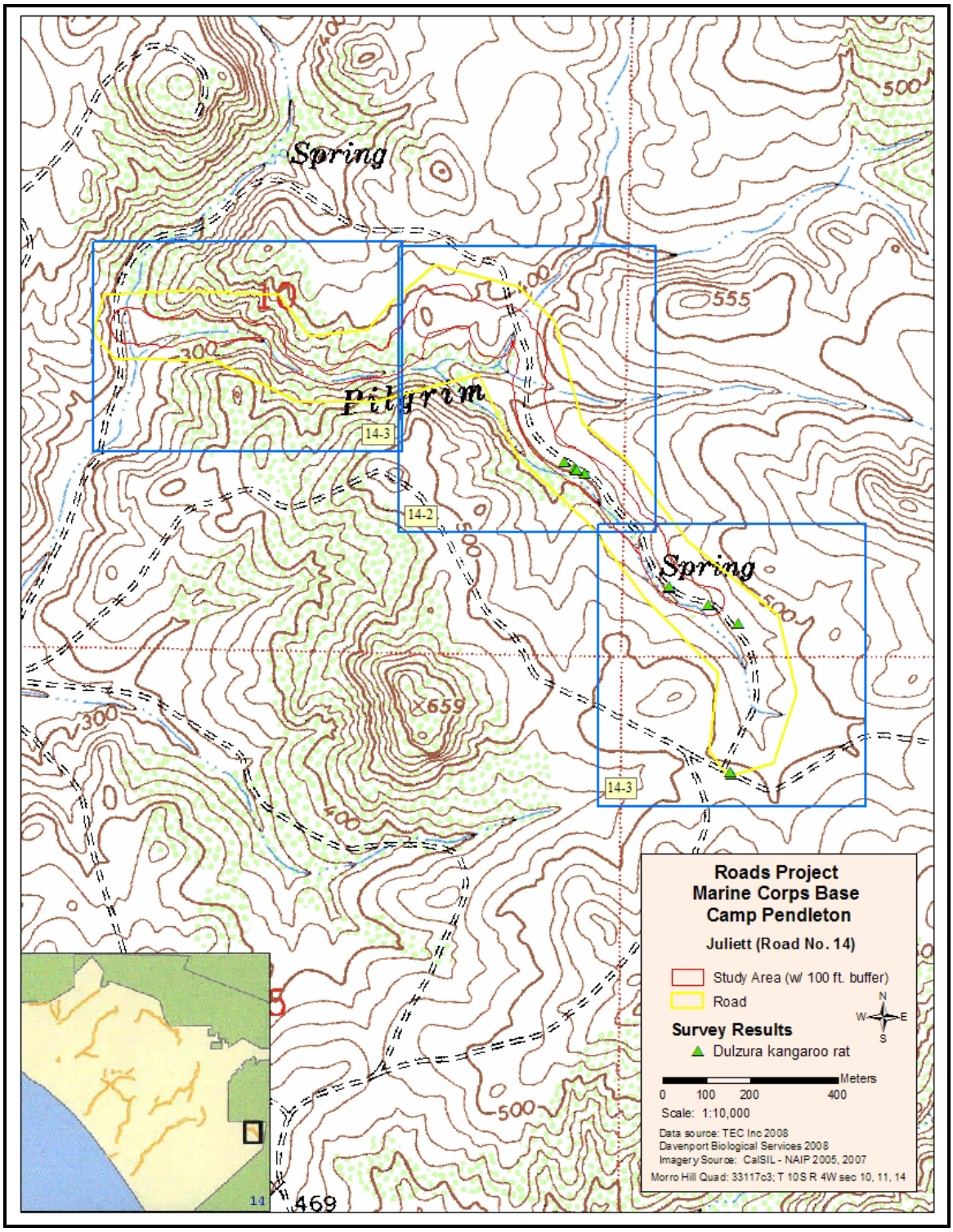
Range 407 Access Road (Road No. 9)



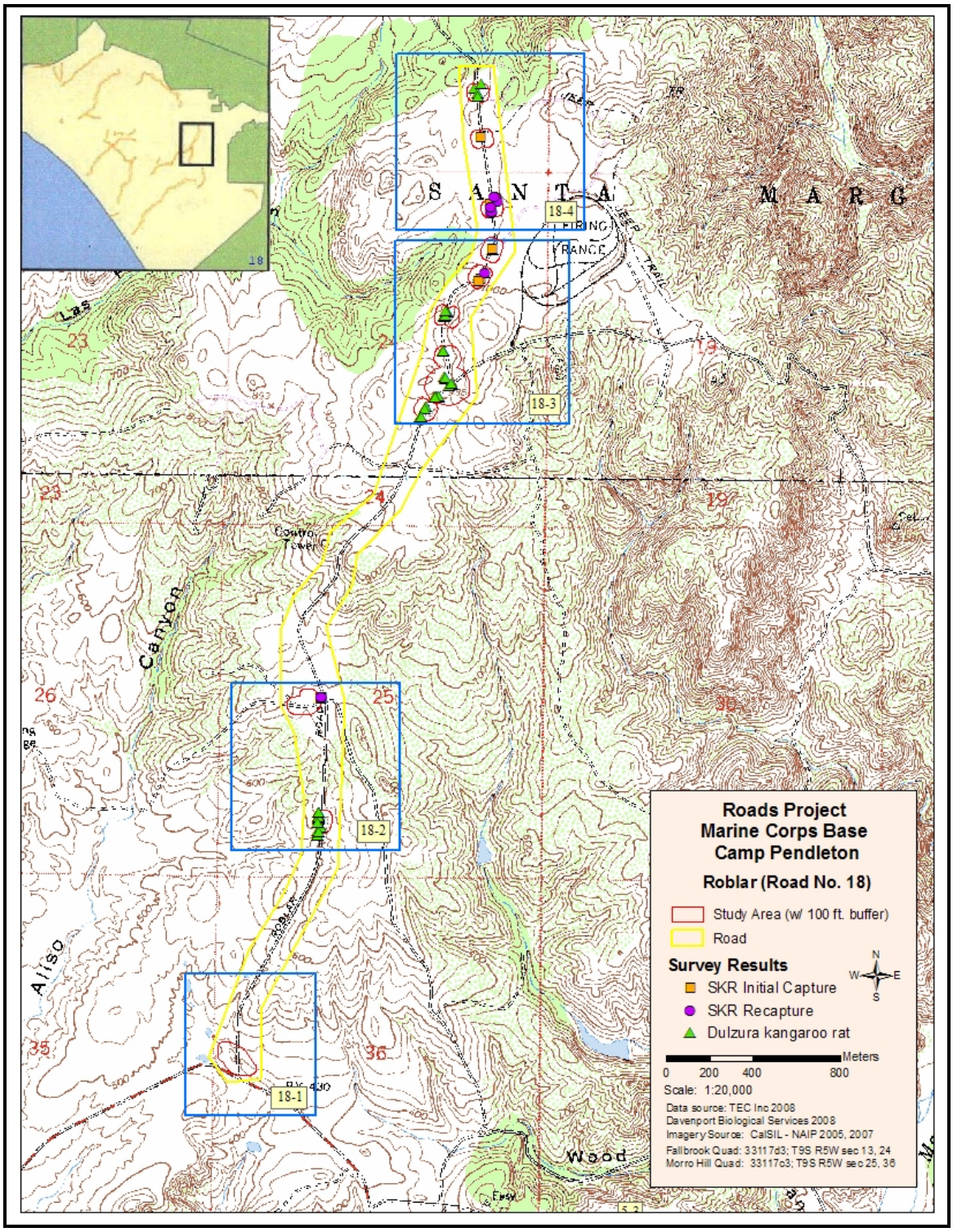
Aliso Canyon (Road No. 12)



Road 216 Series Access Road (Road No. 13)



Juliett Access Road (Road No. 14).



Roblar Road (Road No. 18)

Appendix 2. Weather data for Stephens' kangaroo rat and Pacific pocket mouse surveys.

Survey dates, time, and weather conditions during each survey event for the Stephens' kangaroo rat.

Road No.	Access Road Name	Survey Date	Time (24 Hour)	Temp. (F^o)	Wind Speed (mph)	Cloud Cover (%)
			Start/Stop	Start/Stop	Start/Stop	Start/Stop
3	Jardine Canyon	10-11 Auu 08	1700/0800	63/64	0/0	100/100
3	Jardine Canyon	11-12 Aug 08	1730/0900	73/66	0-1/0	0/20
3	Jardine Canyon	12-13 Aug 08	1715/0840	74/66	1-4/0	5/20
3	Jardine Canyon	13-14 Aug 08	1700/0835	75/66	1-2/0-1	20/0
3	Jardine Canyon	14-15 Aug 08	1700/0813	72/66	1-3/0-1	10/10
5	Area 25 Combat Town	2-3 Jun 08	1630/0800	72/61	1-5/0-1	0/100 ML
5	Area 25 Combat Town	3-4 Jun 08	1700/0800	62/59	0-1/0-1	80/100 ML
5	Area 25 Combat Town	4-5 Jun 08	1730/0830	65/60	0-1/0-1	90/60 ML
5	Area 25 Combat Town	5-6 Jun 08	1630/0800	72/60	1-3/0-1	5/0
5	Area 25 Combat Town	6-7 Jun 08	1730/0830	62/64	1-3/0-1	50/50 ML
12	Aliso Canyon	9-10 Sep 08	1500/0600	74/64	1-4/0	0/80 ML
12 A	liso Canyon	10-11 Sep 08	1800/0630	70/64	1-4/0	5/100 ML
12 A	liso Canyon	11-12 Sep 08	1810/0600	69/65	0-1/0	40/100 ML
12 A	liso Canyon	12-13 Sep 08	1830/0630	68/66	0/0-1	0/100 ML
12 A	liso Canyon	13-14 Sep 08	1900/0800	70/65	0-1/0	50/100 ML
13	Range 216 Series	18-19 Aug 08	1400/0700	78/63	0-1/0	0/100 ML
13	Range 216 Series	19-20 Aug 08	1900/0700	69/63	1-2/0	0/100 ML
13	Range 216 Series	20-21 Aug 08	1830/0700	70/62	0-1/0-1	0/100 ML
13	Range 216 Series	21-22 Aug 08	1730/0630	73/65	0-1/0	0/100 ML
13	Range 216 Series	22-23 Aug 08	1730/0830	76/65	0-1/0-1	0/100 ML
14	Juilett Training Area	2-3 Jun 08	1630/0800	72/61	1-5/0-1	0/100 ML
14	Juilett Training Area	3-4 Jun 08	1700/0800	62/59	0-1/0-1	80/100 ML
14	Juilett Training Area	4-5 Jun 08	1730/0830	65/60	0-1/0-1	90/60 ML
14	Juilett Training Area	5-6 Jun 08	1630/0800	72/60	1-3/0-1	5/0
14	Juilett Training Area	6-7 Jun 08	1730/0830	62/64	1-3/0-1	50/50 ML
22	Range 210 Series	18-19 Aug 08	1400/0700	78/63	0-1/0	0/100 ML
22	Range 210 Series	19-20 Aug 08	1900/0700	69/63	1-2/0	0/100 ML
22	Range 210 Series	20-21 Aug 08	1830/0700	70/62	0-1/0-1	0/100 ML
22	Range 210 Series	21-22 Aug 08	1730/0630	73/65	0-1/0	0/100 ML
22	Range 210 Series	22-23 Aug 08	1730/0830	76/65	0-1/0-1	0/100 ML

ML: Marine Layer

Appendix 2 (Cont.)

Table 2. Shows survey dates, time, and weather conditions during each survey event for the Pacific pocket mouse.

Road No.	Access Road Name	Survey Date	Time (24 Hour)	Temp. (F^o)	Wind Speed (mph)	Cloud Cover (%)
			Start/Stop	Start/Stop	Start/Stop	Start/Stop
8	Red Beach	19-20 May 08	1630/0700	70/64	0-1/0-2	10/100 ML
8	Red Beach	20-21 May 08	1830/0715	64/59	1-3/0-1	100/100 ML
8	Red Beach	21-22 May 08	1930/0730	63/60	1-5/1-3	5/80 ML
8	Red Beach	22-23 May 08	1830/0700	62/58	3-7/3-10	80/100 ML
8	Red Beach	23-24 May 08	1700/0930	56/53	0-2/1-3	80/80 ML
9	Range 407	15-16 Oct 08	1700/-709	86/55	1-3/1-3	10/10
9 Ran	ge 407	16-17 Oct 08	1730/0800	80/57	1-3/1-3	0/0
9 Ran	ge 407	17-18 Oct 08	1745/0745	73/51	0-1/0	20/0
9 Ran	ge 407	18-19 Oct 08	1800/0800	70/56	1-2/0	0/100 ML
9 Ran	ge 407	19-20 Oct 08	1700/0740	70/60	1-3/0	0/100 ML
12	Aliso Canyon	9-10 Sep 08	1500/0600	74/64	1-4/0	0/80 ML
12 A	liso Canyon	10-11 Sep 08	1800/0630	70/64	1-4/0	5/100 ML
12 A	liso Canyon	11-12 Sep 08	1810/0600	69/65	0-1/0	40/100 ML
12 A	liso Canyon	12-13 Sep 08	1830/0630	68/66	0/0-1	0/100 ML
12 A	liso Canyon	13-14 Sep 08	1900/0800	70/65	0-1/0	50/100 ML

ML: Marine Layer

Appendix 3. Habitat conditions along Jardine Canyon Road (Road No. 3).

Grazed by Bison. Dulzura kangaroo rats were captured here.

Grazed by Bison. Dulzura kangaroo rats were captured here.

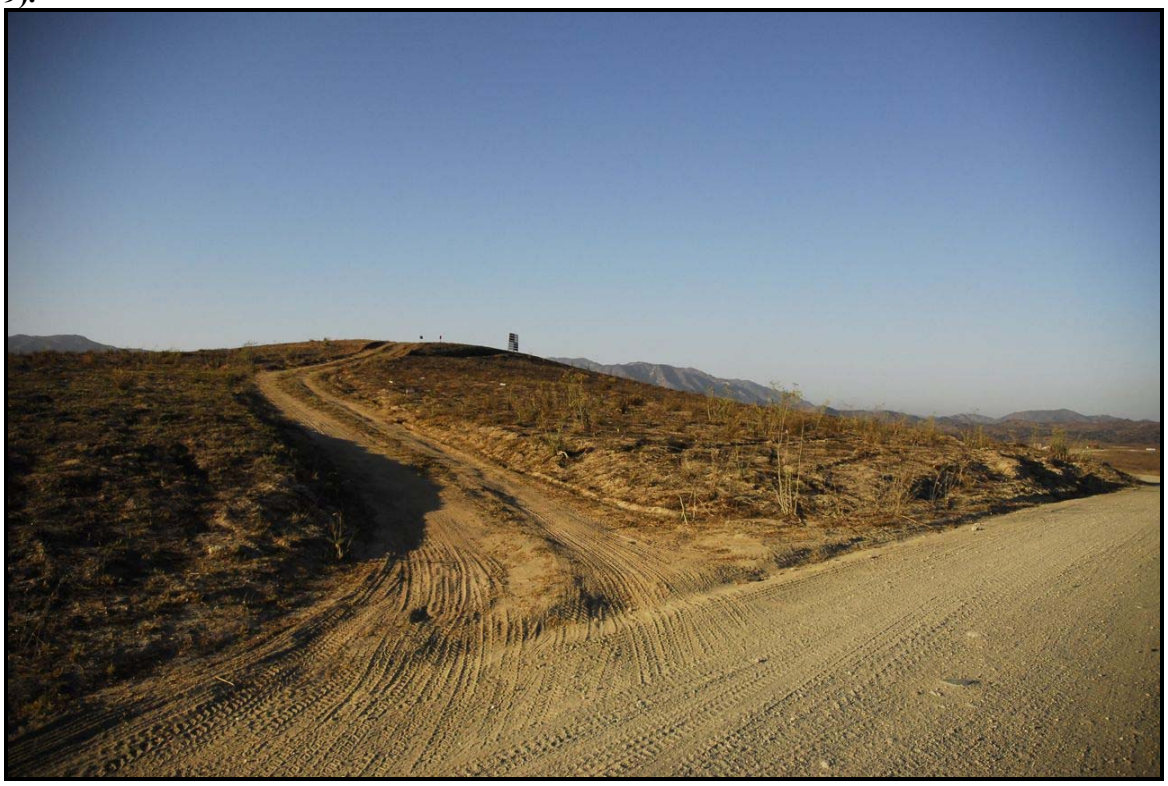
Appendix 4. Typical Habitat Conditions found along the 25 Area Combat Town Access Road (Road No. 5).

Most northern study area. Suitable for Stephens' kanagaroo rats; no kangaroo rats captured despite presence of kangaroo rat burrows.

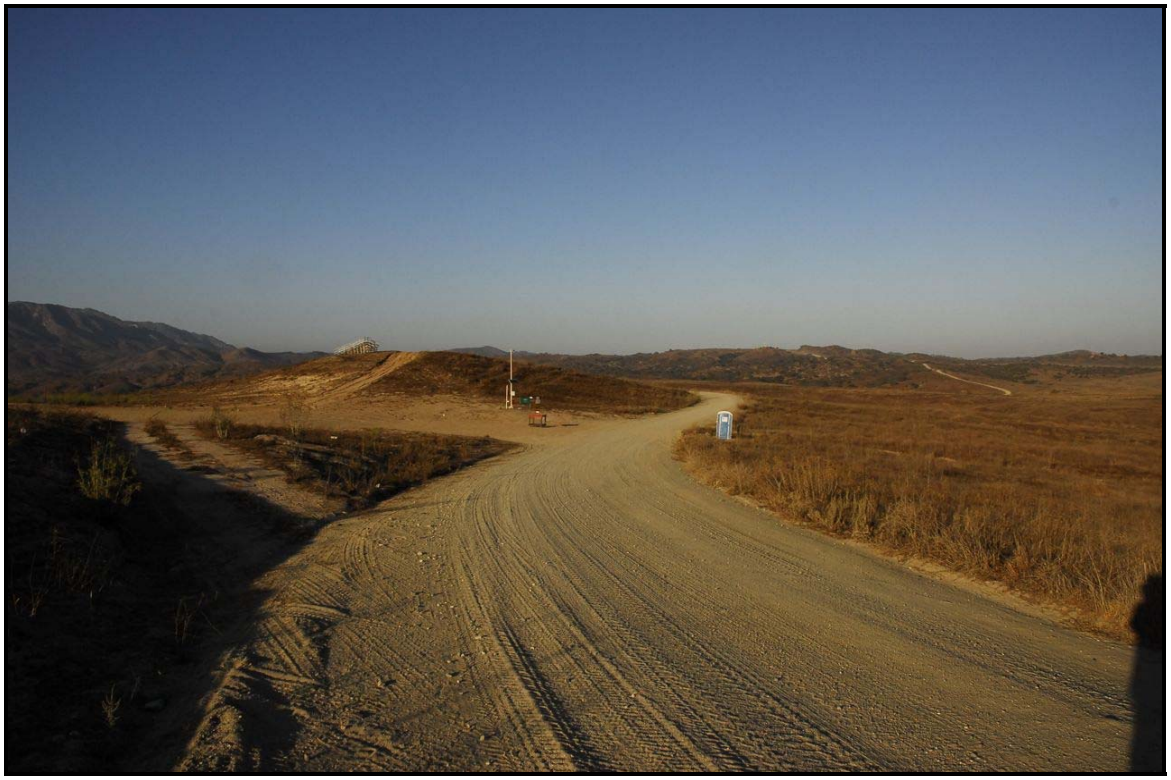
Habitat near 25 Area Combat Town. Suitable for Stephens' kangaroo rats; several captured in this area.

Appendix 5. Typical Habitat Conditions found along the Red Beach Access Road (Road No. 8).

Appendix 6. Typical Habitat Conditions found along the Range 407 Access Road (Road No. 9).



Section 9-1; Southwestern Study Area



Section 9-1; Middle Study Area

Appendix 6. Typical Habitat Conditions found along the Range 407 Access Road (Road No. 9)(Cont.)

Section 9-1; Northeastern Study Area (looking northeast)

Section 9-2; Southwestern Study Area (bottom of hill looking east)

Appendix 6. Typical Habitat Conditions found along the Range 407 Access Road (Road No. 9)(Cont.)

Section 9-2; Southwestern Study Area (top of hill; looking northeast)

Section 9-2; Northeastern Study Area (looking east)

Appendix 7. Typical Habitat Conditions found along Aliso Canyon Road (Road No. 12).

Typical habitat conditions of most of the project area along Aliso Canyon Road (14 Sep 2008). No kangaroo rat sign in this type of plant community.

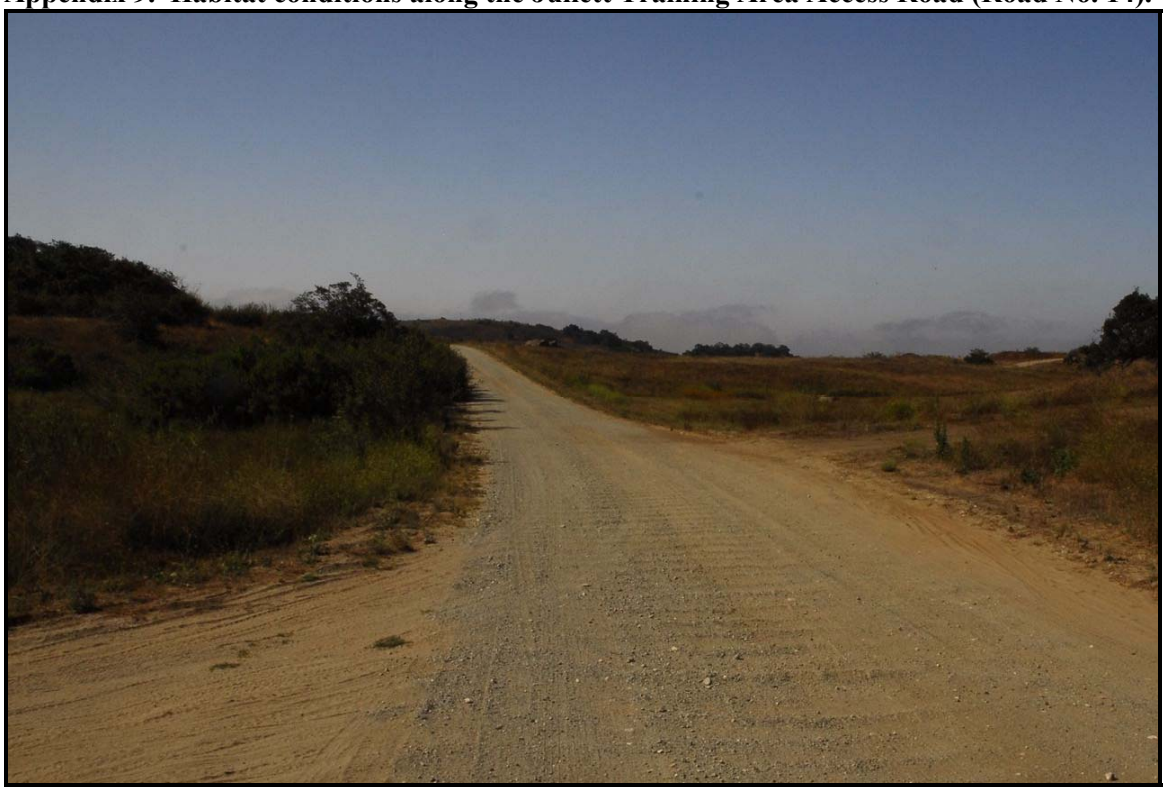
Habitat conditions within segment 12-1, at east end of Aliso Canyon Road. This area was occupied by Stephens' kangaroo rats (14 Sep 2008).

Appendix 8. Habitat conditions along the 216 Series Access Road (Road No. 13).

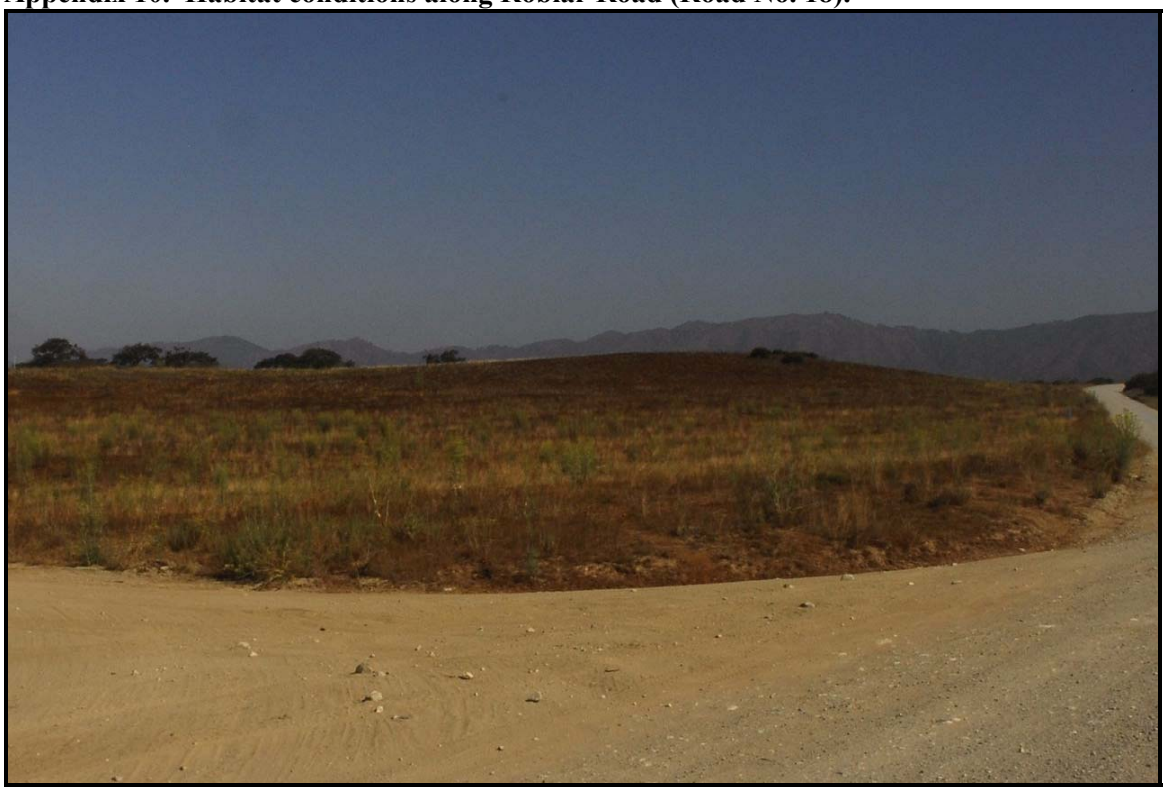
Shows thick annual vegetation in this segment. No kangaroo rats were captured or otherwise detected here.

Recently burned. Dulzura kangaroo rats were captured here.

Appendix 9. Habitat conditions along the Juliett Training Area Access Road (Road No. 14).



Appendix 10. Habitat conditions along Roblar Road (Road No. 18).



Annual vegetation had low aerial cover and many patches of bare ground; Stephens' kangaroo rats were captured here.

Annual vegetation was thicker in this area; Dulzura kangaroo rats were captured her

Appendix 11. Habitat conditions along the 210 Series Access Road (Road No. 22).

Suitable for SKR; No kangaroo rats captured or otherwise detected during presence-absence survey.

Suitable habitat for the Stephens' kangaroo rat; no kangaroo rats captured or otherwise detected.

Appendix 12. Initial and Recapture Sites of both Stephens' and Dulzura Kangaroo Rats.

Road Segm	ent	Species	Easting	Northing	New	Recapture
Jardine Canyon	3-3	DISI	454872	3696998	Yes	
Jardine Canyon	3-3	DISI	454876 3	697005	Yes	
Jardine Canyon	3-3	DISI	454919 3	697957	Yes	
Jardine Canyon	3-3 D	ISI	454869	3696998		Yes
Jardine Canyon	3-4	DISI	454930 3	697905	Yes	
Jardine Canyon	3-4	DISI	454963 3	698181	Yes	
Jardine Canyon	3-4	DISI	454941 3	698176	Yes	
Jardine Canyon	3-4	DISI	454941 3	698180	Yes	
Jardine Canyon	3-4	DISI	454943 3	698205	Yes	
Jardine Canyon	3-4	DISI	454933 3	698233	Yes	
Jardine Canyon	3-4	DISI	454975 3	698266	Yes	
Jardine Canyon	3-4 DIS	I	454910 3	697805	Yes	
Jardine Canyon	3-4 DIS	I	454910 3	697916	Yes	
Jardine Canyon	3-4 DIS	I	454919 3	697935	Yes	
Jardine Canyon	3-4 DIS	I	454934 3	697917	Yes	
Jardine Canyon	3-4 DIS	I	454953 3	698173	Yes	
Jardine Canyon	3-4 DIS	I	454946 3	698176	Yes	
Jardine Canyon	3-4 DIS	I	454964 3	698193	Yes	
Jardine Canyon	3-4 DIS	I	454981 3	698288	Yes	
Jardine Canyon	3-4 DIS	I	454913 3	697815	Yes	
Jardine Canyon	3-4 DIS	I	454919 3	697935	Yes	
Jardine Canyon	3-4 DIS	I	454919 3	697958	Yes	
Jardine Canyon	3-4 DIS	I	454908 3	697796		Yes
Jardine Canyon	3-4 DIS	I	454912 3	697874		Yes
Jardine Canyon	3-4 DIS	I	454934 3	697940		Yes
Jardine Canyon	3-4 DIS	I	454954 3	698171		Yes
Jardine Canyon	3-4 DIS	I	454976 3	698264		Yes
Jardine Canyon	3-4 DIS	I	454917 3	697830		Yes
Jardine Canyon	3-4 DIS	I	454919 3	697961		Yes
Jardine Canyon	3-4 DIS	I	454932 3	697915		Yes
Jardine Canyon	3-4 DIS	I	454950 3	698173		Yes
Jardine Canyon	3-4 DIS	I	454949 3	698177		Yes
Jardine Canyon	3-4 DIS	I	454977 3	698257		Yes
Jardine Canyon	3-4 DIS	I	454981 3	698285		Yes
Jardine Canyon	3-4 DIS	I	454963 3	698177		Yes
Jardine Canyon	3-4 DIS	I	454908 3	697800		Yes
Jardine Canyon	3-4 DIS	I	454909 3	697808		Yes
Jardine Canyon	3-4 DIS	I	454949 3	698178		Yes
Jardine Canyon	3-4 DIS	I	454950 3	698178		Yes
Jardine Canyon	3-4 DIS	I	454976 3	698267		Yes
Jardine Canyon	3-4 DIS	I	454984 3	698290		Yes
Jardine Canyon	3-5	DISI	455170 3	698516	Yes	
Jardine Canyon	3-5	DISI	455174 3	698522	Yes	
Jardine Canyon	3-5	DISI	455172 3	698557	Yes	
Jardine Canyon	3-5	DISI	455179 3	698581	Yes	
Jardine Canyon	3-5	DISI	455187 3	698599	Yes	
Jardine Canyon	3-5	DISI	455190 3	698622	Yes	
Jardine Canyon	3-5	DISI	455185 3	698625	Yes	
Jardine Canyon	3-5	DISI	455181 3	698647	Yes	

Road Segm	ent	Species	Easting	Northing	New	Recapture
Jardine Canyon	3-5 DIS	I	455168 3	698521	Yes	
Jardine Canyon	3-5 DIS	I	455177 3	698581	Yes	
Jardine Canyon	3-5 DIS	I	455169 3	698520	Yes	
Jardine Canyon	3-5 DIS	I	455186 3	698584	Yes	
Jardine Canyon	3-5 DIS	I	455166 3	698503	Yes	
Jardine Canyon	3-5 DIS	I	455187 3	698605		Yes
Jardine Canyon	3-5 D	ISI	455170	3698520		Yes
Jardine Canyon	3-5 D	ISI	455184	3698650		Yes
Jardine Canyon	3-5 D	ISI	455187	3698592		Yes
Jardine Canyon	3-5 D	ISI	455170	3698514		Yes
Jardine Canyon	3-5 D	ISI	455170	3698516		Yes
Jardine Canyon	3-5 D	ISI	455185	3698584		Yes
Jardine Canyon	3-9 D	ISI	457627	3700613	Yes	
Jardine Canyon	3-9 D	ISI	457642	3700664	Yes	
Jardine Canyon	3-9 D	ISI	457641	3700666		Yes
25 Area Combat Town	5-2	DIST	468045	3688159	Yes	
25 Area Combat Town	5-2	DIST	468051	3688220	Yes	
25 Area Combat Town	5-2	DIST	467996	3688232	Yes	
25 Area Combat Town	5-2	DIST	468035	3688257	Yes	
25 Area Combat Town	5-2	DIST	468037	3688255	Yes	
25 Area Combat Town	5-2	DIST	468052	3688290	Yes	
25 Area Combat Town	5-2	DIST	468001	3688345	Yes	
25 Area Combat Town	5-2	DIST	467995	3688231		Yes
25 Area Combat Town	5-2	DIST	468049	3688218		Yes
25 Area Combat Town	5-2	DIST	468034	3688255		Yes
25 Area Combat Town	5-2	DIST	468053	3688291		Yes
25 Area Combat Town	5-2	DISI	467993	3688588	Yes	
25 Area Combat Town	5-2	DISI	468011	3688584		Yes
25 Area Combat Town	5-2	DISI	467995	3688586		Yes
Range 407	9-1	DIST	464420	3690744	Yes	
Range 407	9-1	DIST	464476	3690758	Yes	
Range 407	9-1	DIST	464511	3690790	Yes	
Range 407	9-1	DIST	464479	3690792	Yes	
Range 407	9-1	DIST	464731	3691165	Yes	
Range 407	9-1	DIST	464747	3691177	Yes	
Range 407	9-1	DIST	464784	3691195	Yes	
Range 407	9-1	DIST	464790	3691195	Yes	
Range 407	9-1	DIST	468410	3691231	Yes	
Range 407	9-1	DIST	464710	3691183	Yes	
Range 407	9-1	DIST	464704	3691163	Yes	
Range 407	9-1	DIST	464704	3691158	Yes	
Range 407	9-1	DIST	464429	3690747	Yes	
Range 407	9-1	DIST	464696	3691166	Yes	
Range 407	9-1	DIST	464734	3691174	Yes	
Range 407	9-1	DIST	464810	3691231	Yes	
Range 407	9-1	DIST	464341	3690552	Yes	
Range 407	9-1	DIST	464475	3690760		Yes
Range 407	9-1	DIST	464509	3690791		Yes
Range 407	9-1	DIST	464480	3690791		Yes
Range 407	9-1	DIST	464746	3691176		Yes

Road Segm	ent	Species	Easting	Northing	New	Recapture
Range 407	9-1	DIST	464784	3691195		Yes
Range 407	9-1	DIST	464811	3691231		Yes
Range 407	9-1	DIST	464713	3691183		Yes
Range 407	9-1	DIST	464705	3691162		Yes
Range 407	9-1	DIST	464699	3691166		Yes
Range 407	9-1	DIST	464477	3690758		Yes
Range 407	9-1	DIST	464439	3690745		Yes
Range 407	9-1	DIST	464511	3690790		Yes
Range 407	9-1	DIST	464471	3690793		Yes
Range 407	9-1	DIST	464731	3691165		Yes
Range 407	9-1	DIST	464747	3691177		Yes
Range 407	9-1	DIST	464784	3691195		Yes
Range 407	9-1	DIST	464790	3691195		Yes
Range 407	9-1	DIST	464704	3691163		Yes
Range 407	9-1	DIST	464696	3691158		Yes
Range 407	9-1	DIST	464442	3690750		Yes
Range 407	9-1	DIST	464475	3690760		Yes
Range 407	9-1	DIST	464509	3690791		Yes
Range 407	9-1	DIST	464503	3690788		Yes
Range 407	9-1	DIST	464471	3690793		Yes
Range 407	9-1	DIST	464792	3691198		Yes
Range 407	9-1	DIST	464810	3691231		Yes
Range 407	9-1	DIST	464822	3691269		Yes
Range 407	9-1	DIST	464710	3691183		Yes
Range 407	9-1	DIST	464704	3691163		Yes
Range 407	9-1	DIST	464699	3691159		Yes
Range 407	9-1	DIST	464509	3690791		Yes
Range 407	9-1	DIST	464491	3690777		Yes
Range 407	9-1	DIST	464477	3690788		Yes
Range 407	9-1	DIST	464784	3691195		Yes
Range 407	9-1	DIST	464790	3691195		Yes
Range 407	9-1	DIST	464792	3691198		Yes
Range 407	9-1	DIST	464710	3691183		Yes
Range 407	9-2	DIST	465840	3691595	Yes	
Range 407	9-2	DIST	466507	3691882	Yes	
Range 407	9-2	DIST	466506	3691888	Yes	
Range 407	9-2	DIST	466398	3691905	Yes	
Range 407	9-2	DIST	465841	3691595	Yes	
Range 407	9-2	DIST	466491	3691894	Yes	
Range 407	9-2	DIST	466389	3691903	Yes	
Range 407	9-2	DIST	466398	3691905	Yes	
Range 407	9-2	DIST	465859	3691602		Yes
Range 407	9-2	DIST	466507	3691890		Yes
Range 407	9-2	DIST	466510	3691886		Yes
Range 407	9-2	DIST	466508	3691890		Yes
Range 407	9-2	DIST	466508	3691882		Yes
Range 407	9-2	DIST	466389	3691903		Yes
Range 407	9-2	DIST	465859	3691602		Yes
Range 407	9-2	DIST	465840	3691595		Yes
Range 407	9-2	DIST	465871	3691610		Yes
Range 407	9-2	DIST	465840	3691595		Yes
Range 407	9-2	DIST	466398	3691905		Yes

Road Segm	ent	Species	Easting	Northing	New	Recapture
Range 407	9-2	DIST	466510	3691886		Yes
Range 407	9-2	DIST	466491	3691894		Yes
Range 407	9-2	DIST	466389	3691903		Yes
Range 407	9-2	DISI	466487	3691891	Yes	
Range 407	9-2	DISI	465814	3691581	Yes	
Range 407	9-2	DISI	465783	3691472	Yes	
Range 407	9-2	DISI	466465	3691896	Yes	
Range 407	9-2	DISI	466446	3691907	Yes	
Range 407	9-2	DISI	466440	3691905	Yes	
Range 407	9-2	DISI	466491	3691894		Yes
Range 407	9-2	DISI	465813	3691581		Yes
Range 407	9-2	DISI	466456	3691895		Yes
Range 407	9-2	DISI	466414	3691891		Yes
Range 407	9-2	DISI	466446	3691907		Yes
Range 407	9-2	DISI	465790	3691469		Yes
Range 407	9-2	DISI	465814	3691581		Yes
Range 407	9-2	DISI	466458	3691896		Yes
Range 407	9-2	DISI	466414	3691891		Yes
Range 407	9-2	DISI	466440	3691905		Yes
Range 407	9-2	DISI	465814	3691581		Yes
Range 407	9-2	DISI	466465	3691896		Yes
Range 407	9-2	DISI	466440	3691905		Yes
Range 407	9-2	DISI	466446	3691907		Yes
Aliso Cyn.	12-1	DIST	466406	3687998	Yes	
Aliso Cyn.	12-1	DIST	466409	3687994		Yes
Juliett 1	4-3	DISI	474201	3686317	Yes	
Juliett 1	4-3	DISI	474257	3685929	Yes	
Juliett 1	4-3	DISI	474269	3686275	Yes	
Juliett 1	4-3	DISI	474255	3685935		Yes
Juliett 1	4-2	DISI	474111	3686357	Yes	
Juliett 1	4-2	DISI	473894	3686628	Yes	
Juliett 1	4-2	DISI	474112	3686358	Yes	
Juliett 1	4-2	DISI	473916	3686616	Yes	
Juliett 1	4-2	DISI	473893	3686629	Yes	
Juliett 1	4-2	DISI	473896	3686624		Yes
Juliett 1	4-2	DISI	473916	3686616		Yes
Juliett 1	4-2	DISI	473898	3686624		Yes
Juliett 1	4-2	DISI	473868	3686643		Yes
Roblar Road	18-2	DIST	466533	3691904	Yes	
Roblar Road	18-2	DIST	466538	3691907	Yes	
Roblar Road	18-2	DIST	466531	3691903	Yes	
Roblar Road	18-2	DIST	466538	3691908	Yes	
Roblar Road	18-2	DIST	466539	3691904	Yes	
Roblar Road	18-2	DIST	466537	3691904		Yes
Roblar Road	18-2	DIST	466537	3691906		Yes
Roblar Road	18-2	DIST	466539	3691908		Yes
Roblar Road	18-2	DISI	466528	3691380	Yes	
Roblar Road	18-2	DISI	466531	3691351	Yes	
Roblar Road	18-2	DISI	466540	3691311	Yes	
Roblar Road	18-2	DISI	466528	3691277	Yes	
Roblar Road	18-2	DISI	466528	3691380	Yes	

Road Segm	ent	Species	Easting	Northing	New	Recapture
Roblar Road	18-2	DISI	466528	3691380	Yes	
Roblar Road	18-2	DISI	466528	3691380	Yes	
Roblar Road	18-2	DISI	466530	3691363	Yes	
Roblar Road	18-2	DISI	466530	3691381	Yes	
Roblar Road	18-2	DISI	466531	3691352	Yes	
Roblar Road	18-2	DISI	466528	3691353	Yes	
Roblar Road	18-2	DISI	466531	3691362	Yes	
Roblar Road	18-2	DISI	466531	3691381		Yes
Roblar Road	18-2	DISI	466528	3691277		Yes
Roblar Road	18-2	DISI	466527	3691275		Yes
Roblar Road	18-2	DISI	466531	3691381		Yes
Roblar Road	18-2	DISI	466527	3691296		Yes
Roblar Road	18-2	DISI	466527	3691276		Yes
Roblar Road	18-2	DISI	466532	3691361		Yes
Roblar Road	18-2	DISI	466540	3691310		Yes
Roblar Road	18-2	DISI	466528	3691336		Yes
Roblar Road	18-2	DISI	466532	3691381		Yes
Roblar Road	18-2	DISI	466532	3691293		Yes
Roblar Road	18-3	DIST	467306	3693975	Yes	
Roblar Road	18-3	DIST	467255	3693837	Yes	
Roblar Road	18-3	DIST	467241	3693827	Yes	
Roblar Road	18-3	DIST	467273	3693863		Yes
Roblar Road	18-3	DISI	467270	3693861	Yes	
Roblar Road	18-3	DISI	467093	3693667	Yes	
Roblar Road	18-3	DISI	467093	3693661	Yes	
Roblar Road	18-3	DISI	467094	3693386	Yes	
Roblar Road	18-3	DISI	467056	3693294	Yes	
Roblar Road	18-3	DISI	467066	3693291	Yes	
Roblar Road	18-3	DISI	467065	3693289	Yes	
Roblar Road	18-3	DISI	467009	3693248	Yes	
Roblar Road	18-3	DISI	467103	3693679	Yes	
Roblar Road	18-3	DISI	467087	3693504	Yes	
Roblar Road	18-3	DISI	467132	3693350	Yes	
Roblar Road	18-3	DISI	467056	3693293	Yes	
Roblar Road	18-3	DISI	467048	3693291	Yes	
Roblar Road	18-3	DISI	467104	3693681	Yes	
Roblar Road	18-3	DISI	467007	3693246	Yes	
Roblar Road	18-3	DISI	466983	3693197	Yes	
Roblar Road	18-3	DISI	467103	3693682	Yes	
Roblar Road	18-3	DISI	467093	3693667	Yes	
Roblar Road	18-3	DISI	467098	3693376	Yes	
Roblar Road	18-3	DISI	467094	3693666	Yes	
Roblar Road	18-3	DISI	467113	3693345	Yes	
Roblar Road	18-3	DISI	467273	3693862		Yes
Roblar Road	18-3	DISI	467064	3693289		Yes
Roblar Road	18-3	DISI	467005	3693237		Yes
Roblar Road	18-3	DISI	467067	3693294		Yes
Roblar Road	18-3	DISI	467050	3693291		Yes
Roblar Road	18-3	DISI	467312	3693970		Yes
Roblar Road	18-3	DISI	467050	3693290		Yes
Roblar Road	18-3	DISI	466984	3693199		Yes

Road Segm	ent	Species	Easting	Northing	New	Recapture
Roblar Road	18-3	DISI	467098	3693687		Yes
Roblar Road	18-3	DISI	467088	3693501		Yes
Roblar Road	18-3	DISI	467097	3693377		Yes
Roblar Road	18-3	DISI	467126	3693352		Yes
Roblar Road	18-3	DISI	466986	3693197		Yes
Roblar Road	18-4	DIST	467322	3694206	Yes	
Roblar Road	18-4	DIST	467294	3694180	Yes	
Roblar Road	18-4	DIST	467293	3694181	Yes	
Roblar Road	18-4	DIST	467251	3694488	Yes	
Roblar Road	18-4	DIST	467323	3694206		Yes
Roblar Road	18-4	DIST	467304 3	694140		Yes
Roblar Road	18-4	DIST	467299 3	694166		Yes
Roblar Road	18-4	DIST	467318	3694210		Yes
Roblar Road	18-4	DIST	467298	3694163		Yes
Roblar Road	18-4	DIST	467301	3694138		Yes
Roblar Road	18-4	DIST	467330	3694190		Yes
Roblar Road	18-4	DIST	467298	3694164		Yes
Roblar Road	18-4	DIST	467313	3694214		Yes
Roblar Road	18-4	DIST	467303	3694141		Yes
Roblar Road	18-4	DIST	467299	3694165		Yes
Roblar Road	18-4	DISI	467223	3694709	Yes	
Roblar Road	18-4	DISI	467237	3694671	Yes	
Roblar Road	18-4	DISI	467253	3694727	Yes	
Roblar Road	18-4	DISI	467236	3694689	Yes	
Roblar Road	18-4	DISI	467238 3	694671		Yes
Roblar Road	18-4	DISI	467237 3	694672		Yes
Range 210	22-1	DISI	453961	3695714	Yes	
Range 210	22-1 D	ISI	453970	3695730	Yes	
Range 210	22-1 D	ISI	454654	3695410	Yes	
Range 210	22-1	DISI	453968	3695731	Yes	
Range 210	22-1	DISI	453964	3695702		Yes
Range 210	22-1	DISI	454657	3695408		Yes
Range 210	22-1 D	ISI	453948	3695716		Yes
Range 210	22-1 D	ISI	453962	3695714		Yes
Range 210	22-1 D	ISI	454649	3695412		Yes
Range 210	22-1 D	ISI	453939	3695730		Yes
Range 210	22-2	DISI	455262	3695387	Yes	

Appendix 13. Vertebrate animals observed within the survey area (based on direct observation and/or sign).

Reptiles	
Western Fence Lizard	*Sceloporus occidentalis*
Southern Pacific Rattlesnake	*Crotalus oroganus helleri*
Birds	
California Quail	*Callipepla californic*
Turkey Vulture	*Cathartes aura*
Red-tailed Hawk	*Buteo jamaicensis*
Mourning Dove	*Zenaida macroura*
Anna's Hummingbird	*Calypte anna*
Allen's Hummingbird	*Selasphorus sasin*
Nuttal's Woodpecker Picoides	nuttallii
Western Wood-pewee	*Contopus sordidulus*
Pacific-slope Flycatcher	*Empidonax difficillis*
Black Phoebe	*Sayornis nigricans*
Common Raven	*Corvus corax*
American Crow	*Corvus brachyrhynchos*
White-throated Swift	*Aeronautes saxatalis*
Cliff Swallow	*Petrochelidon pyrrhonota*
Northern Rough-wing Swallow	*Stelgidopteryx serripennis*
Bushtit	*Psaltriparus minimus*
Wrentit	*Chamaea fasciata*
Bewick's Wren	*Thryomanes bewickii*
Northern Mockingbird	*Mimus polyglottos*
California Thrasher	*Toxostoma redivivum*
Common Yellowthroat	*Geothlypis trichas*
Yellow-breasted Chat	*Icteria virens*
Warbling Vireo	*Vireo gilvus*
Least Bell's Vireo	*Vireo bellii pusillus*
California Towhee	*Pipilo crissalis*
Spotted Towhee	*Pipilo maculatus*
Song Sparrow	*Melospiza melodia*
White-crowned Sparrow	*Zonotrichia albicollis*
Brown-headed Cowbird	*Molothrus ater*
Great-tailed Grackle	*Quiscalus mexicanus*
American Goldfinch	*Carduelis tristis*
Lesser Goldfinch	*Carduelis psaltria*
House Finch	*Carpodacus mexicanus*
European Starling	*Sturnus vulgaris*
Mammals	
Botta's Picket Gopher	*Thomomys bottae*
California pocket mouse	*Chaetodipus californicus*
Deer Mouse	*Peromyscus maniculatus*
Cactus Mouse	*Peromyscus eremicus*
Desert wood rat	*Neotoma lepida*
Big-eared wood rat	*Neotoma macrotis*
Desert Cottontail	*Sylvilagus audoboni*
Stiped Skunk	*Mephitis mephitis*
Coyote	*Canis latrans*
Raccoon	*Procyon lotor*
California Mountain Lion	*Felis concolor*
Bison	*Bison bison*
Mule Deer	*Odocoileos hemionus*

CERTIFICATION

I hereby certify that the statements furnished above present the data and information required for this biological survey, and that the facts, statements, and information presented are true and correct to the best of my knowledge. Fieldwork conducted for this assessment was performed by Arthur E. Davenport, Davenport Biological Services

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Date: Dec 16, 2008 Signed: Arthur E. Davenport

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APPENDIX I
STATE HISTORIC PRESERVATION OFFICE CORRESPONDENCE

UNITED STATES MARINE CORPS
MARINE CORPS INSTALLATIONS WEST-MARINE CORPS BASE
BOX 555010
CAMP PENDLETON, CALIFORNIA 92055-5010

5090
ENV/CRS
February 19, 2016

Ms. Julianne Polanco
State Historic Preservation Officer
Department of Parks and Recreation
1725 23rd Street, Suite 100
Sacramento, CA 95816-7100

Dear Ms. Polanco:

SUBJECT: REPAIR 24 TRAINING RANGE ACCESS ROADS, MCB CAMP PENDLETON (PE19990010)

Marine Corps Base Camp Pendleton (MCB CamPen) requests your review and concurrence for the above-referenced undertaking in order to comply with Section 106 of the National Historic Preservation Act of 1966 (54 U.S.C. 306108 [NHPA]) as amended. MCB CamPen previously consulted with your office for this undertaking in a letter dated April 15, 2008 entitled "Repair Various Roads Across MCB Camp Pendleton". MCB CamPen did not receive concurrence on this undertaking from your office at this time. As part of the previous environmental analysis an archaeological survey was conducted by ASM (Hale and Becker 2007). This undertaking was never implemented. Since 2007, new archaeological sites and sites not previously noted within or near to the area of potential effects (APE) have been identified.

MCB CamPen is providing your office with new information for the Repair 24 Training Range Access Roads Project. The purpose of the undertaking is to improve access for both range users and emergency vehicles, reduce the frequency of access road maintenance, and increase user safety by improving the access roads. Proposed road improvements would include regrading and resurfacing the access roads, filling road ruts, and constructing All Weather Crossings to existing roads across MCB CamPen. The roads within the project include Road Nos. 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 14, 15, 17, 19, 21, 23, and 24. Roads 10, 16, 18 and 22 are no longer part of the undertaking. In addition, archaeological sites within portions of the roadway as described below have been removed from the undertaking and will be addressed in a separate Section 106 consultation.

Has Been Sent

Undertaking and Area of Potential Effects

The undertaking, pursuant to 36 CFR §800.16(y), is located in areas across MCB CamPen (Enclosure (1) and (2)). The area of potential effects (APE) for the undertaking includes a 200 to 400 foot wide linear corridor covering approximately 54 miles. The improvements will not take place along the entire length of the roads; only intermittent access road segments will be subject to repair. The improvement projects would invoke pockets of construction activity along the roadways. Therefore, the area of direct impact (ADI) is specific and variably located within the APE. Specific improvements for portions of the existing access roads that are subject to severe erosion and that support a high amount of foot and vehicle traffic would receive new asphalt or concrete pavement surfaces to provide a smooth transition to existing topography and minimize erosion potential. Proposed road improvements would also involve a limited number of minor road realignments to smooth out sharp corners and to cross severely eroded drainages on steep slopes. Road realignments would require minor amounts of cut and fill of soil to establish new road platforms.

Where access roads cross wide, shallow drainage features, MCB CamPen will construct a concrete All Weather Crossing across the length of the crossing. The All Weather Crossings would facilitate the movement of runoff across the road surface, reducing the potential for erosion. New or replacement culverts would be designed and installed to convey floodwaters under the roads, where deemed necessary to reduce undercutting and erosion. Ditches and drainage swales would convey runoff into natural drainage features and culverts. Drainage outfalls into channels would be placed as close as possible to the base of the channel to prevent "waterfall" erosion. MCB CamPen plans to install energy dissipaters (riprap or similar hard materials) to absorb the energy of flowing water and reduce erosion. Proposed road delineation projects include installing signs indicating upcoming turns and speed limits, installing guardrails along curves with narrow and/or steep road segments, and trimming vegetation from blind corners and overgrown areas. Staging and laydown areas would be located in previously disturbed areas with relatively flat topography and easy access to construction areas.

Identification of Historic Properties Present

Pursuant to 36 CFR 800.4(b)(1), MCB CamPen has made a reasonable and good faith effort to carry out appropriate identification efforts for historic properties in the vicinity of the proposed undertaking. Several surveys have been conducted that include the entire 24 Roads undertaking roads segments. These surveys include Apple and Cleland (1994), Huey (1995), Cooley (1998), Reddy et al (1998), Reddy and Victorino (1999), Byrd (1999), King (2001), Eighmey and Wahoff (2001), Doolittle et al (2002), Reddy (2003), Shaver and York (2004), Reddy et al (2004), Reddy and O'Neill (2004a and b), York (2004), Reddy and Hale (2004), Reddy and Pallett (2005), Hale and Becker (2007), York and Wahoff (2009), Becker et al (2009), York (2010), York and Glenny (2010), Becker (2012), Higgins (2013 and 2015), and Becker and Quach (2015).

Cultural Resources within or near the APE

Forty archaeological sites were identified during the survey studies for the Repair 24 Range Access Roads APE on MCB CamPen. Maps of the sites within the APE and ADI are provided as Enclosure (3). These sites are listed and briefly described along with eligibility status and SHPO reference number, road location, and relationship to APE/ADI in Table 1 (Enclosure (4)).

Of the 40 archaeological sites, 21 are unevaluated, 8 have been previously determined ineligible, and 11 have been previously determined eligible. SHPO reference numbers are provided in Table 1 (see Enclosure (4)). Roads 2, 3, 4, 6, 7, 8, 9, 12, 13, 14, 15, 21, 23 and 24 have archaeological sites within the APE. Of these roads all but Road 21 has eligible and/or assumed eligible archaeological sites within the APE.

All unevaluated sites (CA-SDI-6051, CA-SDI-13658, CA-SDI-13661, CA-SDI-14417, CA-SDI-14573, CA-SDI-14575, CA-SDI-14578, CA-SDI-14580, CA-SDI-14657, CA-SDI-14675, CA-SDI-14684/14704, CA-SDI-14687, CA-SDI-14688, CA-SDI-14689, CA-SDI-14717, CA-SDI-15107, CA-SDI-18931, CA-SDI-19383, CA-SDI-19384, CA-SDI-20815, and CA-SDI-21318H) in the APE will be assumed eligible for National Register of Historic Places listing. In accordance with 36 CFR 800.4(c)(2), MCB CamPen requests your concurrence with our determination that these 21 sites be assumed eligible for listing on the NRHP for purpose of the undertaking.

All assumed eligible and eligible sites in the APE will be avoided for the Repair 24 Range Access Roads undertaking. Avoidance measures will include staking of site boundaries with 50 foot buffer and are subject to archaeological monitoring to ensure avoidance. A monitoring and discovery plan will be developed for this project.

Consultation with Tribes and Other Parties

In addition to contacting your office, MCB CamPen, pursuant to 36 CFR 800.4, is consulting with federally and non-federally recognized Luiseño tribal governments (Pauma Band of Mission Indians, Pechanga Band of Luiseño Indians, La Jolla Band of Mission Indians, Soboba Band of Mission Indians, San Luis Rey Band of Mission Indians) and non-federally recognized Juaneño tribal governments (Juaneño Band of Mission Indians) as part of the Base's established consultation process. It has notified the public through contacts with the San Diego County Archaeological Society.

Finding of Effects

We have applied the criteria of adverse effect and found, in accordance with 36 CFR 800.5(a)(1), that the historic properties listed in Table 1 (Enclosure (4)) will not be adversely affected by the proposed undertaking through implementing the following conditions: 1) avoidance of all eligible and assumed eligible archaeological sites in the APE; 2) monitoring of all sites in the APE; 3) development and implementation of a monitoring program for ensuring avoidance of direct impacts to sites from repair; 4) development and implementation of a discovery plan; 5) monitoring of all repair activities will be conducted by a qualified archaeologist and Native American monitor; and 6) a monitoring report will be submitted to your office upon completion. References are provided as enclosure (5).

Request for Concurrence

Based on the results of the identification efforts and conditions imposed, MCB Camp Pendleton has found that the undertaking will have **"No Adverse Effect" with conditions** for the Repair 24 Roads undertaking. In accordance with 36 CFR 800.5(b), we are requesting your review and agreement with our

finding of **"No Adverse Effect" with conditions** for this undertaking.

If you have any questions, please contact Kelli Brasket, Cultural Resources Section Head, at (760) 725-9738 or kelli.brasket@usmc.mil.

Sincerely,

D. M. Page
Resources Management
Environmental Security
By direction of the
Commanding General

Enclosures: 1. Project Location Map
2. Project APE
3. Project APE, ADI and Archaeological Sites
4. Table 1
5. References

Table 1: Archaeological Sites In or Near APE by Road #

Site (SDI-)	Road #	Site Size (m)	Description	Eligibility	In APE/ADI	Action
19383	2	40x30	Bedrock Milling with groundstone and flaked stone artifacts	Unevaluated/Assumed eligible	Yes/8m from ADI	Monitored
13658	2	400x300	Artifact scatter with groundstone and flaked stone artifacts	Unevaluated/ Assumed eligible	Yes/In ADI	AVOIDED and monitored (removed from project) Addressed in separate undertaking
13659	2	24x13	Sparse lithic scatter	Ineligible USMC970718B	Yes/100m from ADI	Monitored
13661	2	230x90	Artifact scatter with flaked stone, fire affected rock (FAR) and a stone bowl	Unevaluated/ Assumed eligible	Yes/In ADI	AVOIDED and monitored (removed from project) Addressed in separate undertaking
14345	2	54 x 72	Sparse lithic scatter	Ineligible USMC970718B	Yes/24m from ADI	Monitored
19384	2	50 x 50	Lithic scatter of debitage, a flake tool, a core tool, and a core	Unevaluated/ Assumed eligible	Yes/5m from ADI	AVOIDED/Monitored
14417	3	400x90	Shell midden with flaked stone, groundstone, shell, bone, FAR, and a bone tool	Unevaluated/ Assume Eligible	Yes/In ADI	AVOIDED and monitored (removed from project) Addressed in separate undertaking

Site (SDI-)	Road #	Site Size (m)	Description	Eligibility	In APE/ADI	Action
20015	3	100 x 35	Artifact scatter with flaked stone, edge modified flakes, two flaked tools, groundstone core/hammer, one core, possible retouched flake	Ineligible USMC120817A	Yes/22m from ADI	Monitored
20815	3	100 x 106	Artifact scatter with projectile point (Elko), core, flake tools, formed flake tools, bifaces, and debitage.	Unevaluated/ Assumed eligible	Yes/57m from ADI	Monitored
9565	4	10x3	Sparse lithic scatter	Ineligible USMC100209B	No/Just Outside APE	No action
9568	4	11x18	Artifact scatter with groundstone and flaked stone artifacts	Ineligible USMC20150112004	Yes/33m from ADI	Monitored
21318H	4	50x45	Historic outdoor theater	Unevaluated/ Assumed eligible	Yes/60m from ADI	AVOIDED/Monitored
812/H	6	227005 m2	Village: Flaked stone, groundstone, ceramics, beads, FAR, bone tools, shell, bone artifacts	Eligible/Listed USMC100209B	Yes/10m From ADI	AVOIDED/Monitored
14573	6	28x12	Shell scatter	Unevaluated/ Assumed eligible	Yes/5m from ADI	AVOIDED/Monitored
4538	7	875x480	Shell midden with flaked stone, groundstone, bone tools, shell, bone, human remains and shell bead	Eligible USMC100209B	Yes/In ADI	AVOIDED and monitored (removed from project) Addressed in separate undertaking

Site (SDI-)	Road #	Site Size (m)	Description	Eligibility	In APE/ADI	Action
10006	7	200x170	Artifact scatter with flaked stone, groundstone, and bone	Eligible USMC20150112004	Yes/In ADI	AVOIDED and monitored (removed from project) Addressed in separate undertaking
14006H	7	Linear	Historic Route 2, El Camino Real	Seg C Eligible USMC100209B	Yes/Adjacent ADI	AVOIDED/Monitored
14577	7	38 x 24	Artifact scatter Flaked stone, groundstone	Eligible USMC990709A	Yes/adjacent ADI	AVOIDED/Monitored
14578	7	28 x 16	Sparse lithic scatter	Unevaluated/ Assumed eligible	Yes/82m from ADI	AVOIDED/Monitored
14580	7	30 x 5	Sparse lithic scatter	Unevaluated/ Assumed eligible	Yes/114m from ADI/	AVOIDED/Monitored
811	8	670x640	Shell midden with flaked stone, groundstone, bone tools, percussion tools, shell bone, FAR, and human remains	Eligible USMC090209A/ USMC0601129A	Yes/In ADI	AVOIDED and monitored (removed from project) Addressed in separate
10731	8	420x170	Shell midden with flaked stone, shell, bone, and human remains	Eligible USMC100209B USMC20130923001	Yes/In ADI	AVOIDED and monitored (removed from project) Addressed in separate
14657	9	80x80	Sparse lithic scatter	Unevaluated/ Assumed eligible	Yes/In ADI	AVOIDED and monitored (removed from project) Addressed in separate
14687	9	115x55	Artifact scatter with flaked stone and groundstone	Unevaluated/ Assumed eligible	Yes/400m from ADI	AVOIDED/Monitored

Site (SDI-)	Road #	Site Size (m)	Description	Eligibility	In APE/ADI	Action
14688	9	370x105	Artifact scatter with flaked stone and groundstone	Unevaluated/ Assumed eligible	Yes/in ADI	AVOIDED and monitored (removed from project) Addressed in separate
14689	9	23x9	Artifact scatter with flaked stone and groundstone	Unevaluated/ Assumed eligible	Yes/330m from ADI	AVOIDED/Monitored
15107	9	50x20	Sparse lithic scatter	Unevaluated/ Assumed eligible	Yes/270m from ADI	AVOIDED/Monitored
14496	12	320x240	Artifact scatter with shell, bone, and one debitage artifact	Ineligible USMC100209B	Yes/in ADI	Monitored
14497	12	70x50	Artifact scatter with flaked stone, shell and bone	Eligible USMC100209B	Yes/67m from ADI	AVOIDED/Monitored
14500	12	90x35	Artifact scatter with shell and one Cottonwood Projectile Point	Ineligible USMC100209B USMC050613A	Yes/14m from ADI	Monitored
14717	12	110x70	Sparse lithic scatter	Unevaluated/ Assumed eligible	Yes/In ADI	AVOIDED and monitored (removed from project) Addressed in separate
14675	13	255 x 125	Bedrock milling features with associated artifact scatter with Pinto points and ceramics	Unevaluated/ Assumed eligible	Yes/56m from ADI	AVOIDED/Monitored
6051	14	100x50	Bedrock milling site with flaked stone, groundstone, ceramics, shell, rock piles mortars, basins and slicks	Unevaluated/ Assumed eligible	Yes/In ADI	AVOIDED and monitored (removed from project) Addressed in separate

Site (SDI-)	Road #	Site Size (m)	Description	Eligibility	In APE/ADI	Action
18931	15	30x10	Artifact scatter with flaked stone and groundstone	Unevaluated/ Assumed eligible	Yes/In ADI	AVOIDED and monitored (removed from project) Addressed in separate
14575	15	100x30	Sparse lithic scatter	Unevaluated/ Assumed eligible	Yes/25m from ADI	AVOIDED/Monitored
15762	21	90x30	Artifact scatter with flaked stone and groundstone	Ineligible USMC070702A	Yes/in ADI	monitored
18990	23	73x39	Habitation Donax, cottonwood projectile points, Tizon brown ware, several bifaces, debitage,	Eligible USMC120514A	Yes/32m from ADI	AVOIDED/Monitored
19392	23	350x280	Habitation projectile points, flake tools, debitage, beads, ground stone, fire-affected rock, animal bone, and marine shell	Eligible USMC100209B USMC111202D	Yes/In ADI	AVOIDED and monitored (removed from project) Addressed in separate
14719	24	75x55	Artifact scatter with flaked stone and groundstone	Eligible USMC990709A USMC070216A	Yes/100m from ADI	AVOIDED/Monitored
14684/14704	24	220x100	Artifact scatter with flaked stone and groundstone	Unevaluated/ Assumed eligible	Yes/In ADI	AVOIDED and monitored (removed from project) Addressed in separate

OFFICE OF HISTORIC PRESERVATION
DEPARTMENT OF PARKS AND RECREATION
1725 23rd Street, Suite 100
SACRAMENTO, CA 95816-7100
(916) 445-7000 Fax: (916) 445-7053
calshpo@parks.ca.gov
www.ohp.parks.ca.gov

May 20, 2016

Reply in Reference To: USMC_2016_0229_001

Danielle Page
Resource Management
Environmental Security
United States Marine Corps
Box 5550010
Camp Pendleton, CA 92055-5010

Re: Repair 24 Training Range Access Roads, MCB Camp Pendleton (PE19990010) (your 5090, ENV/CRS, letters of February 19, 2016 and April 28, 2016)

Dear Ms. Page:

Thank you for requesting my comments on the above cited undertaking in accordance with Section 106 of the National Historic Preservation Act of 1966 (54 U.S.C. §306108), as amended, and its implementing regulation at 36 CFR Part 800. In the proposed undertaking, Marine Corps Base Camp Pendleton (MCB CamPen) proposes to improve access for both range users and emergency vehicles, reduce the frequency of access road maintenance, and increase user safety by improving the access roads.

The proposed undertaking is discontinuous portions of MCB CamPen and will include a 200 to 400 feet wide linear corridor for a length of approximately 54 miles. The improvements will not take place along the entire lengths of the subject roads, but instead only intermittent access road segments will be subject to repair. Specific actions would include the following:

- For roads that are subject to severe erosion and that support a high amount of foot and vehicles traffic, they would receive new asphalt or concrete pavement surfaces to provide a smooth transition to existing topography and minimize erosion potential;
- Minor road realignments to smooth out sharp corners and to cross severely eroded drainages or steep slopes;
- Where roads cross wide, shallow drainage features, concrete All Weather Crossings would be constructed across the length of the crossing;
- New or replacement culverts, ditches, and drainage swales would convey runoff into natural drainage features and culverts; and
- Installation of new signs indicating upcoming curves, turns, change in speed limits, and guardrails where appropriate.

Your initial letter identified 40 archaeological sites as being located in the area of potential effects (APE) and the second letter identified an additional 7 sites. Of the 47 sites, 28 are unevaluated in regards to their eligibility for listing on the National Register of Historic Places (NRHP), 8 have been previously determined to be ineligible, and 11 have been previously determined to be eligible. All of the 47 sites have been identified and described adequately in your two letters to ensure that all interested parties know which sites are involved in this proposed undertaking.

MCB CamPen will assume that the 28 unevaluated sites are eligible for listing for the purposes of the proposed undertaking. All of the 28 assumed eligible sites and the 11 previously determined eligible sites will be avoided during the proposed undertaking. Avoidance measures will include staking of site boundaries with 50 feet buffer and will be subject to archaeological monitoring to ensure avoidance. A monitoring and discovery plan will be developed for this proposed undertaking.

MCB CamPen has consulted with five federally recognized tribal governments, one non-federally recognized tribal government, the United Coalition to Protect *Panhe*, and the San Diego County Archaeological Society. In response, MCB CamPen received the following comments:

- Pechanga Band of Luiseño Indians – proposed undertaking is within their tribal territory, requested that the project be discussed during the March 2016 quarterly meeting, the tribe wants to continue participating in the environmental review process, and they have no concerns with this proposed undertaking moving forward; and
- United Coalition to protect *Panhe* – expressed concerns about the size of the project and potential impacts to archaeological sites, wanted clarification for avoidance and monitoring due to the removal of some sites from the project, and wanted to be involved in further consultations. CamPen addressed their concerns in a follow up e-mail.

MCB CamPen applied the criteria of adverse effect and found that the 39 historical properties would not be adversely affected by the proposed undertaking through implementation of the following conditions:

1) Avoidance of all eligible and assumed eligible archaeological sites in the APE;
2) Monitoring of all sites in the APE;
3) Development and implementation of a monitoring program for ensuring avoidance of direct impacts to sites from repairs;
4) Development and implementation of a discovery plan;
5) Monitoring of all repair activities will be conducted by a qualified archaeologist and a Native American monitor; and
6) A monitoring report will be submitted to your office upon completion.

For the purpose of this submission, MCB CamPen has requested me to review and comment on its finding of No Adverse Effect with Conditions.

After reviewing your letters, I have the following comments:

1) I have no objections to your identification and delineation of the APE, pursuant to 36 CFR Parts 800.4(a)(1) and 800.16(d); and
2) I do not object to your finding of No Adverse Effect with Conditions and believe that it is appropriate for this proposed undertaking

Thank you for seeking my comments and considering historic properties as part of your project planning. If you have any questions or concerns, please contact either of the following members of my staff: Ed Carroll at (916) 445-7006 or at e-mail at Ed.carroll@parks.ca.gov or Duane Marti at (916) 445-7030 or at email at Duane.Marti@parks.ca.gov.

Sincerely,

Julianne Polanco
State Historic Preservation Officer

APPENDIX J
RECORD OF NON-APPLICABILITY AND AIR QUALITY DATA

UNITED STATES MARINE CORPS
MARINE CORPS INSTALLATIONS WEST-MARINE CORPS BASE
BOX 555010
CAMP PENDLETON, CALIFORNIA 92055-5010

5090
ENV/PLN
25 JUN 2016

MEMORANDUM FOR THE RECORD

From: Commanding General
To: Director, Environmental Security

Subj: RECORD OF NON-APPLICABILITY (RONA) FOR REPAIR OF ACCESS ROADS AT MARINE CORPS BASE CAMP PENDLETON

Ref: (a) U.S. Environmental Protection Agency, Determining Conformity of General Federal Actions to State or Federal Implementation Plans; Final Rule, published in the Federal Register on 30 November 1993 (40 CFR Parts 6, 51, and 93)
(b) U.S. Environmental Protection Agency, Revisions to the General Conformity Regulations; Final Rule, published in the Federal Register on 5 April 2010 (40 CFR Parts 51 and 93)
(c) OPNAVINST 5090.1C.
(d) Environmental Assessment (EA) for the Repair of Access Roads at Marine Corps Base Camp Pendleton, April 2016

1. References (a), (b), and (c) provide implementing guidance for documenting Clean Air Act (CAA) Conformity Determination requirements. The General Conformity Rule applies to federal actions proposed within areas which are designated as either non-attainment or maintenance areas for a National Ambient Air Quality Standard (NAAQS) for any of the criteria pollutants.

2. The Proposed Action would almost entirely occur within the San Diego Air Basin (SDAB) portion of Marine Corps Base Camp Pendleton (MCB CamPen). This portion of the SDAB is currently in nonattainment of the 8-hour ozone (O_3) NAAQS and is a maintenance area for carbon monoxide (CO) NAAQS. The SDAB is in attainment of the NAAQS for all other criteria pollutants. Therefore, only project emissions of CO and O_3 (or its precursors, volatile organic compounds [VOCs] and oxides of nitrogen [NO_x]) were analyzed in reference (d) for conformity rule applicability. The annual *de minimis* threshold levels for this region are 100 tons of VOC, NO_x, and CO. Federal actions

may be exempt from conformity determinations if they do not exceed designated *de minimis* threshold levels.

3. A very small portion of the proposed project crosses into Orange County, so falls within the South Coast Air Basin (SCAB). The entire SCAB is currently in extreme nonattainment of the 8-hour O_3 NAAQS, in moderate nonattainment of the $PM_{2.5}$ NAAQS, and is a maintenance area for CO, NO_2, and PM_{10}. The annual *de minimis* thresholds for the SCAB are 10 tons of VOC and NO_x, and 100 tons of CO, NO_2, $PM_{2.5}$, and PM_{10}.

4. Under the Proposed Action, the United States Marine Corps (USMC) proposes to enact several types of road improvements to improve safety, minimize erosion, and lessen the need for maintenance on and adjacent to unpaved training area access roads throughout MCB CamPen. The proposal consists of a variety of repair designs including regrading/resurfacing, slope stabilization, signage, culverts, drainage ditches, riprap protection, and all weather crossings.

5. The purpose of the Proposed Action is to: (1) improve access for both range users and emergency vehicles; (2) reduce the frequency of access road maintenance, (3) and increase user safety by improving the access roads. MCB CamPen needs to repair and stabilize this road network as current erosion and maintenance problems have seriously degraded the condition of the range access roads.

6. This emissions estimate assumed that proposed access road repair activities would occur over a 3-year period. Nearly all of the project activities would occur within San Diego County and the SDAB. The only project activities that would occur within Orange County (within the SCAB) are stabilization activities along one section of Road 4 that straddles the San Diego County/Orange County border. The potential road stabilization within Orange County would comprise less than 1.4 acres.

7. Estimated emissions due to implementation of the Proposed Action are shown in Table 1. The data presented in Table 1 represent the annual estimated emissions with implementation of the Proposed Action. Based on the air quality analysis, the maximum estimated emissions would be below conformity *de minimis* threshold levels for the SDAB. The project activities that

would occur within the SCAB would be minor and well within the *de minimis* thresholds for that air basin. Although there would be an increase in emissions during construction activities, operations would continue to be consistent with existing levels and would not represent a significant change in mobile sources of air pollutants or fugitive dust at MCB CamPen. No additional operational emissions from new traffic trips would be anticipated and no significant impact to air quality would occur.

Table 1. Annual Estimated Emissions Resulting from Implementation of the Proposed Action with Evaluation of Conformity

Emission Source	*Emissions (tons/year)*					
	CO	*VOCs*	NO_x	SO_x	PM_{10}	$PM_{2.5}$
Site Preparation Activities	0.3	0.1	0.4	NA	0.3	0.1
Drainage Improvement Activities	1.8	0.4	2.9	NA	1.1	0.4
Stabilization Activities	2.8	0.6	5.5	NA	1.4	0.5
Road Delineation/Paving Activities	0.6	0.1	0.8	NA	0.0	0.0
Annual Subtotal	**6.8**	**1.3**	**9.8**	**NA**	**2.8**	**1.0**
Conformity SDAB *de minimis* Thresholds	100	100	100	NA	NA	NA
Exceeds Conformity *de minimis* Thresholds?	No	No	No	No	No	No

Note: NA = not applicable.

8. The USMC concludes that *de minimis* thresholds for applicable criteria pollutants would not be exceeded as a result of implementation of the Proposed Action. The emissions data supporting that conclusion are shown in Table 1, which is a summary of the calculations, methodology, and data attached to this RONA. Therefore, the USMC determined that additional emissions analyses are not warranted for the Proposed Action. A formal Conformity Determination was not considered necessary.

9. To the best of my knowledge, the information presented in this RONA is correct and accurate, and I concur in the finding that implementation of the Proposed Action does not require a formal CAA Conformity Determination.

EDWARD D. BANTA

Copy to:
File

Welcome to the Road Construction Emissions Model, Version 7.1.5.1

User Instructions

This spreadsheet system contains the following individual worksheets:

1. This worksheet of User Instructions
2. Emission Estimates
3. Data Entry
4. EMFAC2011
5. OFFROAD Convert
6. OFFROAD HP & LF
7. OFFROAD EF

Changes from previous version of Road Construction Emissions Model

(Version 7.1.4 to 7.1.5) (updated by SMAQMD 12/11/13 with assistance from ENVIRON Corporation)

1) Grubbing and Land Clearing Phase calculation of active months in 2007, 2017, 2019 fixed.
2) Soil Hauling Emissions calculation to select override if it exists for round trips/day.
3) Worker Commute Emissions calculation of starting and hot soak emissions; drainage phase PM_{10} emission rate.
4) Water Truck Emissions calculation to select number of months for Grubbing and Land Clearing Phase; maximum acreage/day after 2025.

(Version 6.3.2 to Version 7.1.0, 7.1.1, 7.1.2, 7.1.3 & 7.1.4) (updated by SMAQMD 8/2/13)

1) EMFAC2011 emission factors added (previous EMFAC versions dropped).
2) OFFROAD2011 emission factors added (and fixed error).
3) OFFROAD2007 for categories not in OFFROAD2011 (and fixed error)
4) Project length changed to include calendar years 2009 through 2025.
5) Average Offroad HP by Equipment Type calculation updated and corrected
6) Load Factor Adjustment deactivated (default load factors already incorporated in ARB's calculation of emission factors)
7) Crawler Tractor equipment added to model
8) Air Compressors ROG & Default Excavators calculation on Data Entry sheet corrected.
9) Default equipment list updated
10) Corrections to Worker Commute Emissions calculations

The Emission Estimates worksheet calculates a project's emissions in pounds per day (and kilograms per day) by project phase and tons (and megagrams) over the entire construction period.
The worksheet can be used to estimate emissions for both vehicle exhaust and fugitive dust. The methodology used to estimate fugitive dust emissions is a simplified methodology involving estimates of the maximum area (acreage) of land disturbed daily. Detailed fugitive dust emission estimates associated with individual materials handling operations and/or activity/vehicle types cannot be conducted with this version of the model.
The Emission Estimates worksheet cannot be modified directly, it is a protected worksheet. It can only be modified indirectly by entering information for the project in selected areas of the Data Entry worksheet.
The last four of these worksheets - EMFAC2011, OFFROAD Convert, OFFROAD HP & LP, and OFFROAD EF - cannot be modified by the user. They are protected worksheets.
Even though all or portions of several worksheets are protected, the individual formulas used in the calculations can be seen by the user.
The Data Entry worksheet includes several areas that can be modified by the user.
User instructions in the Data Entry worksheet are highlighted in red.
On the Data Entry worksheet, the user has two options for entering project data: required data and optional data. Required data is entered in the data input section (yellow cells). That required data is then used by the worksheet to calculate default values for the project.
The user can override the default values (blue cells) calculated for a project and is encouraged to do so if project specific information is available. Due to the difficulty in developing reliable default values for road construction projects, the user is encouraged to enter as much site specific information as is available for the project being analyzed.
The Data Entry Worksheet also includes a button that allows the user to clear previously entered data. This button is found just at the top of and to the right of the data entry portion of the worksheet.
When projects are discontinuous, the user must make adjustments to the spreadsheet manually, since the program cannot be setup to anticpate unexpected project delays.

#VALUE! <- This error message may occur during use of the spreadsheets. This occurs whenever the user enters a non numeric value, including a space character, into a cell that is used to calculate a numeric value. Consequently, to erase values entered into the spreadsheets, use the delete key instead of the space bar!

Note: Information in this worksheet is based on conversations with knowledgeable individuals at the Sacramento Metropolitan Air Quality Management District, the California Department of Transportation, the California Air Resources Board, the U.S. EPA, and private industry involved in road construction.
Also, the 26th edition of Walker's Building Estimator's Reference Book (1999) was used in the development of this spreadsheet.
This spreadsheet was prepared by Jones & Stokes and TIAX LLC with the financial support and direction of the Sacramento Metropolitan Air Quality Management District.

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT
http://www.airquality.org
Karen Huss
Khuss@airquality.org
916/874-4881

ICF Jones & Stokes
an ICF International Company
http://www.jonesandstokes.com
Shannon Hatcher
shatcher@icfi.com
916/737-3000

TETRA TECH
http://www.tetratech.com/
Karen Law
Karen.Law@tetratech.com
408/517-1550

Road Construction Emissions Model, Version 7.1.5.1

Emission Estimates for -> Repair of Access Roads at MCB Camp Pendleton Project Phases (English Units)	ROG (lbs/day)	CO (lbs/day)	NOx (lbs/day)	Total PM10 (lbs/day)	Exhaust PM10 (lbs/day)	Fugitive Dust PM10 (lbs/day)	Total PM2.5 (lbs/day)	Exhaust PM2.5 (lbs/day)	Fugitive Dust PM2.5 (lbs/day)	CO2 (lbs/day)
Grubbing/Land Clearing	5.9	32.1	33.3	22.0	2.0	20.0	5.9	1.7	4.2	5,619.0
Grading/Excavation	12.8	64.0	105.8	25.6	5.6	20.0	9.2	5.0	4.2	12,383.8
Drainage/Utilities/Sub-Grade	9.7	48.6	64.0	24.0	4.0	20.0	7.8	3.6	4.2	8,743.4
Paving	7.3	37.7	43.2	2.7	2.7	-	2.4	2.4	-	7,033.9
Maximum (pounds/day)	12.8	64.0	105.8	25.6	5.6	20.0	9.2	5.0	4.2	12,383.8
Total (tons/construction project)	1.3	6.8	9.8	2.8	0.6	2.2	1.0	0.5	0.5	1,271.2

Notes: Project Start Year -> 2016
Project Length (months) -> 12
Total Project Area (acres) -> 58
Maximum Area Disturbed/Day (acres) -> 2
Total Soil Imported/Exported (yd^3/day)-> 0

PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sum of exhaust and fugitive dust emissions shown in columns K and L.

Emission Estimates for -> Repair of Access Roads at MCB Camp Pendleton Project Phases (Metric Units)	ROG (kgs/day)	CO (kgs/day)	NOx (kgs/day)	Total PM10 (kgs/day)	Exhaust PM10 (kgs/day)	Fugitive Dust PM10 (kgs/day)	Total PM2.5 (kgs/day)	Exhaust PM2.5 (kgs/day)	Fugitive Dust PM2.5 (kgs/day)	CO2 (kgs/day)
Grubbing/Land Clearing	2.7	14.6	15.1	10.0	0.9	9.1	2.7	0.8	1.9	2,554.1
Grading/Excavation	5.8	29.1	48.1	11.6	2.5	9.1	4.2	2.3	1.9	5,629.0
Drainage/Utilities/Sub-Grade	4.4	22.1	29.1	10.9	1.8	9.1	3.5	1.6	1.9	3,974.3
Paving	3.3	17.2	19.6	1.2	1.2	-	1.1	1.1	-	3,197.2
Maximum (kilograms/day)	5.8	29.1	48.1	11.6	2.5	9.1	4.2	2.3	1.9	5,629.0
Total (megagrams/construction project)	1.2	6.2	8.9	2.5	0.5	2.0	0.9	0.5	0.4	1,153.1

Notes: Project Start Year -> 2016
Project Length (months) -> 12
Total Project Area (hectares) -> 23
Maximum Area Disturbed/Day (hectares) -> 1
Total Soil Imported/Exported (meters^3/day)-> 0

PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sume of exhaust and fugitive dust emissions shown in columns K and L.

Road Construction Emissions Model

Version 7.1.5.1

Data Entry Worksheet

Note: Required data input sections have a yellow background.
Optional data input sections have a blue background. Only areas with a yellow or blue background can be modified. Program defaults have a white background.
The user is required to enter information in cells C10 through C25.

Input Type

Project Name	Repair of Access Roads at MCB Camp Pendleton	
Construction Start Year	2016	Enter a Year between 2009 and 2025 (inclusive)
Project Type	2	1 New Road Construction 2 Road Widening 3 Bridge/Overpass Construction
Project Construction Time	12.00	months
Predominant Soil/Site Type: Enter 1, 2, or 3	1	1. Sand Gravel 2. Weathered Rock-Earth 3. Blasted Rock
Project Length	18.00	miles
Total Project Area	58.00	acres
Maximum Area Disturbed/Day	2.00	acres
Water Trucks Used?	1	1. Yes 2. No
Soil Imported	0.00	yd^3/day
Soil Exported	0.00	yd^3/day
Average Truck Capacity	20	yd^3 (assume 20 if unknown)

To begin a new project, click this button to clear data previously entered. This button will only work if you opted not to disable macros when loading this spreadsheet.

The remaining sections of this sheet contain areas that can be modified by the user, although those modifications are optional.

Note: The program's estimates of construction period phase length can be overridden in cells C34 through C37.

Construction Periods	User Override of Construction Months	Program Calculated Months	2005	%	2006	%	2007	%
Grubbing/Land Clearing		1.20	0.00	0.00	0.00	0.00	0.00	0.00
Grading/Excavation		4.80	0.00	0.00	0.00	0.00	0.00	0.00
Drainage/Utilities/Sub-Grade		4.20	0.00	0.00	0.00	0.00	0.00	0.00
Paving		1.80	0.00	0.00	0.00	0.00	0.00	0.00
Totals	0.00	12.00						

NOTE: soil hauling emissions are included in the Grading/Excavation Construction Period Phase, therefore the Construction Period for Grading/Excavation cannot be zero if hauling is part of the project.

Hauling emission default values can be overridden in cells C45 through C46.

Soil Hauling Emissions

User Input	User Override of Soil Hauling Defaults	Default Values
Miles/round trip		30
Round trips/day		0
Vehicle miles traveled/day (calculated)	0	

Hauling Emissions	ROG	NOx	CO	PM10	PM2.5	CO2
Emission rate (grams/mile)	0.16	8.25	0.70	0.17	0.10	1679.86
Emission rate (grams/trip)	0.00	0.00	0.00	0.00	0.00	0.00
Pounds per day	0.00	0.00	0.00	0.00	0.00	0.00
Tons per contruction period	0.00	0.00	0.00	0.00	0.00	0.00

Worker commute default values can be overridden in cells C60 through C65.

Worker Commute Emissions

	User Override of Worker Commute Default Values	Default Values
Miles/ one-way trip		20
One-way trips/day		2
No. of employees: Grubbing/Land Clearing		49
No. of employees: Grading/Excavation		64
No. of employees: Drainage/Utilities/Sub-Grade		58
No. of employees: Paving		54

	ROG	NOx	CO	PM10	PM2.5	CO2
Emission rate - Grubbing/Land Clearing (grams/mile)	0.147	0.194	1.744	0.047	0.020	443.650
Emission rate - Grading/Excavation (grams/mile)	0.147	0.194	1.744	0.047	0.020	443.650
Emission rate - Draining/Utilities/Sub-Grade (gr/mile)	0.147	0.194	1.744	0.047	0.020	443.650
Emission rate - Paving (grams/mile)	0.147	0.194	1.744	0.047	0.020	443.650
Emission rate - Grubbing/Land Clearing (grams/trip)	0.505	0.323	4.200	0.004	0.003	95.592
Emission rate - Grading/Excavation (grams/trip)	0.505	0.323	4.200	0.004	0.003	95.592
Emission rate - Draining/Utilities/Sub-Grade (gr/trip)	0.505	0.323	4.200	0.004	0.003	95.592
Emission rate - Paving (grams/trip)	0.505	0.323	4.200	0.004	0.003	95.592
Pounds per day - Grubbing/Land Clearing	0.742	0.903	8.392	0.202	0.086	1926.075
Tons per const. Period - Grub/Land Clear	0.010	0.012	0.111	0.003	0.001	25.424
Pounds per day - Grading/Excavation	0.970	1.181	10.974	0.265	0.112	2518.713
Tons per const. Period - Grading/Excavation	0.051	0.062	0.579	0.014	0.006	132.988
Pounds per day - Drainage/Utilities/Sub-Grade	0.875	1.065	9.898	0.239	0.101	2271.780
Tons per const. Period - Drain/Util/Sub-Grade	0.040	0.049	0.457	0.011	0.005	104.956
Pounds per day - Paving	0.818	0.996	9.253	0.223	0.094	2123.621
Tons per const. Period - Paving	0.016	0.020	0.183	0.004	0.002	42.048
tons per construction period	0.118	0.143	1.331	0.032	0.014	305.416

Water truck default values can be overriden in cells C91 through C93 and E91 through E93.

Water Truck Emissions	User Override of Default # Water Trucks	Program Estimate of Number of Water Trucks	User Override of Truck Miles Traveled/Day	Default Values Miles Traveled/Day
Grubbing/Land Clearing - Exhaust		1		40
Grading/Excavation - Exhaust		1		40
Drainage/Utilities/Subgrade		1		40

	ROG	NOx	CO	PM10	PM2.5	CO2
Emission rate - Grubbing/Land Clearing (grams/mile)	0.16	8.25	0.70	0.17	0.10	1679.86
Emission rate - Grading/Excavation (grams/mile)	0.16	8.25	0.70	0.17	0.10	1679.86
Emission rate - Draining/Utilities/Sub-Grade (gr/mile)	0.16	8.25	0.70	0.17	0.10	1679.86
Pounds per day - Grubbing/Land Clearing	0.01	0.73	0.06	0.01	0.01	148.00
Tons per const. Period - Grub/Land Clear	0.00	0.01	0.00	0.00	0.00	1.95
Pound per day - Grading/Excavation	0.01	0.73	0.06	0.01	0.01	148.00
Tons per const. Period - Grading/Excavation	0.00	0.04	0.00	0.00	0.00	7.81
Pound per day - Drainage/Utilities/Subgrade	0.01	0.73	0.06	0.01	0.01	148.00
Tons per const. Period - Drainage/Utilities/Subgrade	0.00	0.03	0.00	0.00	0.00	6.84

Fugitive dust default values can be overridden in cells C110 through C112.

Fugitive Dust	User Override of Max Acreage Disturbed/Day	Default Maximum Acreage/Day	PM10 pounds/day	PM10 tons/per period	PM2.5 pounds/day	PM2.5 tons/per period
Fugitive Dust - Grubbing/Land Clearing		2	20.0	0.3	4.2	0.1
Fugitive Dust - Grading/Excavation		2	20.0	1.1	4.2	0.2
Fugitive Dust - Drainage/Utilities/Subgrade		2	20.0	0.9	4.2	0.2

Off-Road Equipment Emissions

Grubbing/Land Clearing	Default Number of Vehicles		ROG	CO	NOx	PM10	PM2.5	CO2
Override of Default Number of Vehicles	*Program-estimate*	Type	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day
		Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00
		Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00
		Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00
		Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00
		Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00
		Cranes	0.00	0.00	0.00	0.00	0.00	0.00
	1	Crawler Tractors	0.74	4.47	9.52	0.37	0.34	824.89
		Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00
	2	Excavators	0.82	5.58	8.93	0.44	0.40	1145.73
		Forklifts	0.00	0.00	0.00	0.00	0.00	0.00
		Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00
		Graders	0.00	0.00	0.00	0.00	0.00	0.00
		Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00
		Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00
		Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Other General Industrial Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Other Material Handling Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Pavers	0.00	0.00	0.00	0.00	0.00	0.00
		Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00
		Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00
		Pumps	0.00	0.00	0.00	0.00	0.00	0.00
		Rollers	0.00	0.00	0.00	0.00	0.00	0.00
		Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00
		Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00
		Rubber Tired Loaders	0.00	0.00	0.00	0.00	0.00	0.00
		Scrapers	0.00	0.00	0.00	0.00	0.00	0.00
10.00	36	Signal Boards	3.63	13.65	13.19	0.95	0.88	1574.34
		Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00
		Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00
		Tractors/Loaders/Backhoes	0.00	0.00	0.00	0.00	0.00	0.00
		Trenchers	0.00	0.00	0.00	0.00	0.00	0.00
		Welders	0.00	0.00	0.00	0.00	0.00	0.00
	Grubbing/Land Clearing	pounds per day	5.2	23.7	31.6	1.8	1.6	3545.0
	Grubbing/Land Clearing	tons per phase	0.1	0.3	0.4	0.0	0.0	46.8

Grading/Excavation	Default Number of Vehicles		ROG	CO	NOx	PM10	PM2.5	CO2
Override of Default Number of Vehicles	*Program-estimate*	Type	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day
		Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00
		Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00
		Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00
		Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00
		Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00
	0	Cranes	0.00	0.00	0.00	0.00	0.00	0.00
	1	Crawler Tractors	0.74	4.47	9.52	0.37	0.34	824.89
		Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00
2.00	3	Excavators	0.82	5.58	8.93	0.44	0.40	1145.73
		Forklifts	0.00	0.00	0.00	0.00	0.00	0.00
		Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00
	2	Graders	2.13	6.96	20.76	1.17	1.07	1342.05
		Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00
		Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00
		Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Other General Industrial Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Other Material Handling Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Pavers	0.00	0.00	0.00	0.00	0.00	0.00
		Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00
		Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00
		Pumps	0.00	0.00	0.00	0.00	0.00	0.00
1.00	2	Rollers	0.35	1.51	3.09	0.23	0.21	279.53
		Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00
		Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00
	1	Rubber Tired Loaders	0.52	3.12	6.51	0.22	0.20	662.62
	2	Scrapers	2.91	14.51	35.39	1.43	1.31	3216.04
10.00	36	Signal Boards	3.63	13.65	13.19	0.95	0.88	1574.34
		Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00
		Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00
2.00	4	Tractors/Loaders/Backhoes	0.72	3.15	6.54	0.50	0.46	671.85
		Trenchers	0.00	0.00	0.00	0.00	0.00	0.00
		Welders	0.00	0.00	0.00	0.00	0.00	0.00
	Grading/Excavation	pounds per day	11.8	52.9	103.9	5.3	4.9	9717.1
	Grading	tons per phase	0.6	2.8	5.5	0.3	0.3	513.1

Drainage/Utilities/Subgrade Override of Default Number of Vehicles	Default Number of Vehicles *Program-estimate*		ROG pounds/day	CO pounds/day	NOx pounds/day	PM10 pounds/day	PM2.5 pounds/day	CO2 pounds/day
		Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00
	1	Air Compressors	0.68	3.42	4.38	0.37	0.34	507.95
		Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00
		Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00
		Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00
		Cranes	0.00	0.00	0.00	0.00	0.00	0.00
		Crawler Tractors	0.00	0.00	0.00	0.00	0.00	0.00
		Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Excavators	0.00	0.00	0.00	0.00	0.00	0.00
		Forklifts	0.00	0.00	0.00	0.00	0.00	0.00
	1	Generator Sets	0.51	2.98	3.86	0.27	0.25	487.07
	1	Graders	1.07	3.48	10.38	0.58	0.54	671.02
		Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00
		Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00
		Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Other General Industrial Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Other Material Handling Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Pavers	0.00	0.00	0.00	0.00	0.00	0.00
		Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00
	1	Plate Compactors	0.04	0.21	0.25	0.01	0.01	34.45
		Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00
	1	Pumps	0.44	2.47	3.19	0.23	0.22	396.14
		Rollers	0.00	0.00	0.00	0.00	0.00	0.00
	1	Rough Terrain Forklifts	0.22	2.03	2.73	0.15	0.14	372.74
		Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00
		Rubber Tired Loaders	0.00	0.00	0.00	0.00	0.00	0.00
	1	Scrapers	1.46	7.25	17.70	0.71	0.66	1608.02
10.00	36	Signal Boards	3.63	13.65	13.19	0.95	0.88	1574.34
		Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00
		Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00
2.00	3	Tractors/Loaders/Backhoes	0.72	3.15	6.54	0.50	0.46	671.85
		Trenchers	0.00	0.00	0.00	0.00	0.00	0.00
		Welders	0.00	0.00	0.00	0.00	0.00	0.00
	Drainage	pounds per day	8.8	38.6	62.2	3.8	3.5	6323.6
	Drainage	tons per phase	0.4	1.8	2.9	0.2	0.2	292.1

Paving	Default Number of Vehicles		ROG	CO	NOx	PM10	PM2.5	CO2
Override of Default Number of Vehicles	*Program-estimate*	Type	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day
		Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00
		Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00
		Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00
1.00		Cement and Mortar Mixers	0.07	0.35	0.42	0.02	0.02	57.88
		Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00
		Cranes	0.00	0.00	0.00	0.00	0.00	0.00
		Crawler Tractors	0.00	0.00	0.00	0.00	0.00	0.00
		Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Excavators	0.00	0.00	0.00	0.00	0.00	0.00
		Forklifts	0.00	0.00	0.00	0.00	0.00	0.00
		Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00
		Graders	0.00	0.00	0.00	0.00	0.00	0.00
		Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00
1.00		Off-Highway Trucks	0.99	4.30	10.90	0.41	0.38	1418.67
		Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Other General Industrial Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Other Material Handling Equipment	0.00	0.00	0.00	0.00	0.00	0.00
	1	Pavers	0.42	2.84	4.49	0.22	0.21	481.68
	1	Paving Equipment	0.32	2.69	3.53	0.18	0.16	426.30
		Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00
		Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00
		Pumps	0.00	0.00	0.00	0.00	0.00	0.00
1.00	2	Rollers	0.35	1.51	3.09	0.23	0.21	279.53
		Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00
		Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00
		Rubber Tired Loaders	0.00	0.00	0.00	0.00	0.00	0.00
		Scrapers	0.00	0.00	0.00	0.00	0.00	0.00
10.00	36	Signal Boards	3.63	13.65	13.19	0.95	0.88	1574.34
		Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00
		Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00
2.00	3	Tractors/Loaders/Backhoes	0.72	3.15	6.54	0.50	0.46	671.85
		Trenchers	0.00	0.00	0.00	0.00	0.00	0.00
		Welders	0.00	0.00	0.00	0.00	0.00	0.00
	Paving	pounds per day	6.5	28.5	42.2	2.5	2.3	4910.2
	Paving	tons per phase	0.1	0.6	0.8	0.0	0.0	97.2
Total Emissions all Phases (tons per construction period) =>			1.2	5.5	9.6	0.5	0.5	949.2

Equipment default values for horsepower and hours/day can be overridden in cells C289 through C322 and E289 through E322.

Equipment		Default Values Horsepower		Default Values Hours/day
Aerial Lifts		63		8
Air Compressors		106		8
Bore/Drill Rigs		206		8
Cement and Mortar Mixers		10		8
Concrete/Industrial Saws		64		8
Cranes		226		8
Crawler Tractors		208		8
Crushing/Proc. Equipment		142		8
Excavators		163		8
Forklifts		89		8
Generator Sets		66		8
Graders		175		8
Off-Highway Tractors		123		8
Off-Highway Trucks		400		8
Other Construction Equipment		172		8
Other General Industrial Equipment		88		8
Other Material Handling Equipment		167		8
Pavers		126		8
Paving Equipment		131		8
Plate Compactors		8		8
Pressure Washers		26		8
Pumps		53		8
Rollers		81		8
Rough Terrain Forklifts		100		8
Rubber Tired Dozers		255		8
Rubber Tired Loaders		200		8
Scrapers		362		8
Signal Boards		20		8
Skid Steer Loaders		65		8
Surfacing Equipment		254		8
Sweepers/Scrubbers		64		8
Tractors/Loaders/Backhoes		98		8
Trenchers		81		8
Welders		45		8

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END OF DATA ENTRY SHEET