

FORA ESCA REMEDIATION PROGRAM

2012 Annual Natural Resource Monitoring, Mitigation, and Management Report

Covering Activities Conducted from 16 October 2011
through 15 October 2012

Environmental Services Cooperative Agreement
Remediation Program Munitions Response Areas

Former Fort Ord
Monterey County, California

February 19, 2013

Prepared for:

FORT ORD REUSE AUTHORITY

920 2nd Avenue, Suite A
Marina, California 93933



Environmental Services Cooperative Agreement
No. W9128F-07-2-01621

and
FORA Remediation Services Agreement (3/30/07)

Document Control Number: 09595-13-057-002

Prepared by:



CONTENTS

1.0	INTRODUCTION	1
1.1	Purpose and Scope	1
1.2	Environmental Services Cooperative Agreement	1
2.0	NATURAL RESOURCE MONITORING AND MITIGATION REQUIREMENTS	3
2.1	Habitat Management Plan	3
2.2	Biological Opinions	6
3.0	SITE DESCRIPTION	7
3.1	Vegetation Types in MRAs	7
3.1.1	Central Maritime Chaparral	7
3.1.2	Coast Live Oak Woodland	8
3.1.3	Grassland	8
3.1.4	Aquatic Features	9
3.2	Environmental Characteristics of MRAs with Habitat Parcels	9
3.2.1	Future East Garrison MRA Site Description	9
3.2.2	Interim Action Ranges MRA Site Description	10
3.2.3	Parker Flats MRA Site Description	11
4.0	HMP SPECIES	12
4.1	HMP Amphibians	13
4.2	HMP Birds	13
4.3	HMP Reptiles	14
4.4	HMP Mammals	14
4.5	HMP Invertebrates	14

4.6	HMP Shrubs	15
4.7	HMP Herbaceous Perennials	16
4.8	HMP Annuals	16
5.0	METHODS FOR MUNITIONS RESPONSE ACTIVITIES AND HABITAT MONITORING	17
5.1	Methods for Munitions Response Activities	17
5.1.1	Methods for Vegetation Cutting	18
5.1.2	Methods for Digital Geophysical Mapping MEC Response Activities	18
5.1.6	Methods for Other Activities in Support of Munitions Response	20
5.2	Habitat Monitoring Methods	20
5.2.1	Methods for Vegetation Monitoring	21
5.2.2	Methods for Supplemental Herbaceous Vegetation Monitoring	22
5.2.3	Methods for HMP Annual Plant Monitoring	22
5.2.4	Methods for HMP Manzanita Retention	23
5.2.5	Methods for Post-Rainfall CTS Monitoring	23
5.2.6	Methods for Aquatic Feature Monitoring	24
5.2.7	Methods for Weed Monitoring and Management	24
5.2.8	Methods for Erosion Control	24
5.3	Methods for Restoration Implementation Preparation	24
6.0	SUMMARY OF MUNITIONS RESPONSE ACTIVITIES AFFECTING HABITAT PARCELS	25
6.1	Munitions Response Activities in Future East Garrison MRA	25
6.2	Munitions Response Activities in Interim Action Ranges MRA	25
6.3	Munitions Response Activities in Parker Flats MRA	26

6.4	Cumulative Areas of Vegetation Cutting in Habitat Parcels	26
7.0	RESULTS of MONITORING, MANAGEMENT, AND MITIGATION ACTIVITIES	26
7.1	Natural Resource Impact Mitigation Checklists and Inspection Reports	26
7.1.1	NRIM Checklists	27
7.1.1.1	Future East Garrison MRA	27
7.1.1.2	Military Operations in Urban Terrain Site	27
7.1.2	NRIM Field Inspection Reports	27
7.1.2.1	Future East Garrison MRA NRIM Inspection Reports	27
7.1.2.2	Interim Action Ranges MRA NRIM Inspection Report	28
7.1.2.3	Military Operations in Urban Terrain Site NRIM Inspection Report	28
7.2	Habitat Monitoring Activities	29
7.2.1	Vegetation Monitoring in MRAs	29
7.2.1.1	Vegetation Monitoring in Future East Garrison MRA	29
7.2.1.2	Vegetation Monitoring in Interim Action Ranges MRA	30
7.2.1.3	Vegetation Monitoring in Parker Flats MRA	32
7.2.2	HMP Species Monitoring in MRAs	33
7.2.2.1	HMP Species Monitoring in Future East Garrison MRA	33
7.2.2.2	HMP Annual Species Monitoring in IAR MRA	33
7.2.2.3	HMP Annual Species Monitoring in Parker Flats MRA	35
7.3	CTS Mitigation Measures Implemented	35
7.4	Aquatic Feature Monitoring in the Future East Garrison MRA	36
7.5	Wildlife Relocation	36
7.6	Weed Management Activities	36

7.7	Environmental Awareness Training	38
7.8	Erosion Control Monitoring and Mitigation	39
8.0	RESTORATION PLANNING IN THE INTERIM ACTION RANGES MRA	39
9.0	CONCLUSION	40
10.0	REFERENCES	42

TABLES

1-1	Approximate Areas Affected by Field Activities Conducted by ESCA RP from October 16, 2011 through October 15, 2012
1-2	Vegetation Monitoring Activities in Habitat Parcels of MRAs 2008-2012
2-1	HMP Species Occurrence within Habitat Parcels of MRAs
3-1	Future East Garrison Grenade Range: Aquatic Features Observed Plant Species
7-1	Future East Garrison MRA Central Maritime Chaparral Transects 2011 Baseline Data
7-2	Future East Garrison MRA Oak Woodland Transects 2012 Baseline Data
7-3	Future East Garrison MRA Grenade Range Transects 2012 Baseline Data
7-4	Interim Action Ranges MRA Central Maritime Chaparral 2010-2012 Baseline and Post-activity Cover and Frequency of Shrub Species in Nine 50-meter Transects
7-5	Interim Action Ranges MRA Central Maritime Chaparral 2012 Cover and Frequency of Plant Species after Vegetation Cutting in 11 Herbaceous Quadrats
7-6	Interim Action Ranges MRA Central Maritime Chaparral 2012 Cover and Frequency of Plant Species after Small-scale Excavations in Five 50-meter Transects
7-7	Interim Action Ranges MRA Central Maritime Chaparral 2012 Cover and Frequency of Plant Species after Small-scale Excavations in 36 Herbaceous Quadrants
7-8	Interim Action Ranges MRA Grassland 2012 Cover and Frequency of Plant Species after Vegetation Cutting in Six Herbaceous Quadrants
7-9	Parker Flats MRA Central Maritime Chaparral 2008-2012 Baseline and Post-activity Cover and Frequency of Shrub Species in Eight 50-meter Transects

- 7-10 Parker Flats MRA Central Coastal Scrub 2012 Cover and Frequency of Shrub Species after Vegetation Cutting in Three 50-meter Transects
- 7-11 Parker Flats MRA Central Coastal Scrub 2012 Cover and Frequency of Plant Species after Vegetation Cutting in Six Herbaceous Quadrats
- 7-12 Future East Garrison MRA 2010-2012 HMP Annual Species Abundance
- 7-13 Future East Garrison MRA 2012 Toro Manzanita Density Survey
- 7-14 Interim Action Ranges MRA 2010-2012 HMP Annual Species Abundance
- 7-15 Interim Action Ranges MRA 2008-2012 HMP Annual Species Reference Plots
- 7-16 Interim Action Ranges MRA 2010-2012 Baseline and Post-activity Monterey Spineflower Presence
- 7-17 Interim Action Ranges MRA 2010-2012 Baseline and Post-activity Monterey Gilia Presence
- 7-18 Interim Action Ranges MRA 2010-2012 Baseline and Post-activity Seaside Bird's Beak Presence
- 7-19 Parker Flats MRA 2008-2012 HMP Annual Species Abundance
- 8-1 Munitions Response Activity Types during 2012 Reporting Period

FIGURES

- 1 Former Fort Ord Location Map
- 2 ESCA Property Proposed Future Land Use
- 3 Future East Garrison MRA
- 4 Interim Action Ranges MRA
- 5 Parker Flats MRA
- 6 Future East Garrison MRA Munitions Response Activities
- 7 Interim Action Ranges MRA Munitions Response Activities
- 8 Parker Flats MRA Munitions Response Activities
- 9 Former Fort Ord Monterey Spineflower Critical Habitat Location
- 10 Former Fort Ord California Tiger Salamander Potential Habitat Zones

- 11 Future East Garrison MRA Maritime Chaparral Areas and Habitat Monitoring Transects
- 12 Interim Action Ranges MRA 2010-2011 HMP Annual Species Plot Locations and Habitat Monitoring Transects
- 13 Parker Flats MRA Phase II Habitat Area Monitoring Locations Established in 2008 Baseline Survey

APPENDICES

- A Natural Resource Impact Mitigation Checklists and Reports for Habitat Parcels
- B Documentation of Approval by USFWS for California Tiger Salamander Handling by ESCA RP Biologists
- C Weed Monitoring Plans and Reports

ACRONYMS AND ABBREVIATIONS

AOC	Administrative Order of Consent
ARCADIS	ARCADIS U.S., Inc.
Army	U.S. Department of the Army
BO	Biological Opinion
BRAC	Base Realignment and Closure
CDFG	California Department of Fish and Game
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cm	centimeter(s)
CNDDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CSUMB	California State University Monterey Bay
CTS	California tiger salamander
dbh	diameter at breast height
DGM	digital geophysical mapping
DTSC	Department of Toxic Substances Control
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
ESCA	Environmental Services Cooperative Agreement
ESCA RP	Environmental Services Cooperative Agreement Remediation Program
FFA	Federal Facility Agreement
FORA	Fort Ord Reuse Authority
FEG	Future East Garrison
GIS	Geographic Information System
GPS	Global Positioning System
ha	hectare(s)
HMP	Habitat Management Plan
HRP	Habitat Restoration Plan
IAR	Interim Action Ranges
km	kilometer(s)
m	meter(s)
MD	munitions debris
MEC	munitions and explosives of concern
MOUT	Military Operations in Urban Terrain
MRA	Munitions Response Area(s)
MRS	Munitions Response Site

msl	mean sea level
NCA	Non-Completed Area
NRCS	Natural Resources Conservation Service
NRIM	Natural Resource Impact Mitigation
NRMA	Natural Resources Management Area
QB	Qualified Biologist
reporting period	16 October 2011 through 15 October 2012
ROD	Record of Decision
RWQCB	Regional Water Quality Control Board
SCA	Special Case Area
SOP	Standard Operating Procedure
SQB	Senior Qualified Biologist
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
UXO	unexploded ordnance

1.0 INTRODUCTION

1.1 Purpose and Scope

This Annual Natural Resource Monitoring, Mitigation, and Management Report summarizes natural resource-related activities performed by the Fort Ord Reuse Authority (FORA) Environmental Services Cooperative Agreement Remediation Program (ESCA RP) Team during the period from 16 October 2011 through 15 October 2012; although the reporting period does not follow a strict calendar year, the term 2012 reporting period refers to the 16 October 2011 through 15 October 2012 period.

This report summarizes data and associated information that meet requirements outlined in the Installation-Wide Multispecies Habitat Management Plan for Former Fort Ord, California (HMP; USACE 1997) and in Biological Opinions (BOs; USFWS 1999, 2002, 2005) issued to the United States Department of the Army (Army). The HMP and BOs identify mitigation measures to avoid and minimize impacts to rare, threatened, and endangered species and their habitats during pre-disposal activities such as munitions response activities. Implementation of the requirements by the ESCA RP Team is conducted in coordination with the Army.

Implementation of the requirements by the ESCA RP Team was conducted in coordination with the Army. ARCADIS U.S., Inc. (ARCADIS) has prepared this document on behalf of the Recipient in accordance with industry standards and consistent with the requirements of the Remediation Services Agreement dated 31 March 2007 by and between ARCADIS and FORA (Recipient) including any applicable governing documents and applicable laws and regulations.

This report is the fifth in a series of Annual Natural Resource Monitoring, Mitigation, and Management Reports produced for the ESCA RP. The four previous reports covered the 2008, 2009, 2010, and 2011 reporting periods (ESCA RP Team 2009, 2010a, 2011, 2012a).

1.2 Environmental Services Cooperative Agreement

The former Fort Ord was placed on the National Priorities List in 1990, primarily because of chemical contamination in soil and groundwater that resulted from past Army operations. To oversee the cleanup of the base, the Army, the Department of Toxic Substances Control (DTSC), the Central Coast Regional Water Quality Control Board (RWQCB), and the U.S. Environmental Protection Agency (EPA) entered into a Federal Facility Agreement (FFA). One of the purposes of the FFA was to ensure that the environmental impacts associated with past and present activities at the former Fort Ord were thoroughly investigated and appropriate remedial action taken as necessary to protect public health and the environment.

In accordance with the FFA, the Army is designated as the lead agency under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) for conducting environmental investigations, making cleanup decisions, and taking cleanup

actions at the former Fort Ord. The EPA is designated as the lead regulatory agency for the cleanup, while the DTSC and RWQCB are supporting agencies.

On 31 March 2007, the Army and FORA entered into an Environmental Services Cooperative Agreement (ESCA) to provide munitions and explosives of concern (MEC) remediation services, thereby allowing the Army to transfer approximately 3,279 acres (1,327 hectare [ha]) of property to FORA as an Economic Development Conveyance. In accordance with the ESCA and an Administrative Order on Consent (AOC), FORA is responsible for completion of the MEC remedial activities on the 3,279 acres (1,327 ha).

The AOC was entered into voluntarily by FORA, the EPA, the DTSC, and the U.S. Department of Justice Environment and Natural Resources Division on 20 December 2006 (EPA Region 9 CERCLA Docket No. R9-2007-03). The AOC was issued under the authority vested in the President of the United States by Sections 104, 106, and 122 of the CERCLA, as amended, 42 United States Code §§ 9604, 9606, and 9622.

FORA, through the ESCA RP Team, will complete the Army's MEC response actions, in a program hereinafter identified as the ESCA RP. Proposed future land use designations for the ESCA RP Munitions Response Areas (MRAs) include: habitat reserve, development (residential, non-residential, and mixed use), and borderland development areas along Natural Resources Management Area (NRMA) interface. As described in the 1997 HMP, these categories are defined as:

Habitat Reserve – management goal is conservation and enhancement of threatened and endangered species

Habitat Corridor – lands between major reserve areas; to be managed to promote connections between conservation areas

Development – no management restrictions; some plans for salvage of biological resources from these lands may be specified

Development with Reserve Areas or Development with Restrictions – lands slated for development that contain in holdings of reserve or require specific restrictions to protection biological resource values; management of reserve in holdings must match that for habitat reserves, while management in developable areas must proceed with certain specific restrictions identified in the HMP

Borderland Development Areas along NRMA Interface (also called Borderland Boundary or Borderland Interface) – areas abutting the NRMA that are slated for development; management of these lands includes no restrictions except along the development/reserve interface

Future Road Conditions – lands within habitat reserve set aside for future road development; to be managed as habitat reserve until road development occurs

The nine ESCA RP MRAs are made up of entire or partial parcels as defined by the HMP, and thus have multiple intended uses. These MRAs include: California State University at Monterey Bay (CSUMB) Off-Campus MRA, County North MRA, Del Rey Oaks/Monterey MRA, Future East Garrison (FEG) MRA, Interim Action Ranges (IAR) MRA, Laguna Seca Parking MRA, Military Operations in Urban Training (MOUT) Site MRA, Parker Flats MRA, and Seaside MRA (Figure 1). Of these nine ESCA MRAs, five include habitat reserve or habitat corridor parcels: County North, Del Rey Oaks/Monterey, FEG, IAR, and Parker Flats (ESCA RP Team 2009, 2010a, 2011; Figure 2). These five MRAs that contain habitat reserves or corridors have been subject to natural resource monitoring, mitigation, and management activities since the inception of the ESCA RP, including erosion control, target weed management, and active and passive restoration activities. Borderland boundary areas are also subject to erosion control and weed management efforts, as needed. The borderland boundary is shown on Figures 1 and 2.

During this reporting period, ESCA RP munitions response activities and associated biological field activities were performed in three MRAs that contain habitat reserve or habitat corridor parcels: FEG, IAR, and Parker Flats (Tables 1-1 and 1-2).

Erosion control and weed monitoring was conducted in development parcels in the Seaside MRA as well as along the adjacent borderland boundary, and environmental awareness training and Natural Resource Impact Mitigation (NRIM) checklist field inspections were conducted in the MOUT Site MRA.

2.0 NATURAL RESOURCE MONITORING AND MITIGATION REQUIREMENTS

Primary requirements for natural resource monitoring and mitigation associated with the ESCA RP are described in the HMP (USACE 1997) and the BOs (USFWS 1999, 2002, 2005) issued to Army to enable compliance with the federal Endangered Species Act (ESA) and to avoid or minimize, to the extent feasible, take of listed species as well as protecting other species of concern.

2.1 Habitat Management Plan

The HMP (USACE 1997) and modifications to the HMP provided in the “Assessment, East Garrison—Parker Flats Land Use Modifications, Fort Ord, California” (Zander 2002) present the boundaries of habitat reserve and development areas and describe land use, conservation, management, and habitat monitoring requirements for target species within the former Fort Ord.

The HMP and BOs establish guidelines for the conservation and management of wildlife and plant species and habitats that largely depend on former Fort Ord land for survival (USACE 1997). Threatened and endangered plant and animal species as well as designated critical habitat occur at the former Fort Ord. Each reuse area has been screened for potential impacts or disturbances to any species identified in the HMP (USACE 1997). Implementation of the

provisions of the HMP and referenced additional measures satisfy the requirements of the ESA.

Pertinent goals of the HMP include:

- Preserve, protect, and enhance populations and habitats of federally listed threatened and endangered wildlife and plant species.
- Avoid reducing populations or habitat of federal proposed and candidate wildlife and plant species to levels that may result in one or more of these species becoming listed as threatened or endangered.
- Preserve and protect populations and habitat of state-listed threatened and endangered wildlife and plant species.
- Avoid reducing populations or habitat of species listed as rare, threatened, and endangered by the California Native Plant Society (CNPS 2012), or with large portions of their range at former Fort Ord, to levels that may result in one or more of these species becoming listed as threatened or endangered.

Natural resource monitoring and mitigation requirements associated with munitions response activities addressed in the HMP have several primary objectives: minimize disturbance associated with MEC investigation; avoid or minimize impacts to known sensitive HMP species, where feasible; conduct passive and/or active habitat restoration, where required; and conduct employee environmental training.

A total of 18 species were addressed in the HMP and are referred to in this report as HMP species (Table 2-1); these species are described in further detail in Section 4. HMP species are defined as those species that had the following status at the time of HMP preparation (USACE 1997):

- Federally proposed and listed threatened and endangered species;
- Species that are candidates for federal listing as threatened or endangered;
- State-listed threatened and endangered species;
- Species that fell under one of the previous categories during preparation of the 1994 HMP but that no longer have any legal status under the federal or state ESA; and
- CNPS List 1B species with extensive portions (greater than 10 %) of their known ranges at former Fort Ord (Hooker's manzanita, Toro manzanita, sandmat manzanita, Eastwood's ericameria, and coast wallflower).

The HMP addressed effects to sensitive HMP wildlife species, including California black legless lizard (*Anniella pulchra nigra*), California red-legged frog (*Rana draytonii*), California tiger salamander (CTS; *Ambystoma californiense*), California linderiella (*Linderiella occidentalis*), Smith's blue butterfly (*Euphilotes enoptes smithi*), Monterey ornate shrew (*Sorex ornatus salarius*), and western snowy plover (*Charadrius nivosus nivosus*). HMP plant species include Monterey spineflower (*Chorizanthe pungens* var. *pungens*), robust spineflower (*Chorizanthe robusta* var. *robusta*), Monterey (sand) gilia (*Gilia tenuiflora* ssp. *arenaria*), seaside bird's-beak (*Cordylanthus rigidus* spp. *littoralis*), coast wallflower (*Erysimum ammophilum*), Yadon's piperia (*Piperia yadoni*), Eastwood's ericameria (*Ericameria fasciculata*), Hooker's manzanita (*Arctostaphylos hookeri* ssp.

hookeri), Toro manzanita (*Arctostaphylos montereyensis*), sandmat manzanita (*Arctostaphylos pumila*), and Monterey ceanothus (*Ceanothus rigidus*). Several HMP species have estimated ranges that include more than 50% of their population at the former Fort Ord; these include: Monterey gilia, Monterey spineflower, Eastwood's ericameria, Monterey ceanothus, sandmat manzanita, and Toro manzanita (USACE 1997). The HMP treated the potential effects of MEC investigation and remedial activities at the former Fort Ord as likely to have the greatest effect on the two federally-listed HMP annual species with populations concentrated at the former Fort Ord: Monterey spineflower and Monterey gilia.

The types of effects that munitions response activities have on sensitive habitats and HMP species were anticipated in the HMP; these include vegetation burning and cutting, whole plant excavation, crushing or trampling from movement of excavation equipment and removal team foot traffic, and on-site MEC detonation. The anticipated habitat acreage and number of individuals of HMP species affected by munitions response activities was not quantified in the HMP because the range and quantity of MEC targets had not been determined and investigations are ongoing.

Monitoring requirements at munitions response sites include surveys prior to field work; and at years 3, 5, 8, and 13 after munitions response activities for shrubs; and in years 1, 3, 5, and 8 for HMP annual species (Army 2009a); and monitoring of restored aquatic features during each rainy season for five years after restoration. Data to be gathered during maritime chaparral monitoring include site size, methods used for vegetation clearing, extent of soil disturbance, percent cover by different vegetation types, percent cover by non-native species, HMP annual species density, and other documentation. Data to be gathered during monitoring of restored aquatic features include dates when the aquatic features begin to fill, when they dry out, water conditions, percent cover by different wetland vegetation types, and occurrence and relative abundance of California linderiella, CTS, and California red-legged frog. The monitoring protocol used for this project is detailed in Section 5.

Habitat restoration activities occurring in central maritime chaparral vegetation affected by munitions response activities focuses on restoring naturally regenerating vegetation that exhibits such characteristics as high species diversity, a mosaic of seral stages and age classes, and suitable habitat to support HMP species such as Monterey gilia, Monterey spineflower, seaside bird's-beak, and California black legless lizard. Recovery of native vegetation after munitions response activities on the former Fort Ord has historically proceeded naturally within a short timeframe in areas that are subjected to controlled burning and vegetation cutting.

Post-disturbance restoration focusing on the HMP annual species, Monterey gilia, Monterey spineflower, and seaside bird's-beak, is considered successful if three criteria are met five years after disturbance: self-sustaining populations of these HMP annual species are observed in a mosaic of various stand ages of maritime chaparral, the amount of habitat supporting these species is comparable to 1992 levels, and population sizes are comparable to 1992 levels (USACE 1997). After each year's monitoring, the resulting data is then utilized for adaptive management of restoration activities to reflect changing conditions and continued progression toward success criteria, including supplemental weeding, planting, or seeding, as needed.

Wetlands used by CTS, if disturbed, are also required to be restored (USFWS 2005). Corrective measures for vernal pool and pond (referred to as “aquatic features” by the ESCA RP Team) restoration include minimizing excavation area and depth, topsoil salvaging and replacement, and restoring affected wetlands so that they are of the same acreage and provide the same functions as before MEC clearance. Aquatic feature effects are evaluated on a case-by-case basis.

The period between transfer of the ESCA property from the Army to FORA and final approval by the regulatory agencies of the MEC investigation and remedial activities conducted by the ESCA RP Team is expected to be relatively short. During this period, caretaker (i.e., "interim") management requirements described in Chapter 4 of the HMP will be implemented by the ESCA RP Team in areas that are disturbed as a result of the ESCA RP munitions response activities. These measures target prevention and minimization of degradation of natural resources within such parcels beyond what is required to complete munitions response activities; such caretaker requirements include maintaining fire breaks, limiting public access, providing for emergency vehicle access along the borderland boundary, and erosion and weed control, as needed. Requirements associated with long-term management of the ESCA parcels will be implemented when the parcels transfer to the intended owners or, if transfer is substantially delayed, by FORA, as appropriate.

2.2 Biological Opinions

U.S. Fish and Wildlife Service (USFWS) has issued BOs to the Army, of which three are applicable to the ESCA RP. The ESCA RP Team acts as the Army’s agent to implement relevant requirements of the BOs while conducting fieldwork within ESCA RP MRAs. In this role, the ESCA RP Team members are in frequent communication with Mr. William Collins, Base Realignment and Closure (BRAC) Wildlife Biologist, to address natural resource compliance requirements and progress.

Of the three applicable BOs, the 30 March 1999 “Biological and Conference Opinion on the Closure and Reuse of Fort Ord, Monterey County, California (1-8-99-F/C-39R)” addresses the impacts that the closure and reuse of Fort Ord may have on nine sensitive species, which were at the time federally listed or proposed to be listed (USFWS 1999).

The 22 October 2002 “Biological and Conference Opinion on the Closure and Reuse of Fort Ord, Monterey County, California as it affects Monterey Spineflower Critical Habitat (1-8-01-F-70R)” addresses the impacts that the closure and reuse of Fort Ord may have on the Monterey spineflower and its critical habitat (USFWS 2002). Army Geographic Information System (GIS) data indicate that Monterey spineflower critical habitat exists in County North, IAR, Laguna Seca Parking, and FEG MRAs.

The 30 March 2005 BO titled “Cleanup and Reuse of Former Fort Ord, Monterey County, California, as it affects California Tiger Salamander and Critical Habitat for Contra Costa Goldfields (1-8-04-F-25R)” addresses the impacts that the closure and reuse of Fort Ord may have on CTS and critical habitat for Contra Costa goldfields (USFWS 2005). Army GIS data indicate that CTS occur within areas adjacent to County North, IAR, FEG, Laguna Seca

Parking, MOUT Site, Parker Flats, and Seaside MRAs (Army 2009b). It should be noted that no critical habitat for Contra Costa goldfields occurs on former Fort Ord.

3.0 SITE DESCRIPTION

Former Fort Ord is located about 8 miles (13 kilometers [km]) north of the city of Monterey, California and occupies approximately 28,000 acres (11,331 ha) adjacent to Monterey Bay and the cities of Marina, Seaside, Sand City, Del Rey Oaks, and Monterey. State Highway 1 crosses the western portion of the former Fort Ord, separating the beachfront from most of the former Fort Ord site (Figure 1). The former Fort Ord lies just to the south of the Salinas River delta in a broad low area between the Santa Lucia Mountains to the south and the Santa Cruz Mountains to the north.

The site vicinity is dominated by Pleistocene-age Aeolian sand dunes and other geologically younger sediments (Aromas sand and sandstone, Baywood sand, Oceano sand, Paso Robles formation, gravels, sands, silts, and clays), which cover older consolidated rocks, including Mesozoic granite and metamorphic rocks, Miocene sedimentary rocks of the Monterey shale formation, and upper Miocene to lower Pliocene marine sandstones. The sand sheet in the Salinas Basin is the northernmost of six distinctive sand sheets that occur in geologically subsiding basins at the mouths of rivers along the coast of southern California and northern Baja California (Hunt 1993).

The local weather pattern of mild, wet winters and warmer, dry summers is characteristic of Mediterranean-climate regions, with most precipitation concentrated between October and April. In the Monterey area, local climate is influenced by summer fog and predominant cool northwest winds. There is a sharp gradient in climate from the coast to inland areas, where summer temperatures may be much higher, especially during calm periods and/or in areas sheltered from the prevailing winds.

3.1 Vegetation Types in MRAs

There are four primary vegetation types in the ESCA RP MRAs with habitat parcels at the former Fort Ord: central maritime chaparral, coast live oak woodland, grassland, and aquatic features. These are summarized below.

3.1.1 Central Maritime Chaparral

The predominant vegetation at the former Fort Ord is central maritime chaparral, which is comprised of evergreen shrubs and occasional multi-trunked coast live oaks that grow together at varying densities from open stands to almost impenetrable thickets in coastal areas of the Central Coast underlain with sand or sandstone-derived soils. This woody chaparral shrub vegetation ranges from 4 to 15 or more feet (1 to 5 meters [m]) in height, although low-growing annuals and herbaceous perennials are scattered in exposed openings. Species composition varies with microhabitat characteristics and stand age since the last disturbance.

In general, maritime chaparral is an unusual vegetation type found primarily on sandy substrates in a few coastal locations in Santa Barbara, San Luis Obispo, Monterey, and Santa Cruz Counties. Often these maritime chaparral associations are dominated by local endemic species of ceanothus (*Ceanothus*) and manzanita (*Arctostaphylos*) mixed with other widespread and endemic species (Holland 1986; Holland and Keil 1995). Maritime chaparral is a vegetation type of particular concern in the HMP because it supports a number of rare, threatened, and endangered species populations; see Section 4 below.

Central maritime chaparral occurs in all three MRAs containing habitat parcels. The FEG MRA also supports chaparral vegetation dominated primarily by a widespread shrub, chamise (*Adenostoma fasciculatum*), which can form large stands on arid south-facing rocky slopes. In addition, chaparral vegetation occurs in patches in coast live oak woodland vegetation, such as in the Parker Flats and FEG MRAs. In places that have been heavily disturbed by human activities, a mosaic of chaparral shrubs may intergrade with non-native weedy grasses and herbaceous species.

3.1.2 Coast Live Oak Woodland

Coast live oak woodland is dominated by coast live oak trees that vary in density from concentrated bands of oaks along drainage bottoms to scattered trees on nearby slopes. Coast live oak is an evergreen tree ranging from 20 to 75 feet (6 to 25 m) in height, with a spreading crown, many massive branches, and a dense canopy of thick waxy leaves. Trees can live for 100 years or more. Although common in the hills surrounding Monterey, coast live oaks (*Quercus agrifolia*) are restricted to a 50-mile (8 -km) wide swath along the coast from Mendocino County south to northern Baja California. They are completely absent in the Sierra Nevada and other interior ranges; rather, they tend to occur in the maritime belt that receives fog during the summer months.

Most healthy stands of coast live oak woodland contain mixed age classes of oak trees, saplings, and seedlings that can vary widely in overall appearance, depending on moisture availability. Associated species such as toyon (*Heteromeles arbutifolia*), poison-oak (*Toxicodendron diversilobum*), California blackberry (*Rubus ursinus*), coastal wood fern (*Dryopteris arguta*), bracken fern (*Pteridium aquilinum*), yerba buena (*Satureja douglasii*), wood mint (*Stachys bullata*), and others also form a dense understory in undisturbed oak woodland.

Coast live oak woodland is found in the FEG MRA in drainage bottoms as well as in the Parker Flats MRA. Like chaparral vegetation, oak woodland and annual grassland may intergrade in areas with extensive habitat disturbance.

3.1.3 Grassland

Annual grassland vegetation is located in disturbed areas where there has been prior soil disturbance, as well as along roadways, access routes, and fuel breaks; annual grasslands tend to be dominated by non-native annual grasses and other native and weedy herbaceous species. Among the non-native grasses observed are invasive annual Mediterranean grasses

such as slender wild oats (*Avena barbata*), rip-gut brome (*Bromus diandrus*), soft chess (*Bromus hordeaceus*), red brome (*Bromus madritensis* subsp. *rubens*), foxtail barley (*Hordeum murinum*), and annual fescues (*Festuca* species) and forbs such as filaree (*Erodium cicutarium*, *E. botrys*), iceplant, and others. Degraded central maritime chaparral subjected to habitat disturbances often supports a mosaic of shrubs and weedy non-native grassland.

Annual grassland occurs in disturbed areas in all three MRAs containing habitat parcels where work was conducted during this reporting period.

Perennial grassland vegetation at the former Fort Ord is more common adjacent to broad drainages and swales, where spreading grasses such as alkali rye (*Elymus triticoides*) form large colonies. Perennial grasslands occur near some aquatic features in the northeast corner of the FEG MRA.

3.1.4 Aquatic Features

A total of 12 aquatic features are found only in the FEG MRA in two main clusters, one in the northeastern corner and the other near the grenade range (Section 3.2.1). These aquatic features were described in detail in Appendix C of the 2011 Annual Resource Monitoring Report (ESCA RP Team 2012a). The aquatic features are dominated by native herbaceous annual and perennial plants that are typical of seasonal wetlands in coastal California (Table 3-1). Species tend to occur in zones depending on the depth of the depression, from submergent aquatic species to emergent species and then surrounding upland vegetation such as coast live oak woodland, central maritime chaparral, and grassland. Arroyo willow (*Salix lasiolepis*) occurs adjacent to some of the aquatic features in the northeast corner of the FEG MRA as well.

The grenade range aquatic features are surrounded by bare sandstone due to apparent historical disturbance.

3.2 Environmental Characteristics of MRAs with Habitat Parcels

A summary of environmental characteristics and existing vegetation for each of the MRAs containing habitat parcels where natural resource monitoring was conducted during the reporting period is provided in the ensuing sections.

3.2.1 Future East Garrison MRA Site Description

The FEG MRA (formerly known as the East Garrison MRA) is located in the northeastern portion of the former Fort Ord (Figures 2 and 3), and is wholly contained within the jurisdictional boundaries of Monterey County. This MRA encompasses approximately 251.5 acres (102 ha) and contains the following four United States Army Corps of Engineers (USACE) parcels: E11b.6.1, E11b.7.1.1, E11b.8 (includes 100 -foot [30 -m] buffer), and L20.19 1.1. Of the 251.5 acres (102 ha) within this MRA, 177.5 (71.8 ha) are designated as habitat reserve.

The topography of the FEG MRA is variable, with gentle ridges and steeper canyon walls. Overall, slopes descend from south to north, with higher ridges in the south over 450 feet (137 m) above mean sea level (msl) and lower slopes to the north at 170 feet (52 m) above msl. The southern portion of the FEG MRA is bisected by a small drainage that descends gradually from west to east before joining an unnamed tributary to the Salinas River. Sandstone Ridge borders this drainage to the south, reaching over 400 feet (122 m) above msl; upper slopes of this drainage exceed 500 feet (152 m) elevation to the immediate west of the FEG MRA. Another small forked drainage is located in the northern portion of the FEG MRA and descends directly to the Salinas River floodplain to the north.

The slope of the terrain in the FEG MRA ranges from relatively flat (3 to 5 percent) within an area formerly used as an Ammunition Supply Point, to steep (up to 50 percent) along the drainages. The FEG MRA is underlain by several hundred feet of Aeolian deposits (Aromas formation) consisting mostly of weathered dune sand (NRCS 2012). Surface soil conditions in the FEG MRA are predominantly weathered dune sand and/or sandstone.

Vegetation on the ridges of the FEG MRA primarily consists of central maritime chaparral, with coast live oak woodland predominating in drainages. Disturbed areas support non-native annual grassland vegetation as well. The western portion of the MRA is designated as critical habitat for Monterey spineflower (Figure 9). In addition, several small aquatic features occur in the FEG MRA.

There are 12 aquatic features concentrated in two main areas within the FEG MRA (AF09-1, AF09-1B, AF09-2, AF10-1, AF66A, AF66B, AF67Meadow, AF67-EX1, AF67-EX2, AF67-EX3, AF67-EX4, and AF69; Figure 3). Aquatic larval surveys were completed during the 2009-2010 and 2010-2011 wet seasons to determine whether CTS were present, consistent with the HMP, 2005 BO, Wetland Monitoring and Restoration Plan for Munitions and Contaminated Soil Remedial Activities at the Former Fort Ord (Burlison 2006) and The Interim Guidance on Site Assessment and Field Surveys for Determining Presence or a Negative Finding of the California Tiger Salamander (CDFG 2003). Results were reported in the 2010 and 2011 Annual Natural Resource Reports (ESCA RP Team 2011 and 2012a).

AF09-1 and -1B are located in the eastern edge of the grenade range and AF092 is located in the northern portion of the grenade range. The grenade range has been repeatedly scraped; as a result, much of the terrain surrounding the aquatic features in the grenade range is unvegetated sandstone.

The remaining aquatic features occur in the northeast corner of the FEG MRA and are surrounded by coast live oak woodland, arroyo willow clusters, and grassland vegetation.

3.2.2 Interim Action Ranges MRA Site Description

The IAR MRA is located in the north-central portion of the former Fort Ord, within the boundary of the former Army impact area. The IAR MRA is bordered by the Parker Flats MRA to the north, the Seaside MRA to the east, and the former impact area to the southeast,

south, and southwest (Figures 2 and 4). The IAR MRA is contained within the jurisdictional boundaries of Monterey County and a small portion in the City of Seaside.

The IAR MRA encompasses approximately 227 acres (92 ha) and is located in the area designated by the Army as Munitions Response Site (MRS) Ranges 43-48. An Interim Action Record of Decision (ROD) was produced by the Army in August 2002 (Army 2002) for Interim Action Sites at the former Fort Ord. The Interim Action Sites include MRS Ranges 43-48. The ROD summarizes the Final Interim Action Ordnance and Explosives Remedial Investigation/Feasibility Study for Ranges 43-48, Range 30A, Site OE-16, Former Fort Ord, which summarizes the previous field activities conducted at the Interim Action Sites, and examines and selects a preferred interim remedial action for the Interim Action Sites.

Previous interim remedial actions conducted by the Army resulted in areas where only surface removals were conducted. These areas where subsurface removals were not completed are known as Special Case Areas (SCAs) or Non-completed Areas (NCAs), which are the focus of the ESCA RP Team's efforts. The IAR MRA fully contains the following five USACE Parcels: E38, E39, E40, E41, and E42. Of the 227 acres (92 ha) within this MRA, 206 acres (83 ha) are designated as habitat reserve, and the northern boundary comprises part of the borderland interface (Figure 4).

The terrain of the IAR MRA consists of gently undulating slopes ranging from 370 to approximately 530 feet (161.5 m) above msl, generally with 2 to 15 percent slopes. No ravines pass through the IAR MRA, although a few low areas support grassland and scattered shrubs and/or trees. In the Range 47 SCA, prior military earthwork has modified the original topography, resulting in an artificial escarpment located in the southwest portion of this area.

The primary soil type present in the IAR MRA is Arnold-Santa Ynez Complex, with Baywood Sand in the northwestern portion of the MRA. Soil conditions at the MRA consist predominantly of weathered Aeolian dune sand and are described as unconsolidated materials of the Aromas and Old Dune Sand formations (NRCS 2012).

Vegetation in the IAR MRA consists primarily of maritime chaparral, with a small patch of grassland vegetation in the southern portion of the MRA. Prior to 2003, much of the IAR MRA was inhabited by dense maritime chaparral with stands ranging in maturity, based on the age of the stand since the last fire. The MRA was subjected to a prescribed burn in 2003. Post-fire conditions documented by the ESCA RP biological team indicate that the vegetation was less dense in 2008 than it had been prior to 2003 and averaged about 4 feet (1 m) in height. Except for a small parcel on the northern edge of the area, most of the MRA is designated as critical habitat for Monterey spineflower (Figure 9).

3.2.3 Parker Flats MRA Site Description

The Parker Flats MRA is located in the central portion of the former Fort Ord, bordered by the CSUMB Off-Campus MRA and the County North MRA to the north, the IAR MRA to the south, CSUMB campus property to the west, and additional former Fort Ord property to the east and southeast (Figures 2 and 5). The Parker Flats MRA is contained within the

jurisdictional boundaries of the City of Seaside and Monterey County. The Parker Flats MRA has been divided into two phases of work, identified as Parker Flats MRA Phase I and Parker Flats MRA Phase II. The Army completed a Track 2 Munitions Response Remedial Investigation/Feasibility study and the signed Track 2 Munitions Response Site Record of Decision (MACTEC 2006 and Army 2008, respectively) for the Parker Flats MRA Phase II area. The remediation plan documented in the Army ROD for the Phase I area is implemented in this area by the ESCA RP Team. The Parker Flats MRA (Phase I and Phase II areas) encompasses approximately 1,180 acres (477.5 ha) and fully contains USACE parcels E18.1.1, E18.1.2, E18.1.3, E18.4, E19a.1, E19a.2, E19a.5, E20c.2, E21b.3, L20.18, L23.2, and L32.1, and portions of USACE parcels E19a.3 and E19a.4. The remaining portions of USACE parcels E19a.3 and E19a.4 are contained in the County North MRA.

The area completed by the Army under the Phase I activities is approximately 698 acres (282 ha); the remaining approximately 482 acres (195 ha) completed by the ESCA RP Team are included under the Phase II activities. Of the 698 acres (282 ha) within the Phase I portion of this MRA, 143.8 acres (51 ha) are designated as habitat reserve. Of the 482 acres (195 ha) within the Phase II portion of this MRA, approximately 166 acres (67.2 ha) are designated as habitat reserve. The borderland interface in this MRA where the development parcel abuts the NRMA is in the middle of the Phase II portion of the Parker Flats MRA (Figures 2 and 5).

The terrain of the Parker Flats MRA consists primarily of rolling sandy hills. The elevation ranges from approximately 280 to approximately 490 feet (85 to 149 m) msl with 2 to 15 percent slopes. The surface soils are characterized as Aeolian (sand dune) and terrace (river deposits), formed from unconsolidated materials of the Aromas and Old Dune Sand formations. The primary soil type present in the Parker Flats MRA is Oceano Loamy Sand with smaller areas of Arnold-Santa Ynez complex and Baywood Sand. Soil conditions at the MRA consist predominantly of weathered dune sand (NRCS 2012).

Vegetation in the Parker Flats MRA consists primarily of coast live oak woodland and smaller areas of maritime chaparral, grassland, and coastal scrub. Vegetation varies from sparsely vegetated areas to heavy brush. In 2005, FORA, under the supervision of the Army, performed a prescribed burn on 147 acres (59.5 ha) in the Parker Flats MRA.

4.0 HMP SPECIES

The requirements outlined in the HMP (USACE 1997) and in BOs (USFWS 1999, 2002, 2005) are described in more detail in Section 2 and focus on compliance with the federal ESA and avoidance or minimization, to the extent feasible, of take of listed species as well as protecting other species of concern. A total of 18 species were addressed in the HMP (Table 2-1, see Section 2). Of these, 11 are plant species and 7 are wildlife species. Five species are restricted to the Monterey Bay region: the Monterey ornate shrew, Toro manzanita, sandmat manzanita, Eastwood's ericameria, and Yadon's piperia. An additional eight species are endemic to the Central Coast of California between the Bay area and Santa Barbara County, including the California black legless lizard, Smith's blue butterfly, Hooker's manzanita, Monterey ceanothus, Monterey spineflower, robust spineflower, Monterey gilia, and seaside bird's beak. Most of these species have 10 or more percent of their populations concentrated

at the former Fort Ord. Only two HMP plants (robust spineflower and Yadon's piperia) and three HMP wildlife species (California red-legged frog, CTS, and California linderiella) have 99% of their range outside the Fort Ord region.

Those HMP species that occur in vegetation types that are widespread at the former Fort Ord, such as central maritime chaparral, tend to be much more common in the MRAs addressed in this report than species confined to specific habitats such as aquatic features and shoreline areas. A summary of each HMP species is provided below, along with brief comments on occurrence in the MRAs.

4.1 HMP Amphibians

There are two amphibian species that are designated as HMP species (USACE 1997).

California tiger salamander (*Ambystoma californiense*) – Federally Endangered and California Threatened. Adults are 7 to 8 inches (18 to 20 centimeters [cm]) long, black with yellow to cream-colored spots, larvae are greenish-gray in color. CTS occur in open woodlands and grasslands, ponds, and vernal pools from Sonoma to Santa Barbara Counties, inland to portions of the Sierra Nevada. Surveys were conducted for CTS larvae in 2010 and 2011 in aquatic features in the FEG MRA in advance of munitions investigations remediation activities. Two CTS larvae were observed by the ESCA RP Team in the FEG MRA during the 2011 aquatic surveys (ESCA RP 2012a, Appendix C): one CTS larva was observed in aquatic feature AF67-EX2 and one CTS larva was observed in aquatic feature AF66A. Both aquatic features are located in northeast FEG MRA in the habitat parcel. USFWS -designated habitat zones for CTS on site are shown on Figure 10.

California red-legged frog (*Rana draytonii*) – Federally Threatened and California Species of Concern. Adults are 2 to 5 inches (5 to 13 cm) long, reddish-brown, olive, or green with black flecks; hind legs can be red underneath. California red-legged frogs require coldwater ponds or slow moving river pools with emergent and submergent vegetation and riparian vegetation at the edges. California red-legged frogs range from Humboldt to San Diego Counties and in portions of the Sierra Nevada. Larvae of California red-legged frogs have been recently reported in the Fort Ord National Monument adjacent to Toro Park (William Collins, personal communication) and suitable habitat is present in parcels outside of ESCA RP MRAs (HMP; USACE 1997). No California red-legged frogs have been observed by ESCA RP biologists in any MRAs on site.

4.2 HMP Birds

There is one bird species that is designated as an HMP species (USACE 1997) and it occurs outside of the ESCA RP MRAs in the Beach Ranges.

Western snowy plover (*Charadrius nivosus nivosus*) – Federally Threatened and California Species of Concern. The western snowy plover is a small shore bird about 6 to 7 inches (18 cm) in length with pale grayish brown upper body and white underbody bearing a dark breast band, and black legs and bill. Western snowy plover occur on flat sandy beach above the high

tide level from Washington to Baja California. Western snowy plovers have not been observed by ESCA RP biologists in any of the MRAs on site, and no MRAs include shoreline habitat.

4.3 HMP Reptiles

There is one reptile species that is designated as an HMP species (USACE 1997).

California black legless lizard (*Anniella pulchra nigra*) – California Species of Concern. The limbless adults reach 7 inches (18 cm) in length and are dark on the upper surface and yellow below. Black legless lizards occur in various coastal plant communities where loose sandy soil and abundant invertebrate populations are available. Presently they are found in Monterey County and possibly extirpated from Santa Cruz and San Luis Obispo Counties. California black legless lizards have been observed by ESCA RP in Parker Flats MRA and IAR MRA. In 2009 a California black legless lizard was observed in an area of oak woodland habitat at the interface with maritime chaparral habitat in sandy soil in the habitat parcel in the Parker Flats MRA. In 2010 a California black legless lizard was observed in maritime chaparral habitat in a development parcel of Parker Flats MRA. More recently, in 2012 a California black legless lizard was observed in maritime chaparral with sandy soil in a habitat reserve parcel in IAR MRA.

4.4 HMP Mammals

There is one mammal species that is designated as an HMP species (USACE 1997).

Monterey ornate shrew (*Sorex ornatus salaries*) - California Species of Concern. The Monterey ornate shrew is a small mammal approximately 3.5 to 4.25 inches (10 cm) long with grayish brown black fur. It occurs in riparian, woodland, and upland communities where there is thick duff or downed logs. It is endemic to Monterey region. Potential habitat exists for the Monterey ornate shrew in County North, CSUMB, FEG, IAR, MOUT Site, and Parker Flats MRAs. No Monterey ornate shrews have been observed during ESCA RP biological surveys.

4.5 HMP Invertebrates

There are two invertebrate species that are designated as HMP species (USACE 1997).

California linderiella (*Linderiella occidentalis*) – No California or federal listing. California linderiella is a small (<0.5 inch, or 1.2 cm) aquatic fairy shrimp found in seasonal ponds. California linderiella have been observed by ESCA RP biologists in two aquatic features in habitat parcels in the FEG MRA during the 2010 aquatic surveys: AF09-1 and AF09-1B in southern FEG MRA and AF67-EX1 in northeast FEG MRA.

Smith's blue butterfly (*Euphilotes enoptes smithi*) – Federally Endangered. Adults with a wingspan of 1 inch (2.5 cm); males with bright blue upper (dorsal) wing surfaces and females with brown upper wing surfaces; both with orange spotted band on hind upper wing surface

edge and whitish gray underwings with dark speckling. It occurs in coastal sand dunes and ravines associated with coast and seacliff buckwheat in Monterey, Santa Cruz, and San Mateo Counties. The Smith's blue butterfly has not been observed by ESCA RP biologists in any of the MRAs on site; it occurs outside of the ESCA RP MRAs in the Beach Ranges.

4.6 HMP Shrubs

There are five shrub species that are designated as HMP species (USACE 1997).

Hooker's manzanita (*Arctostaphylos hookeri* ssp. *hookeri*) – CNPS 1B.2. Hooker's manzanita is a low-growing to medium-sized shrub in the heather family that rarely reaches 5 feet (1.5 m) in height, and is usually much shorter in stature; it lacks a basal burl and therefore does not resprout after fire or vegetation cutting. Hooker's manzanita is endemic to the general Monterey Bay region, where it occurs in central maritime chaparral vegetation, especially in sandy soils (Baywood sands) or on ancient marine terraces of the Aromas sandstone formation. Hooker's manzanita is a smaller manzanita than the two widespread stump-sprouting manzanitas in the MRAs: shaggy-bark manzanita (*Arctostaphylos tomentosa* ssp. *tomentosa*), which predominates in lowland ocean-facing central maritime chaparral, and brittleleaf manzanita (*A. crustacea* ssp. *crustacea*), which occurs further inland. Hooker's manzanita has been previously mapped as relatively common in portions of the Parker Flats, FEG, and the MOUT Site MRAs, with smaller numbers in the Laguna Seca Parking MRA. Recent mapping work by ESCA RP biologists suggest that densities of Hooker's manzanita have been over-estimated due to previous plant misidentification.

Toro manzanita (*Arctostaphylos montereyensis*) – CNPS 1B.2. Toro manzanita is a large single-trunked shrub to 12 feet (3.6 m) in height in the heather family; it lacks a basal burl and therefore does not resprout after fire or vegetation cutting. Toro manzanita is endemic to the Monterey region, where it occurs in central maritime chaparral vegetation, especially in sandy soils (Arnold sands) overtopping leached Aromas sandstone bedrock. Toro manzanita is scattered to dominant in maritime chaparral in portions of the Parker Flats, FEG, and MOUT Site MRAs; it occurs in lower densities in the Seaside and Laguna Seca Parking MRAs.

Sandmat manzanita (*Arctostaphylos pumila*) – CNPS 1B.2. Sandmat manzanita is a low mound-forming shrub in the heather family that can reach up to 3 feet (1 m) in height, with broad spreading branches bearing bicolored dull green to grayish leaves. Like Toro manzanita, sandmat manzanita lacks a basal burl and does not resprout after a fire or vegetation cutting. Sandmat manzanita is endemic to Monterey County, and tends to be found in central maritime chaparral and at the margins of oak woodland and Monterey pine forest in Baywood sands and on marine terraces of the Aromas and Paso Robles formations and sandstones allied to Monterey shale. Sandmat manzanita occurs commonly in maritime chaparral in the Seaside, IAR, Parker Flats, and Del Rey Oaks/Monterey MRAs, and in lower densities in the County North and Laguna Seca Parking MRAs.

Monterey ceanothus (*Ceanothus rigidus*) – CNPS 4.2. Monterey ceanothus is a densely-branching shrub in the buckthorn family that reaches approximately 4.5 feet (1.4 m) in height

and rarely exceeds 6 feet (2 m). It lacks a basal burl and does not resprout after a fire or vegetation cutting. Monterey ceanothus is endemic to maritime chaparral, central coastal scrub, and Monterey pine forest habitats from southern Santa Cruz to San Luis Obispo County, with its center of distribution in Monterey County. Monterey ceanothus occurs commonly in maritime chaparral in the Seaside, IAR, Parker Flats, FEG, Laguna Seca Parking, MOUT Site, and Del Rey Oaks/Monterey MRAs.

Eastwood's ericameria (*Ericameria fasciculata*) – CNPS 1B.1. Eastwood's ericameria is a multi-stemmed, rounded subshrub to small shrub in the sunflower family that rarely reaches 5 feet (1.5 m) in height. It is able to resprout after a fire or vegetation cutting. Eastwood's ericameria is endemic to Monterey County and is found primarily in central coastal scrub and central maritime chaparral in sandy inland soils (Arnold sands overtopping Aromas sandstone). Eastwood's ericameria occurs in maritime chaparral in the Seaside, IAR, Parker Flats, FEG, MOUT Site, and Del Rey Oaks/Monterey MRAs.

4.7 HMP Herbaceous Perennials

There are two herbaceous perennial species that are designated as HMP species (USACE 1997).

Coast wallflower, sand-loving wallflower (*Erysimum ammophilum*) – CNPS 1B.2. Coast wallflower is biennial to short-lived perennial in the mustard family that reaches from several inches to 1 foot (0.3 m) in height when flowering. It is endemic to coastal dunes flanking the Monterey Bay region and is also found on Santa Rosa Island in Santa Barbara County. It is found at Marina Dunes State Beach and has been observed east of the town of Marina. According to the HMP coast wallflower has the potential to occur in Seaside and IAR MRAs (USACE 1997). However, coast wallflower has not been observed by ESCA RP biologists in any of the MRAs on site, and no MRAs include coastal dune habitat.

Yadon's piperia (*Piperia yadoni*) – Federally Endangered, CNPS 1B.2. Yadon's piperia is a perennial herb in the orchid family with basal leaves and an elongate flowering spike when it blooms in late spring and summer. A 1992 survey located a population of Yadon's piperia in northwestern former Fort Ord, just to the east of Highway 1 and the Del Monte Boulevard exit (USACE 1997). Yadon's piperia also exists in southwest former Fort Ord southeast of Del Rey Oaks/Monterey MRA (Army 2009b). Yadon's piperia has not been observed by ESCA RP biologists in any of the MRAs on site.

4.8 HMP Annuals

There are four annual species that are designated as HMP species (USACE 1997); these annual HMP species have sometimes been referred to as HMP focus species.

Monterey spineflower (*Chorizanthe pungens* var. *pungens*) – Federally Threatened, CNPS 1B.2. Monterey spineflower is a low spreading annual in the buckwheat family that is covered with gray hairs and blooms in late spring and early summer. It occurs in sandy soils in coastal strand, coastal scrub, maritime chaparral, margins of oak woodland and riparian

habitats, and disturbed sites in grassland, below 450 m elevation. It is endemic to northern Monterey and southern Santa Cruz Counties. Monterey spineflower occurs commonly in maritime chaparral in the County North, CSUMB, Del Rey Oaks/Monterey, FEG, IAR, MOUT Site, Parker Flats, and Seaside MRAs; USFWS -designated critical habitat for Monterey spineflower on site is shown on Figure 9.

Robust spineflower (*Chorizanthe robusta* var. *robusta*) – Federally Endangered, CNPS 1B.1. Robust spineflower is low spreading to erect annual in the buckwheat family. It occurs in sandy soils in coastal dune and coastal scrub habitats. Robust spineflower ranges from Santa Cruz County to northern Monterey County. Historically one population was found on former Fort Ord west of Highway 1 to the north of Lightfighter exit. According to the HMP former Fort Ord does not provide important habitat for this species (USACE1997). Robust spineflower has not been observed by ESCA RP biologists in any of the MRAs on site.

Seaside bird's-beak (*Cordylanthus rigidus* spp. *littoralis*) – California Endangered, CNPS 1B.1. Seaside bird's-beak is a multi-stemmed annual root parasite that reaches 1 to 2 feet (0.3 to 0.6 m) in height at maturity. Seaside bird's-beak generally occurs in openings in coastal dune scrub, central coastal scrub, and maritime chaparral and is restricted to the ancient sand sheets of Santa Barbara and Monterey Counties. Seaside bird's-beak has been observed by ESCA RP in maritime chaparral in IAR MRA. According to the HMP, seaside bird's beak has the potential to occur in Del Rey Oaks/Monterey, FEG, Parker Flats, and Seaside MRAs.

Monterey gilia (*Gilia tenuiflora* var. *arenaria*) – Federally Endangered, California Threatened, CNPS 1B.2. Monterey gilia is a small annual in the phlox family that produces a basal rosette of leaves and lavender flowers that emerge from a short branching inflorescence that reaches about 6.5 inches (16.5 cm) in height in late spring. It occurs in open loose sandy soils with low silt content in coastal dune scrub and maritime chaparral habitats in limited locations near Monterey Bay and the adjacent coastal plain of the Salinas Valley. Monterey gilia occurs in maritime chaparral and is known to be present in IAR, FEG, Parker Flats, and Seaside MRAs.

5.0 METHODS FOR MUNITIONS RESPONSE ACTIVITIES AND HABITAT MONITORING

This section summarizes the methods used for munitions investigation remediation activities and associated biological monitoring. Munitions response activities include analog or geomagnetic investigation, vegetation cutting, small or large scale soil screening operations, and other minor activities. Associated biological monitoring involves using established or modified protocols to document baseline conditions prior to munitions response activities and to monitor vegetation recovery following munitions response activities.

5.1 Methods for Munitions Response Activities

Munitions response activities often require removal of vegetation in order to facilitate target investigation using visual and electromagnetic means. When surface targets are identified,

they are generally removed by hand or with the use of handheld tools. When subsurface targets are identified, they are investigated individually or in larger contiguous areas (soil excavation and sifting). Other minor activities in support of munitions response activities include installation of signage, trash and debris removal, erosion monitoring, and erosion control monitoring and installation of erosion prevention materials.

A brief summary of methods for munitions response activities is provided below.

5.1.1 Methods for Vegetation Cutting

Prior to initiation of munitions response activities in MRAs where work is conducted in habitat parcels, manual and mechanical vegetation cutting is conducted to make the ground surface safe and accessible for MEC investigation field crews. Manual and mechanical vegetation cutting in this report generally refers to removal of most vegetation to ground level except for trees and shrubs with a diameter at breast height (dbh) equal or greater than 6 inches (15 cm). The trees and shrubs left in place are pruned to remove dead branches and to clear up to height sufficient to allow human access below the tree canopies. Adaptive management procedures for protecting non-sprouting HMP shrubs in areas subject to proposed vegetation cutting are discussed in Section 5.2.4.

5.1.2 Methods for Digital Geophysical Mapping MEC Response Activities

Digital Geophysical Mapping (DGM) remedial investigation is conducted with either an EM61-MK2 towed array platform (“the FORA ESCA Sled”) or manually towed single-array EM61-MK2 combined with a navigation system. Personnel drive the sled along parallel transects through the work area. Data is evaluated and target anomalies are selected for investigation. Unexploded ordnance (UXO) dig teams reacquire target anomalies based on Global Positioning System (GPS) coordinates and intrusively investigate targets to depth.

5.1.3 Methods for Analog MEC Response Activities

Analog remedial investigations are surveys generally conducted on foot by technicians to locate and remove surface or subsurface MEC or munitions debris (MD) with minimal soil excavation. Technicians walk 3 -foot (1-m) wide search lanes through 100 x 100 foot (30 x 30 m) grid cells with a handheld magnetometer, which records the presence of ferrous metal targets. If potential UXO is detected on the surface of the investigation area, soil around the potential item is removed using handtools (e.g., shovels and spades). This method is referred to as ‘mag and dig’ and is preferred by the ESCA RP Team in sensitive habitat since it minimizes disturbance to native vegetation and helps facilitate vegetation regeneration by retaining the seed bank, nutrients, and beneficial organisms on the surface.

Areas requiring subsurface investigation/removal activities are usually identified prior to field work by careful review of historical records as well as during interviews; these areas historically served as training sites where MEC may have penetrated the ground surface, or may be areas that contain possible buried MEC or MD. Subsurface investigation areas range in size from a single cubic foot to several cubic feet, depending on the type, location, and

position of MEC. A shovel or other hand tool is typically used, although a backhoe may be used for deeper targets. If MEC is identified but is unsafe to move, in situ detonation may be conducted. During excavations, subsoil and topsoil are stored separately and replaced with the topsoil on top after investigations are complete. This method facilitates vegetation regeneration by retaining the seed bank, nutrients, and beneficial organisms on the surface.

5.1.4 Methods for Large -Scale Soil Screening Disturbance

Large -scale soil screening is required in isolated areas containing a high density of small metallic debris and ammunition links within the soil, in which manual removal is not feasible. Prior to soil excavation, the above-ground vegetation is cut at ground level with mechanical heavy equipment, as described in Section 5.1.1. Subsequently, root material is removed by "root raking;" during root raking, a bulldozer equipped with heavy tines pushes the tines through the soil, pulling out roots and burls, while retaining most of the soil. The above and below ground plant material is stockpiled and later ground to wood chips for UXO technicians to determine that the material is free from explosives. Finally, a bulldozer and excavator work to load soil on trucks and transport it to a mechanical sift plant that can remove possible MEC from the soil using magnets and soil screens.

Excavations consist of a sequence of removal involving the top 6 to 12 inches (15 to 30 cm) of soil, followed by removal of subsoil. Each soil layer is sifted and stockpiled separately. Soil replacement follows the same sequence in reverse, with replacement of subsoil and then topsoil replacement. This process encourages regeneration of native species through replacement of seed bank, soil nutrients, and beneficial soil organisms.

5.1.5 Methods for Interim Action Ranges Design Study

The Design Study is an approach used in the IAR MRA to determine the location, type, and level of munitions investigation necessary; this process is described in the Phase II Interim Action Work Plan (ESCA RP 2011b). The Design Study was performed in areas where the Army did not conduct subsurface investigations (NCAs and SCAs).

During Design Study activities, the ESCA RP Team cut vegetation to ground level within 10-foot (3-m) wide investigation transects in maritime chaparral habitat in the IAR MRA. The transect approach disturbs as little habitat as possible while gathering information about the potential distribution of munitions. In a portion of the Design Study transects crews conducted root raking (removal), soil removal, and sifting, as described above. With the information gained from initial munitions investigation in some areas, no further habitat disturbance was necessary, such as in the South Range 44 SCA/NCA. In the Range 47 SCA large -scale vegetation removal and soil screening were necessary for munitions response activities. The ESCA RP Team has submitted for approval the IAR MRA Habitat Restoration Plan (HRP) and associated Field Variance Form to address the habitat restoration requirements as identified in the Installation -Wide Habitat Management Plan (ESCA RP 2012b, USACE 1997). See Section 8.0 for a summary of restoration planning in the IAR MRA.

5.1.6 Methods for Other Activities in Support of Munitions Response

Other minor fieldwork includes installation of signage, trash and debris removal, erosion monitoring, and erosion control monitoring, as well as installation of erosion prevention materials. Most of these activities are conducted on an as needed basis except for erosion and weed monitoring; methods for weed monitoring and management are described in more detail in Section 5.2.7 and methods for erosion monitoring and control are described in section 5.2.8.

Minor field activities are conducted in accordance with the HMP, BOs, and the appropriate ESCA work plan. All personnel working in ESCA parcels receive environmental awareness training.

5.2 Habitat Monitoring Methods

As required by the 1997 HMP, vegetation monitoring is conducted in habitat parcels where vegetation is disturbed as a result of ESCA RP munitions response activities. The vegetation monitoring methodology is detailed in the U.S. Army Protocol for Conducting Vegetation Monitoring in Compliance with the Installation-Wide Multispecies Habitat Management Plan at the former Fort Ord (Burleson 2009).

The 2009 monitoring protocol requires performing a pre-disturbance (i.e., “baseline”) vegetation survey. HMP shrubs and herbaceous flora are surveyed in the baseline year and in years 3, 5, 8, and 13 post-remediation. HMP annuals (‘focus species’ in prior reports) are surveyed in the baseline year and in years 1, 3, 5, and 8 post-remediation. Note that, depending on the timing of the baseline monitoring effort and the time required to complete munitions response activities, post-disturbance vegetation surveys may begin more than one year after the baseline survey for HMP annuals and/or more than three years after the baseline survey for shrub and herbaceous cover monitoring.

In addition to methods for monitoring shrubs, herbaceous vegetation, and HMP annuals, methods are described below for monitoring Toro manzanita retention during vegetation cutting, monitoring of aquatic features, erosion monitoring, weed monitoring, CTS monitoring, and monitoring related to restoration planning.

Plant nomenclature follows the *Jepson Manual: Vascular Plants of California*, Second Edition (Baldwin et al. 2012). In addition, pertinent volumes of the *Flora of North America* (Flora of North America Editorial Committee, eds. 1993+) were also utilized for plant identification. Plant community classifications and sensitive species information follow Holland (1986), Sawyer, Keeler-Wolfe, and Evens (2009), and the California Natural Diversity Database (CNDDDB; CDFG 2012).

5.2.1 Methods for Vegetation Monitoring

Shrub and herbaceous vegetation cover in areas subjected to munitions response activities are measured in 50-m-long line-intercept transects. Transects are concentrated in central maritime chaparral and coastal scrub communities.

Prior to transect installation, site history and aerial images are reviewed, followed by vegetation mapping. Differences in stand age, plant diversity, or other characteristics are documented in order to stratify transect placement into areas that are likely to have distinct species composition and distribution. For example, a set of transects may be placed into an area that was cut or burnt 5 years ago and a separate set of transects may then be placed into an area that was cut or burnt 25 years ago in order to compare species composition and abundance. In this example the two baselines would be maintained separately because regeneration after vegetation cutting is likely to be different at each location. Transects are sited semi-randomly on an MRA -by -MRA basis because each habitat and work area is quite different. A random number generator is used to 1) select a grid cell (total number of grid cells in strata), 2) select the quadrant of the grid cell the transect starts from (1-4), and 3) select which compass direction in which to align the transect from the starting point (0-360 degrees). If a transect location is randomly selected and overlaps another transect, it is discarded and a new transect location is chosen.

Aerial cover by shrub and tree species is recorded on data sheets for all individuals that intercept the 50-m monitoring tape; all layers of shrub and tree species cover are recorded, so there may be two or more species recorded in the same location. Herbaceous cover is only recorded in the absence of shrub or tree overstory, as per the 2009 protocol (Burlison 2009). Cover by herbaceous plants in areas lacking a shrub canopy are not recorded by species but are combined as “herbaceous cover.” Bare ground and/or litter is recorded in transect segments devoid of vegetation. Waypoints obtained from a GPS unit are recorded for each end of the transect so that the same transect can be revisited in subsequent years. A photo is taken from one end.

Modifications to Methods for the IAR MRA: Modifications to the 2009 vegetation monitoring protocol were necessary for the IAR MRA surveys because safety concerns prevented ESCA RP biologists from entering the SCAs and NCAs to establish baseline vegetation conditions. In order to establish baseline vegetation conditions for the SCAs and NCAs, a proxy approach was developed that involved establishing reference monitoring plots and transects in areas close to the SCAs/NCAs that contain similar vegetation. Some of the baseline vegetation transects for the ESCA RP remediation work were conducted in transects that previously served as follow-up monitoring transects for the Army remediation.

Shrub and herbaceous cover baseline transects were established in two different areas: IAR MRA-wide and Range 47 SCA Subarea B. The IAR MRA-wide shrub and herbaceous cover baseline was developed from data gathered from 29 50-m transects located throughout the IAR MRA in similar-appearing central maritime chaparral. Some of these were follow-up monitoring transects from previous monitoring associated with Army remediation in 2004. Three Range 47 SCA Subarea B shrub and herbaceous proxy baseline transects were

established northwest of Range 47 SCA because these areas had similar-appearing native vegetation and weed presence.

Modifications to Methods for FEG MRA: The 2009 vegetation monitoring protocol only addresses vegetation monitoring using transects in central maritime chaparral. Coast live oak woodland and an area mapped as “sandstone” by ESCA RP biologists were also monitored (2011 Annual Natural Resources Report, Appendix F; ESCA RP Team 2012a). In coast live oak woodland, transects were established to clearly document conditions prior to soil and tree removal in an area of approximately 1 acre. Transects in the sandstone area were established to document the vegetated state of the site prior to soil excavation.

5.2.2 Methods for Supplemental Herbaceous Vegetation Monitoring

Supplemental herbaceous 0.25 square meter (m²) quadrats are installed if transects contain high cover of herbaceous species and/or a low cover of shrubs, following the Army’s 2009 sampling protocol. ESCA biologists used approximately 50% cover of herbaceous species as the threshold for establishing quarter meter plots. Supplementary herbaceous quadrats are placed on alternating sides of each transect every 10 m for a total of six plots per transect. Aerial cover and stem counts for all plant species in the plot are recorded. Baseline data may not be available for quarter meter plots.

5.2.3 Methods for HMP Annual Plant Monitoring

The HMP annual monitoring surveys are intended to document baseline conditions or any population change after munitions investigation and remediation activities. The entire work area is surveyed for all HMP annual species in the habitat parcel during the peak flowering period (April through September, depending on the species), and then a map is generated to show the general distribution and abundance of HMP annuals in the proposed work area.

Point count survey plots are 25 m² and are placed where average-sized populations of the target HMP annual species are growing (not the most dense or least dense populations). The protocol recommends that plots be established in approximately 20% of the habitat area or 38 plots, whichever is larger; in the FEG and Parker Flats MRAs, however, the HMP annual populations were too small to establish this many plots.

Within each circular plot, a census is conducted of all individual target HMP annual plants (e.g., Monterey gilia, Monterey spineflower, seaside bird’s beak). A GPS point is taken at the center of the plot, and a photo is taken of the whole plot.

Modifications to the Methods for the IAR MRA: Modifications to the HMP annual plant monitoring protocol have been necessary in the IAR MRA between 2010 and 2012 since safety exclusion zones associated with munitions response activities have prevented ESCA RP biologists from entering the SCAs and NCAs. Instead, modified reference baseline plots for HMP annual species monitoring have been installed around the perimeter of the SCAs/NCAs; modified reference baseline plots are placed as close to the work area as possible or in habitat with similar vegetation structure and diversity to off-limit munitions

investigation areas. In addition to monitoring 25 m² plots, HMP annual plants were counted within 100 x 100 foot (30 x 30 m) grid cells when it was feasible.

Baseline monitoring plots were established in six different locations, based on habitat types (e.g., grassland, maritime chaparral), species distribution areas (e.g., seaside bird's-beak present or absent), and/or disturbance type (e.g., historically-altered chaparral, proposed remediation haul road). The baseline areas are: 1) North Range 44 SCA, South Range 44 SCA/Central Area NCA; 2) Grassland; 3) Range 47 SCA Subarea A (low recruitment area); 4) Range 47 SCA Subarea B (range fan); 5) Range 47 SCA Subarea C (outside range fan); and 6) Ingress/Egress corridors. The ESCA RP IAR MRA HRP (ARCADIS 2012b) describes these baseline locations in more detail.

5.2.4 Methods for HMP Manzanita Retention

Data gathered by ESCA RP between 2008 and 2012 indicate that non-stump sprouting shrub species, such as Toro manzanita and Hooker's manzanita, do not readily recolonize sites subject to vegetation cutting in the absence of fire. To mitigate for possible reduction in the abundance of these species and to ensure the presence of seed-producing mature individuals, the ESCA RP Team developed methods for retaining between five and 50 Toro manzanitas per acre and any observed Hooker's manzanitas in areas subject to vegetation cutting in the FEG MRA. Prior to vegetation cutting, ESCA RP biologists surveyed work areas and clearly flagged Hooker's manzanita individuals for avoidance. Flagging of mature Toro manzanita shrubs was unsafe; however, so vegetation crews were trained by ESCA RP biologists how to visually identify them.

Field sampling was conducted in 2012 to measure the effectiveness of the HMP manzanita retention approach. A total of 116 100 x 100 foot (30 x 30 m) grid cells were selected in the east and west habitat parcels using a random number table; stratification of grid cells was used for selection of sampling locations based on geographic area (east and west habitat parcels) and central maritime chaparral structure or level of disturbance; once a grid cell was chosen for sampling three to five adjacent cells were also sampled. Within each surveyed grid cell, a census of all shrub and tree species left standing after vegetation cutting was recorded. This protocol is not part of the 2009 vegetation monitoring protocol but is consistent with the goals of the HMP to avoid and preserve HMP species to the maximum extent possible.

5.2.5 Methods for Post-Rainfall CTS Monitoring

Inspections for CTS are conducted by biologists and field crews after one-half inch (1.2 cm) or more of rain is recorded on site within the previous 24-hour period. All CTS inspectors have received the MRA-specific environmental awareness training.

Inspections take place prior to fieldwork commencement and involve careful examination below all materials, equipment, and vehicles that could be used during the post-rainfall day. Inspectors are directed to use a high-powered flashlight to look for CTS. Inspections are only done within two km of a known current or historical CTS breeding pond. If a CTS is observed by a crew member, the ESCA RP Senior Qualified Biologist (SQB) is called

immediately so that a USFWS -approved Qualified Biologist (QB) can relocate the animal to a safe place, if necessary. A crew member will stay with the animal until it is outside of the work area so that it is not injured or killed by a vehicle, predation, or another means.

5.2.6 Methods for Aquatic Feature Monitoring

In 2012 ESCA RP biologists conducted additional baseline monitoring specifically in the FEG MRA grenade range aquatic features (AF09-1, AF09-1B, and AF09-2). Vegetation zones within the aquatic features were identified to assist with restoration, and plant diversity and abundance were visually surveyed in each zone to augment the plant data recorded in 2010 and 2011. Photo-points were established prior to munitions response activities and are monitored on an annual basis, or more frequently during work activities in the area.

5.2.7 Methods for Weed Monitoring and Management

Weed monitoring is conducted using visual surveys throughout the year, especially prior to and during the flowering season. As directed by the 1997 HMP the ESCA RP weed monitoring targets pampas and/or jubata grass (*Cortaderia selloana*, *C. jubata*), French broom (*Genista monspessulana*), and iceplant (*Carpobrotus* spp., especially *C. edulis*). Weed abatement is conducted where necessary to prevent the spread of these target weed species into habitat areas. In addition, any weedy species observed that are listed by the California Invasive Plant Council as invasive weeds are also monitored if present in sufficient numbers to threaten sensitive species or habitats (California Invasive Plant Council 2006).

To comply with applicable weed management requirements, the ESCA RP Team developed a Weed Management Plan (ESCA RP Team 2010b). The plan identifies development of weed monitoring plans (minimum of one monitoring plan per year) followed by weed management activities as indicated by the monitoring results. The 2012 weed monitoring plan is attached as Appendix C.

5.2.8 Methods for Erosion Control

Erosion monitoring is conducted using visual surveys of borderland boundaries where munitions response activities may affect habitat parcels. When necessary the ESCA RP Team installs erosion control measures, such as silt fencing, biodegradable weed-free straw wattles, and biodegradable coconut fiber erosion control blankets.

5.3 Methods for Restoration Implementation Preparation

During the 2012 reporting period, seed collection, plant propagation, plant production, and top soil stockpiling were conducted to prepare for passive and active habitat restoration in the IAR MRA. Methods for these activities will be detailed in the 2013 Annual Natural Resource Report.

6.0 SUMMARY OF MUNITIONS RESPONSE ACTIVITIES AFFECTING HABITAT PARCELS

Munitions response activities conducted by the ESCA RP Team in the 2012 reporting period affected approximately 87.4 acres (35.4 ha) of habitat (Table 1-1). The work included maintenance/staging of equipment and vehicles, vegetation cutting, munitions investigation, excavation, and soil stockpiling. These activities occurred in habitat parcels in the FEG MRA, IAR MRA, and Parker Flats MRAs (Figures 6 through 8). During the 2012 reporting period vegetation cutting was conducted on approximately 67.5 acres (27.3 ha), well below the 800 acres (324 ha) allowed per year in the HMP. The area where vegetation cutting occurred was not all vegetated. It contained central maritime chaparral, oak woodland, grassland, and bare ground (roads, trails, historical disturbance area). Details of the activities in each MRA are described in the following sections.

6.1 Munitions Response Activities in Future East Garrison MRA

Munitions response activities within the habitat area of the FEG MRA were initiated on 13 October 2010 and is ongoing as of 15 October 2012 (Figure 6). Munitions response activities included digging of anomalies, both near-surface digs using hand tools and subsurface removal using hand tools and a backhoe. Vegetation cutting included mechanical vegetation removal in the east and west habitat parcels. Manual limbing of trees and shrubs greater than 6 inches (15 cm) dbh and Toro and Hooker's manzanita retention were practiced, as described in Section 7.2.1.

On 16 May 2012 the ESCA RP Team submitted Field Variance Form Number G4WPFVF-003 recommending vegetation cutting in an additional 50 acres (20 ha) of central maritime chaparral. This was consistent with approval from USFWS to conduct an additional 50 acres (20 ha) of vegetation cutting in central maritime chaparral habitat (letter dated 24 April 2012). Soil excavation and sift operations began in the last week of the reporting period in the grenade range consistent with Field Variance Form Numbers G4WPFVF-004 and G4WPFVF-005, which included additional soil sifting operations and Standard Operating Procedures for Soil and Vegetation Handling in Aquatic Features.

During the 2012 reporting period equipment/vehicles/materials staging occurred on <1 acre (<0.4 ha), vegetation cutting occurred on 65 acres (26.3 ha) in oak woodland and central maritime chaparral vegetation, munitions investigation occurred on 44.6 acres (18 ha), soil excavation occurred on 0.7 acres (0.3 ha), and soil was stockpiled on <1 acre (<0.4 ha) (Table 1-1).

6.2 Munitions Response Activities in Interim Action Ranges MRA

In November 2009, the ESCA RP Team conducted a site reconnaissance of the IAR MRA in support of the Remedial Investigation/Feasibility Study Report. MEC investigations and munitions response activities commenced in June 2011 and are ongoing as of 15 October 2012 (Figure 7). Field Variance Form IARWP-004 dated 09 November 2011 recommends

design study expansion for North Range 44 SCA in accordance with Final Phase II Interim Action Work Plan (ESCA RP 2012b).

During the 2012 reporting period equipment/vehicle/material staging occurred on <1 acre (<0.4 ha), vegetation cutting occurred on 2.5 acres (1 ha), MEC cutting occurred on 22.4 acres (9 ha), soil excavation occurred on 12.5 acres (5 ha), and no habitat was affected by soil stockpiling (Table 1-1).

6.3 Munitions Response Activities in Parker Flats MRA

Munitions response activities consisted of instrument-aided, analog near-surface investigation followed by a DGM investigation in limited areas. Investigation of anomalies included both near-surface digs using hand tools and subsurface investigation using either hand tools or backhoes. Field Variance Form G1WP-008 recommends proceeding with Residential Quality Assurance in Parker Flats to Level 2.

During the 2012 reporting period equipment/vehicle/material staging occurred on <1 acre (<0.4 ha), no vegetation cutting occurred, MEC investigation occurred on <1 acre (<0.4 ha), and no soil excavation or stockpiling occurred (Table 1-1, Figure 8).

6.4 Cumulative Areas of Vegetation Cutting in Habitat Parcels

Table 1-1 presents the approximate number of acres affected during munitions response activities in habitat parcels in the FEG, IAR, and Parker Flats MRAs during this reporting period. Activities conducted in the three MRAs with habitat parcels include: maintenance/staging, vegetation cutting, MEC clearance, and stockpiling. Excavation was conducted in the FEG and IAR MRAs.

Total habitat acres affected during the reporting period are: FEG MRA – 65 acres (26 ha) out of 177.5 habitat acres (69 ha), IAR MRA – 22.4 acres (9 ha) out of 206 habitat acres (83 ha) and Parker Flats MRA – <1 acre (<0.4 ha) out of 166 habitat acres (67.2 ha).

7.0 RESULTS OF MONITORING, MANAGEMENT, AND MITIGATION ACTIVITIES

This section summarizes the habitat monitoring, management, and mitigation activities required by the HMP and BO and performed by the ESCA RP Team during the period from 16 October 2011 through 15 October 2012.

7.1 Natural Resource Impact Mitigation Checklists and Inspection Reports

NRIM Checklists and Inspection Reports tabulate detailed mitigation measures required in association with munitions response activities. Such checklists inform and assist field personnel in complying with HMP and BO requirements. The NRIM checklist replaces the habitat checklists previously prepared by the U.S. Army for the same purpose. The following sections summarize the checklists developed and implemented during this reporting period.

Copies of the NRIM checklists and inspection reports that were prepared during the reporting period are presented in Appendix A.

7.1.1 NRIM Checklists

There are two unnumbered and nine numbered (e.g., Checklist 1 Revision 0) NRIM Checklists that have been developed for activities that occur in habitat and development parcels since 2008. New checklists are developed when a new activity starts in an MRA, and checklists are revised when the scope changes for an ongoing activity. After the development of a checklist, QBs conduct training events to update personnel on compliance measures. During this reporting period, one new checklist was developed for the MOUT Site MRA and two revisions were developed for the FEG MRA. Inspections were carried out in the IAR MRA using previously developed checklists.

7.1.1.1 *Future East Garrison MRA*

Two NRIM checklist revisions (Checklist No. 5 Revision 1 and Revision 2) were developed for munitions response activities in the FEG MRA habitat parcels, including vegetation removal, mechanical excavation, and soil screening. Checklist No.5 Revision 1 addressed measures to minimize impacts to aquatic features, CTS, Monterey gilia, and Monterey spineflower, as well as other habitat impacts, as a result of vegetation removal and munitions response activities. It also provided for preserving trees over 5 inches (13 cm) dbh whenever feasible. Checklist No.5 Revision 2 specifically addressed measures to minimize impacts on the three aquatic features within the grenade range. An updated Standard Operating Procedure (SOP) for soil disturbance and replacement in the aquatic features, coupled with seed and duff collection and plant salvaging, was developed and attached to the revision. A copy of the revisions and associated attachments is included as Appendix A.

7.1.1.2 *Military Operations in Urban Terrain Site*

One NRIM checklist was developed for vegetation removal and other munitions response activities in the MOUT Site MRA non-residential development parcel. The checklist addressed measures to minimize impacts on CTS upland habitat, Monterey gilia, and Monterey spineflower, and also provided for preserving trees over 5 inches (13 cm) dbh whenever feasible. A copy of the checklist is included as Appendix A.

7.1.2 NRIM Field Inspection Reports

NRIM field inspections were performed by ESCA RP QBs to document compliance with mitigation measures in the checklists. Summaries of the inspections are presented below. Copies of the reports are presented in Appendix A.

7.1.2.1 *Future East Garrison MRA NRIM Inspection Reports*

On six separate dates, a QB conducted an inspection in the habitat parcels of FEG MRA to determine compliance with the respective NRIM checklist. Below are the details of the

individual inspections. In all cases, field personnel were observed to be following the mitigation measures in the checklist, and there were no concerns to report. Copies of the inspection reports are included in Appendix A.

On 11 April 2012, QBs conducted inspections of equipment for CTS and provided additional CTS training subsequent to greater than 0.5 inches (1.2 cm) of rainfall within 24 hours. The QBs visually inspected under rubber tracks for CTS; none were observed.

On 25 May and 10 July 2012, QBs conducted inspections of vegetation cutting and ingress/egress routes. The QB flagged Toro manzanitas larger than 6 inches dbh (13 cm), any observed Hooker's manzanitas, and one Pajaro manzanita (*Arctostaphylos pajaroensis*) to be avoided during vegetation removal.

On 25 July 2012, QBs conducted inspections of vegetation cutting and ingress/egress routes. The QBs performed surveys of individual grid cells to ensure field personnel were retaining the prescribed number of manzanitas per cell. The QBs conducted additional manzanita identification training for field personnel.

On 02 October 2012, QBs conducted inspections during topsoil removal within aquatic features as described in the updated SOP. QBs labeled containers and stockpiles with aquatic feature name and layer for soil replacement.

On 08 October 2012, QBs conducted inspections during sift operations in the grenade range. Field personnel were observed following ingress/egress procedures and had installed silt fence around aquatic features as necessary and feasible. QBs inspected subsoil stockpiles and observed personnel keeping soil separate, as described in updated SOP for the grenade range aquatic features.

7.1.2.2 Interim Action Ranges MRA NRIM Inspection Report

On 09 April 2012, a QB inspected vegetation cutting and ingress/egress routes in the IAR MRA. Field personnel limited ingress/egress routes to designated roads and corridors, as described in the checklist. Vegetation removal was performed in accordance with the checklist mitigation measures. Biologists noted that CTS radii were not staked; however, field personnel were provided maps showing CTS radii and were requested to use CTS mitigation measures in those areas. Additionally, personnel backfilled or sloped excavations to prevent trapping CTS. Personnel were in compliance with checklist mitigation measures and there were no concerns to report. A copy of the inspection report is included in Appendix A.

7.1.2.3 Military Operations in Urban Terrain Site NRIM Inspection Report

On 14 February 2012, a QB inspected vegetation cutting and ingress and egress routes in the MOUT Site MRA. Field personnel limited ingress/egress routes to designated roads and corridors as described in the checklist. Vegetation removal was performed in accordance with the checklist mitigation measures. CTS radii were not staked; however, field personnel were provided maps showing CTS radii and were requested to use CTS mitigation measures in

those areas. Personnel were in compliance with checklist mitigation measures and there were no concerns to report. A copy of the inspection report is included in Appendix A.

7.2 Habitat Monitoring Activities

Monitoring is required in habitat parcels in association with potential or actual habitat disturbance as a result of ESCA RP munitions response activities. The habitat monitoring protocols are outlined in Section 5. A summary of habitat monitoring activities initiated by the ESCA RP Team during the 2012 reporting period is shown in Table 1-2. During this period, ESCA RP biologists completed 31 50-m vegetation transects, 59 supplemental herbaceous quadrats, 59 HMP annual plots, and surveyed Toro manzanitas in 29 acres (11.7 ha) in three MRAs: FEG MRA, IAR MRA, and Parker Flats MRA. Tables 7-1 through 7-19 present the results from habitat monitoring activities.

7.2.1 Vegetation Monitoring in MRAs

Vegetation monitoring in the habitat parcels performed during the reporting period are summarized by MRA in this section.

7.2.1.1 Vegetation Monitoring in Future East Garrison MRA

A total of 43 ESCA RP baseline transects were established between fall 2010 and summer 2012 prior to munitions response activities in the FEG MRA; all are reported in this 2012 Annual Natural Resource Report (Tables 1-2, 7-1, 7-2, and 7-3 and Figure 11). Of these transects, 39 were baseline transects in central maritime chaparral, two were situated in a largely unvegetated mineral soil area in a portion of the grenade range, and two were located in oak woodland on the edge of the grenade range.

Results from ESCA RP baseline central maritime chaparral transects indicate dominance by three shrub species: brittleleaf manzanita (45.8% average cover), chamise (*Adenostoma fasciculatum*, 27.4% average cover), and Toro manzanita (14.4% average cover), along with high diversity of associated shrub and herbaceous species forming greater than 100% cover due to branch overlap (Table 7-1). Non-native target weed cover by iceplant is less than 1% in mature chaparral vegetation. This vegetation type is classified as the brittleleaf manzanita shrubland alliance by CNPS and California Department of Fish and Game (CDFG; Sawyer et. al 2009). Brittleleaf manzanita chaparral has a G2/S2 rating (6-20 viable occurrences and/or 2,000-10,000 acres [518-2590 ha] worldwide and statewide), as listed in the CDFG Natural Communities Hierarchy (CDFG 2010) and in CNDDDB (CDFG 2012); G2/S2 ratings indicate an alliance that is threatened throughout its range.

Due to misidentification of a dominant manzanita, 25 chaparral transects were revisited in 2012 and are not included in the total baseline transect numbers. In early 2012 ESCA RP biologists discovered that the widespread brittleleaf manzanita (*Arctostaphylos crustacea* ssp. *crustacea*) had been erroneously recorded as the HMP shrub Hooker's manzanita. Biologists revisited 25 maritime chaparral transects after crews had started brush-cutting in the MRA to confirm manzanita identification. Fifteen of these transects had not been brush cut or

disturbed by ESCA RP activities; these transects were in a condition similar if not identical to when surveyed in the 2011 reporting period. Six transects were partially cut and four transects were completely brush cut and sprouting back. Biologists were able to correctly identify all manzanitas in uncut transects and use these data to modify results for partially or completely cut transects.

Oak woodland baseline transects suggest more open woody vegetation than chaparral, with bare ground comprising an average of 61.7% of the site and dominance by coast live oak (*Quercus agrifolia*, 37% average cover including canopy and understory saplings), California blackberry in the understory (*Rubus ursinus*, 12.1% average cover), and brittleleaf manzanita (11.3% average cover), along with other associated native species in vegetated areas (Table 7-2). No target weeds were observed in these transects. This vegetation type is classified as the coast live oak woodland alliance by CNPS and CDFG (Sawyer et. al 2009). Coast live oak woodland has a global rank of G5 (no threats known) and a state rank of G4 (apparently secure, but factors exist to cause some concern; i.e., there is some threat or somewhat narrow habitat), as listed in the CDFG Natural Communities Hierarchy (CDFG 2010) and in CNDDDB (CDFG 2012).

Two transects were also placed in a largely unvegetated area prior to munitions response activities. This area is comprised of bare mineral soil over 94.6% of the sampling area (Table 7-3). The remainder of the site supports a few scattered Toro manzanitas and other species.

7.2.1.2 Vegetation Monitoring in Interim Action Ranges MRA

Central maritime chaparral is a fire-dependent vegetation type, and chaparral stands are often aged based on fire history. As mentioned in Section 3, the entire IAR MRA burned in 2003, so the stand of central maritime chaparral in this area is roughly one decade old. The Army established initial baseline survey transects in this area in 2000 prior to this recent burn (Parsons 2005). Thirty of these transects were revisited by ESCA RP biologists in 2008 and 20 transects were revisited in 2010 to monitor vegetation recovery after remediation work by the Army in the IAR MRA; data from these transects were reported in the 2011 Annual Natural Resource Report (ESCA RP Team 2012a).

Nineteen additional ESCA RP baseline transects were established between 2010 and 2011 in the IAR MRA prior to ESCA munitions response activities; these baseline transects were all located outside the SCAs and NCAs for safety reasons (Figure 12). Three of these ESCA RP transects serve as a vegetation baseline for habitat restoration in Range 47 SCA. Sixteen of these ESCA RP baseline transects and 11 follow-up monitoring transects (located in areas previously monitored and remediated by the Army) serve as the baseline for disturbance to habitat by ESCA munitions response activities in the rest of the SCAs and NCAs (North Range 44 SCA, South Range 44/Central Area SCAs/NCAs, Range 47 SCA Subarea C, and ingress/egress corridors).

Follow-up vegetation monitoring transects were established in June 2012 in the ESCA RP munitions response area, 16 in areas of vegetation cutting and six in areas with small -scale excavation. Although newly established, the data from these 2012 transects represent Year 1 growth because they are located in SCAs and NCAs that were cleared of vegetation or

vegetation and soil prior to 2012 and support newly established vegetation that has been restored by passive means.

Results from the ESCA RP 2010 and 2011 baseline maritime chaparral transects in the IAR MRA indicate dominance by four shrub species: shaggy-bark manzanita (29.3% average cover), dwarf ceanothus (*Ceanothus dentatus*, 20.2% cover), Monterey ceanothus (13.5% cover), and chamise (9.0 % average cover), along with associated shrub and herbaceous species forming almost 100% cover (Table 7-4). Non-native target weed cover by iceplant is about 3% in mature chaparral vegetation in these transects. This vegetation type is classified as the shaggy-bark manzanita shrubland alliance by CNPS and CDFG (Sawyer et. al 2009). Shaggy-bark manzanita chaparral has a G2/S2 rating (6-20 viable occurrences and/or 2,000-10,000 acres [518-2590 ha] worldwide and statewide), as listed in the CDFG Natural Communities Hierarchy (CDFG 2010) and in CNDDDB (CDFG 2012); G2/S2 ratings indicate an alliance that is threatened throughout its range.

Overall cover dropped in transects in the IAR MRA after vegetation cutting: shaggy-bark manzanita (15.6 % average cover) and chamise (3.5 % average cover) had the greatest cover of any shrub species, and both species are stump-sprouters from a basal burl (Table 7-4). Other species exhibited less than 3% cover at the time of sampling after vegetation cutting. No dwarf ceanothus were present and cover by Monterey ceanothus dropped to 0.5%; shrub and subshrub species diversity remained roughly the same, with 17 out of 19 species present after vegetation cutting.

When relative cover data are compared between baseline and follow-up transects, patterns emerge that suggest the initial phase of robust vegetation recovery in the IAR MRA. Relative cover by the dominant species on site increased after vegetation cutting: shaggy-bark manzanita increased from 31% to 47.9% and chamise increased slightly from 9.5% to 10.7%. Lower-growing associates, such as deerweed (*Acmispon glaber*) and sandmat manzanita also exhibited greater relative cover after vegetation cutting: deerweed increased from 1.5% to 7.5% relative cover and sandmat manzanita, an HMP species, increased from 1.7% to 4% relative cover. Although relative cover by Monterey ceanothus dropped from 14.3% to 1.5%, seedlings of this HMP shrub were observed in half of the transects. Recovery by dwarf ceanothus was not observed, however. Among the native species exhibiting high frequencies (found in at least 80% of transects) in 2012 are shaggy-bark manzanita, chamise, black sage, sandmat manzanita, deerweed, and a great variety of herbaceous plants growing in open areas between shrubs, which suggests that vegetation recovery will be rapid.

A total of 10 native herbaceous species and an additional nine species of shrubs and subshrubs were counted in supplemental herbaceous quadrats after vegetation cutting, including two HMP species, sandmat manzanita and Monterey spineflower; twenty-two species were recorded in these 0.25 m² plots, reflecting the high species diversity of herbaceous species and shrubs after vegetation cutting (Table 7-5).

In areas subject to small-scale excavation activities, cover by woody vegetation is less than 3%, with herbaceous species contributing approximately 5% to total vegetative cover (Table 7-6). Species exhibiting the greatest presence included deerweed and rush-rose (*Helianthemum scoparium*), but larger woody shrubs are largely absent in these transects.

Fifteen native herbaceous species were present in supplemental herbaceous quadrats in areas subject to small-scale excavation, along with an additional nine species of shrubs (Table 7-7).

Grassland vegetation subject to munitions investigation remedial activities exhibits low cover overall, with 90.6% bare ground and the remaining vegetation split between native herbaceous species and weedy annual grasses and forbs (Table 7-8). Native species include coastal tarweed (*Deinandra corymbosa*), Monterey spineflower, sky lupine (*Lupinus nanus*), and others. Weedy grasses include rattail fescue (*Festuca myuros*), wild oat (*Avena fatua*), soft chess (*Bromus hordeaceus*), and others. No native grasses were observed in transect locations.

7.2.1.3 Vegetation Monitoring in Parker Flats MRA

A total of 11 ESCA RP baseline transects were established in 2008 prior to ESCA RP Phase II munitions response activities in the Parker Flats MRA; during 2012, follow-up monitoring occurred in these baseline transects after vegetation cutting. Eight transects occur in maritime chaparral vegetation and three transects occur in central coastal scrub vegetation (Figure 13).

Results from ESCA RP 2008 baseline maritime chaparral transects indicate dominance by two shrub species: brittleleaf manzanita (56.7% average cover) and chamise (37.2% average cover), along with a diversity of associated shrub and herbaceous species forming greater than 100% cover (Table 7-9). Toro manzanita, an HMP shrub, comprises 3.5% average cover in baseline transects. Non-native target weed cover by iceplant is less than 1% in mature chaparral vegetation. This vegetation type is classified as the brittleleaf manzanita shrubland alliance by CNPS and CDFG (Sawyer et. al 2009).

Cover by the two dominant shrubs was high in 2012 after vegetation cutting: shaggy-bark manzanita had 39.1% cover and chamise had 37.4% cover only two years after vegetation cutting, with total vegetation cover of 90.7% (Table 7-9). None of the Toro manzanitas persisted after vegetation cutting, but five shrub and/or subshrub species appeared in transects that were not previously recorded.

Central coastal scrub vegetation supported a mix of shrub species in 2008 ESCA RP baseline transects prior to vegetation cutting, including black sage (33% average cover), coyote bush (14.2% average cover), sticky monkeyflower (7.5% average cover), poisonoak (7.1% average cover), and others, with an average total of 78.3% total vegetative cover and no target weeds present (Table 7-10). This vegetation type is classified as the black sage shrubland alliance by CNPS and CDFG (Sawyer et. al 2009); the black sage shrubland alliance has global and state ranks of G5/S5 (no threats known), as listed in the CDFG Natural Communities Hierarchy (CDFG 2010) and in CNDDDB (CDFG 2012).

Native plant cover exhibited higher cover after vegetation cutting in central coastal scrub than before, with a total average cover of 87.8%; herbaceous species contributed 27.4% cover after vegetation cutting compared with 0.2% before. Dominant shrubs after vegetation cutting include sticky monkeyflower (14.4% average cover), coyote bush (13.6% average cover), and deerweed (13.5% average cover); three shrub/ subshrub species were present after cutting that were not present during the 2008 ESCA RP baseline surveys of these transects. Three native

herbaceous species and 11 non-native herbaceous species were documented in supplemental herbaceous quadrats in central coastal scrub after vegetation cutting, along with six shrubs and one coast live oak tree (Table 7-11).

7.2.2 HMP Species Monitoring in MRAs

HMP species monitoring in the habitat parcels performed during reporting period are summarized by MRA in this section.

7.2.2.1 HMP Species Monitoring in Future East Garrison MRA

Two HMP annual species were observed in the FEG MRA in 2010 in areas targeted for munitions response activities: Monterey spineflower and Monterey gilia (Table 7-12). Two ESCA RP baseline HMP annual plots were installed in 2010 to monitor Monterey spineflower and three baseline HMP annual plots were installed to monitor Monterey gilia.

The data suggest that both species have declined in number after munitions response activities were conducted in the habitat parcels, although no excavation or vegetation removal occurred in the plots. An average of 118 Monterey spineflower individuals occurred in the two plots in 2010; this number dropped to 55 in 2012. An average of 30 Monterey gilia was present in three plots in 2010, declining to an average of 5 in 2012.

Results of the census of the HMP shrub, Toro manzanita, after vegetation cutting using the modified shrub retention method indicate retention of an average of 19 Toro manzanitas per acre (Table 7-13). West of Barloy Canyon Road in an area previously mapped as supporting high densities of Toro manzanita (USACE 1992), a total of 339 individuals were retained on 11.3 acres (4.6 ha). East of Barloy Canyon Road, where Toro manzanitas were previously mapped with medium and high densities, a total of 166 Toro manzanitas were retained on 16.4 acres (6.6 ha). Survival of these retained manzanitas has been high; only one Toro manzanita to date has died subsequent to vegetation cutting activities.

7.2.2.2 HMP Annual Species Monitoring in IAR MRA

A combination of 25 m² baseline plots and 100 x 100 foot (30 x 30 m) grid cells were monitored in the IAR MRA in 2010 prior to ESCA RP munitions response activities in order to monitor HMP annual species before and after disturbance. The 25 m² baseline plots were placed where annual HMP species were growing during surveys of relatively large areas surrounding target locations for munitions investigations (Table 7-14). Post-disturbance 25 m² plots were confined to smaller disturbance areas. Reference plots were placed around the perimeter of the SCAs and NCAs (Table 7-15).

Monterey spineflower: Monterey spineflower ranged from an average of 89 to 158.1 individuals per 25 m² plot in 2010 baseline results (prior to disturbance). During 2012 post-disturbance monitoring the average plot counts dropped to 13 to 26 individuals per plot. The decline in density was proportionally smaller for plots subject to small-scale excavation; Monterey spineflower densities dropped by about 65% in these plots compared with a drop of

over 80% in ingress/egress route areas and areas that had been subject to vegetation cutting. A similar decrease in Monterey spineflower density occurred in reference plots between 2010 and 2012, despite the fact that these plots were not subject to disturbance associated with munitions response activities.

Data from 100 x 100 foot (30 x 30 m) grid cells that were monitored for Monterey spineflower indicate a fairly broad distribution of this HMP annual in the IAR MRA (Table 7-16). Of the 79 grid cells surveyed for the presence of Monterey spineflower in 2010, 62 grid cells (78%) supported Monterey spineflower individuals. Nineteen grid cells were surveyed after munitions investigation remedial activities between 2010 and 2012, and 17 of the surveyed grid cells (89%) supported Monterey spineflower in 2012.

Grid cell data suggest Monterey spineflower densities are stable or only slightly decreasing in the North Range 44 SCA and South Range 44/Central Area SCAs/NCAs after small-scale excavation. Densities of Monterey spineflower decreased during this two year period along ingress/egress corridors; after vegetation cutting in all areas; after large-scale excavation in Range 47 SCA Subarea A; after vegetation cutting and small-scale excavation in Range 47 SCA Subarea C; and in grassland vegetation after small-scale excavation.

Monterey gilia: Monterey gilia is less abundant in the IAR MRA than Monterey spineflower, with numbers ranging from an average of 3.2 to 23.5 per 25 m² plot in 2010 baseline results (prior to disturbance), dropping to 0.5 to 4.1 individuals after disturbance resulting from munitions response activities. The decline in density was mirrored in the reference plots between 2010 and 2012, despite the fact that these plots were not subject to disturbance associated with munitions response activities.

Data from 100 x 100 foot (30 x 30 m) grid cells that were monitored for Monterey gilia indicate a fairly broad distribution of this HMP annual in the IAR MRA (Table 7-17). Of the 65 grid cells surveyed for the presence of Monterey gilia in 2010, 34 grid cells (52%) supported Monterey gilia individuals. Nineteen grid cells were surveyed after munitions investigation remedial activities between 2010 and 2012, and 16 of the surveyed grid cells (84%) supported Monterey gilia in 2012.

Grid cell data suggest Monterey gilia densities decreased during this two year period along ingress/egress corridors and after small-scale excavation and vegetation cutting in the North Range 44 SCA and South Range 44/Central Area SCAs/NCAs. Presence in grids is limited in Range 47 SCA for all munitions investigation activity types, although there was a slight increase in density after vegetation cutting in Range 47 SCA Subarea C.

Seaside bird's beak: Seaside bird's beak only occurs in North Range 44 in the IAR MRA, with numbers ranging from an average of 3.6 to 30.7 per 25 m² plot in 2010 baseline results (prior to disturbance). Although no seaside bird's beak was observed after small-scale excavation in 2012, numbers of seaside bird's beak remained stable along ingress/egress routes and after vegetation cutting. In contrast, numbers of seaside bird's beak declined in reference plots between 2010 and 2012, from an average of 160.8 to 2.8 individuals.

Grid cell data suggest seaside bird' beak densities decreased during this two year period along ingress/egress corridors (Table 7-18). On the other hand, seaside bird's beak was found in eight grid cells after vegetation cutting in the North Range 44 SCA and South Range 44/Central Area SCAs/NCAs and had not been noted in those areas prior to disturbance.

7.2.2.3 HMP Annual Species Monitoring in Parker Flats MRA

One HMP annual species, Monterey spineflower, has been observed in the Parker Flats MRA in areas subject to Phase II munitions response activities.

An average of 136.9 Monterey spineflower individuals occurred in the 10 plots in 2008; these numbers declined to 40.7 individuals in 2011 (Table 7-19). In order to improve potential habitat for Monterey spineflower in these plots, the layer of chipped woody debris remaining after vegetation cutting was cleared in early 2012 to provide more open areas for seed germination and plant growth. In these cleared areas, the average number of Monterey spineflower increased to 57.1 per 0.25 m² plot.

7.3 CTS Mitigation Measures Implemented

Two new ESCA RP Biologists were approved by the USFWS to handle CTS for rescue and relocation in 2012. Approval documentation is included in Appendix B.

Along with the general impact minimization practices, such as employee training, limiting ingress and egress to a work area to established roads and paths, and limiting soil disturbances to work areas only, additional CTS-specific mitigation measures were implemented by the ESCA RP Team. A QB performed environmental awareness training of field personnel prior to initiation of fieldwork in all MRAs, placing special emphasis on CTS awareness, requirements, and mitigation measures. During the training personnel were advised that several aquatic features (potential breeding habitats for CTS) are present in the FEG MRA, and aquatic features known to have contained CTS are present within 2 km (1.24 miles) of the FEG and IAR MRAs (Figure 10). Environmental awareness training and CTS refresher training was provided to field personnel and supervisors prior to the beginning of MEC remedial investigation in the FEG MRA. On 17 October 2011, QBs conducted CTS refresher training in all MRAs. Additional trainings for the FEG MRA conducted by a QB during the reporting period include: NRIM Checklist 5 revision 1 training, conducted 22 May 2012 and 29 May 2012; NRIM Checklist 5 revision 2 training, conducted 01 October 2012, 03 October 2012, and 08 October 2012; and Environmental Awareness Training, conducted 22 May 2012, 29 May 2012, 29 June 2012, 03 October 2012, and 08 October 2012.

Fieldwork supervisors also frequently coordinate with the QBs on the status of field operations so that the QBs are aware of where work was occurring. If more than 0.5 inches (1.2 cm) of rain falls within 24 hours of the initiation of fieldwork, field personnel are instructed to carefully inspect below equipment, materials, and vehicles left out overnight before starting work and to notify a QB if any CTS were observed. Field personnel are reminded of the mitigation measures associated with CTS getting stuck in open pits, although the planned field operations are not expected to result in pits large enough to exceed the

mitigation measure trigger thresholds, and pits normally would be filled at the end of the day. They are also instructed, if CTS are encountered in an open pit, to cover the pit to prevent desiccation and predation of the animal and to call the SQB immediately.

7.4 Aquatic Feature Monitoring in the Future East Garrison MRA

During 2012 aquatic feature monitoring was only conducted in the grenade range aquatic features and encompassed general site reconnaissance and botanical surveys. The aquatic features support wetland plant species in zonal gradients, depending on depth and duration of standing water. At the bottom of the aquatic feature rhizomatous herbaceous perennials predominate, including patches of native brown-headed rush (*Juncus phaeocephalus*) and common spikerush (*Eleocharis macrostachya*). Introduced species in the aquatic features include hyssop-leaved loosestrife (*Lythrum hyssopifolia*) and rabbitsfoot grass (*Polypogon monspeliensis*). The vegetation at the margins of the aquatic features differs slightly, with native perennials such as western rush (*Juncus occidentalis*) and western goldenrod (*Euthamia occidentalis*) predominating, along with the native annual toad rush (*Juncus bufonius* var. *occidentalis*). Upland vegetation includes central maritime chaparral and nearby oak woodland; however, the immediate area around the aquatic features is largely bare sandstone due to past anthropogenic activity.

During 2012, large-scale excavations in support of munitions investigation remedial activities occurred in the vicinity of the southwestern aquatic features. Seed of native species and duff were collected prior to this disturbance, and plants were salvaged as well. Soil was excavated by zone and stockpiled separately. Remediation was not complete at the end of the reporting period, but soil will be replaced by zone and the site will be seeded and planted in early 2013.

7.5 Wildlife Relocation

ESCA RP Team members perform animal rescue and/or relocation as needed to avoid or reduce impacts of the fieldwork on wildlife. There were three wildlife relocations performed by ESCA RP Team members during the 2012 reporting period: on 20 January, 14 February, and 05 March. On 20 January 2012 in the IAR MRA, one Northern Pacific rattlesnake (*Crotalus oreganus*) was relocated. On 14 February 2012 in the IAR MRA, one California black legless lizard was rescued and released. On 05 March 2012 in the FEG MRA, two California king snakes (*Lampropeltis getula californiae*) were relocated. Handling procedures, including using snake tongs, wearing gloves and snake gaiters, and using a high-sided, thick-walled container for transport, minimized risk to human health and safety as well as minimizing injury to the animals (ESCA RP Team 2010a).

7.6 Weed Management Activities

Consistent with the requirements of the HMP (USACE 1997) and BOs relevant to ESCA RP activities (USFWS 1999, 2002, and 2005), weed management activities are routinely conducted in the parcels included in the ESCA RP; the 2005 BO (USFWS 2005, pp. 14-15) outlines weed control measures in detail. The goal of weed management is to avoid

degradation of ecological communities and especially sensitive species populations as a result of weed invasion in parcels not designated for development.

The ESCA RP Team is responsible for monitoring weed infestations that occur as a result of surface soil disturbances related to munitions investigation remedial activities by ESCA RP personnel in the ESCA parcels. If weeds populate such disturbed areas in habitat parcels or threaten to disperse from disturbed areas in development parcels into nearby habitat parcels, appropriate abatement actions should be implemented as described in the ESCA RP Weed Management Plan, which was finalized in May 2010 (ESCA RP Team 2010b). In 2011 and 2012, individual weed monitoring plans and reports for the FEG, IAR, and Seaside MRAs were prepared (see Appendix C).

FEG MRA: The Weed Monitoring Plan for the FEG MRA identifies a population of French broom in the vicinity of aquatic features AF-66 and AF-67 (Appendix C). Monitoring is based on visual inspection of the vicinity of historical populations. In 2010 and 2011 mature and immature French broom plants were removed by hand in the vicinity of aquatic features AF-66 and AF-67. On 14 February and 09 April 2012, ESCA RP biologists pulled French broom plants by hand in the vicinity of AF-66 and AF-67. Two pampas grass plants were also pulled by hand on 09 April 2012 in an area where munitions response activities had occurred in eastern FEG MRA (see Appendix C). Ongoing monitoring is planned in this area due to the persistent seed bank produced by French broom; this monitoring is not required by the HMP because the plants and seed bank pre-existed the ESCA RP project. Soil has not been disturbed in the location of the French broom population as a result of ESCA RP work.

Soil disturbance resulting from munitions investigation remedial activities occurred in the FEG MRAs in the 2012 reporting period; the excavation activities were still active at the end of the reporting period, so monitoring of this location has been deferred until investigation work is complete. In August 2012 one individual pampas grass plant was removed during soil screening operations and seed heads removed from approximately 13 individuals. Additional pampas grass locations were mapped in September 2012 for future monitoring and abatement (see Appendix C).

In the FEG MRA, weed monitoring was conducted six times in August 2012.

IAR MRA: The Weed Monitoring Plan for IAR MRA identifies two locations in the IAR MRA that potentially support target weed infestations: the excavated area in Range 47 SCA, where large numbers of pampas grass and iceplant were present prior to vegetation cutting, and the small scale excavation area located in Range 44 SCA Northern area, which also contains pampas grass and iceplant (Appendix C). Soil stockpiles resulting from excavations in these areas are monitored on an ongoing basis. Individuals of iceplant and pampas grass have been observed in the stockpiles and are targeted for removal. Pampas grass locations were mapped near the excavations in September 2012 for future monitoring and abatement (see Appendix C).

Seaside MRA: The Weed Monitoring Plan for the Seaside MRA focuses on target weeds that occur in areas of surface soil disturbances that are a consequence of activities related to munitions response activities by ESCA RP personnel in the ESCA parcels (Appendix C). The

main goal of weed management in this area is to control invasive weed populations in habitat parcels, adjacent to habitat areas, and along the boundary-land interface to minimize degradation of habitat quality and/or sensitive plant populations. In the Seaside MRA target weeds are monitored to minimize dispersal across Blue Line Road into the adjacent NRMA. On 09 April 2012 ice plant and pampas grass were observed during monitoring. Pampas grass individuals were observed further than 100 feet (30 m) from the boundary of the NRMA. It was recommended that the plants continue to be monitored and if necessary abated to prohibit seeds from spreading across Blue Line Road into the NRMA (see Appendix C).

7.7 Environmental Awareness Training

During employee environmental awareness trainings, work crews are introduced to the HMP and habitats in the MRAs, measures to comply with the federal ESA, protection of HMP species and their habitats, and minimization of environmental impacts during MEC work. Work crews are encouraged to restrict site access to established roads and paths whenever possible, and to limit vegetation cutting and soil disturbance to the minimum feasible area required to conduct MEC investigation and remedial activities. Where appropriate to avoid unnecessary impacts, locations of HMP plant species and/or their habitats are marked in the field by ESCA RP biologists to assist avoidance by field crews.

Employee environmental awareness training events were conducted as follows during the reporting period:

On 17 October 2011 a QB conducted CTS refresher training for all MRAs.

Training for the FEG MRA conducted by a QB during the reporting period included: NRIM Checklist 5 revision 1 training, conducted 22 May 2012 and 29 May 2012; NRIM Checklist 5 revision 2 training, conducted 01 October 2012, 03 October 2012, and 08 October 2012; and Environmental Awareness Training, conducted 22 May 2012, 29 May 2012, 29 June 2012, 03 October 2012, and 08 October 2012.

Training for the IAR MRA conducted by a QB during the reporting period included: NRIM Checklist 7 revision 1 training was conducted 31 October 2011 and Environmental Awareness Training was conducted 29 June 2012.

Training for the MOUT Site MRA conducted by a QB during the reporting period included: NRIM Checklist 9 revision 0 training was conducted 27 January 2012 and 13 February 2012 and Environmental Awareness Training was conducted 29 June 2012.

Training for the Parker Flats MRA conducted by a QB during the reporting period included: NRIM Checklist 7 revision 1 training was conducted 31 October 2011.

Environmental Awareness Training for the Seaside MRA was conducted by a QB on 29 June 2012.

7.8 Erosion Control Monitoring and Mitigation

Consistent with the requirements of the HMP (USACE 1997) and BOs relevant to ESCA RP activities (USFWS 1999, 2002, and 2005), ongoing erosion control monitoring and mitigation is implemented as needed in the parcels included in the ESCA RP; the 2005 BO (USFWS 2005, pp. 14-15) and the ESCA RP Soil Management Field Implementation Plans for each MRA (ESCA RP 2011, 2012a) describe erosion control measures in detail.

ESCA RP erosion monitoring and control is focused on excavation areas in habitat parcels and areas adjacent to the borderland boundary where substantial disturbance of soil may occur during munitions response activities. Such areas are monitored before and after significant rain events and periodically during rain events. Erosion control monitoring was conducted in the IAR, FEG, and Seaside MRAs during the reporting period.

IAR MRA: On 02 August 2012 ESCA RP QBs monitored for wind-based soil erosion in the IAR MRA. Wind erosion was identified in the form of sand deposition at the east end of Range 47 SCA. The maximum depth of sand deposition in this area was measured using a ruler and area of sand deposition was mapped using a hand held Trimble GPS unit. The deepest area of sand deposition was 13 inches (33 cm) and the mapped area totaled approximately 0.2 acres (0.08 ha). Photographs were also taken at recorded points for future comparison and monitoring.

FEG MRA: In the grenade range in FEG MRA straw wattles and silt fences were installed around aquatic features AF09-1b and AF09-2 on 09 October 2012 prior to conducting soil moving activities to prevent sediment flow into the aquatic features. These erosion control measures continue to be inspected and maintained on a regular basis, or after one-half inch (1.2 cm) of precipitation has fallen. Additional straw wattles were installed prior to high rain events and maintained around the site where necessary.

Seaside MRA: Routine erosion monitoring was conducted along the interface of the Seaside MRA and the NRMA. Visual monitoring was conducted from a vehicle before and after each rain event and every two weeks during the summer.

8.0 RESTORATION PLANNING IN THE INTERIM ACTION RANGES MRA

An HRP was prepared by the ESCA RP Team in 2012 as an addendum to the Phase II Interim Action Work Plan for the IAR MRA (ESCA RP Team 2012b). The HRP details the methods for restoration implementation of central maritime chaparral and associated plant populations in habitat parcels that were affected by munitions investigation remedial activities in the IAR MRA. Four main activity types are associated with vegetation disturbance in these areas, and each has associated remediation, monitoring, and restoration requirements: ingress/egress corridors, vegetation cutting, small -scale excavation, and large -scale excavation (Table 8-1).

One of the three restoration strategies listed below will be applied to each affected site, depending on the type and extent of disturbances. Restored sites will be monitored for erosion and invasion by exotic plant species.

- **Monitoring only** (ingress/egress corridors and vegetation cutting) - Monitoring only will be implemented where above-ground vegetation was cut or disturbed, but root systems remain intact. The primary activity will be monitoring regrowth of vegetation; however, minor site grading and/or erosion protection may be employed.
- **Passive Restoration** (small scale excavation) - Passive restoration (seeding only) will be implemented where root systems were removed or substantially disturbed (primarily as a result of excavation) within contiguous areas that are either less than 1 acre (0.4 ha) or less than 100 feet (30 m) wide and surrounded by undisturbed vegetation. Backfilling of subsoil and topsoil in the proper sequence; grading to reflect the pre-existing topography or a natural landform; seeding of native species; and monitoring will be implemented in passive restoration sites.
- **Passive and Active Restoration** (large scale excavation) - Both passive (seeding) and active (container plantings) restoration will be implemented where root systems were removed in a contiguous area greater than 1 acre (0.4 ha) in size and greater than 100 feet (30 m) wide in smallest dimension. The total area subject to large-scale excavation in Range 47 totals approximately 14 acres (5.7 ha); this area constitutes the focus of restoration implementation that commenced in fall 2012. Actions taken in active restoration sites include: backfilling of subsoil and topsoil in the proper sequence; grading to match original topography; creation of microhabitats for HMP annual species; seeding and planting of native species; irrigation; and intensive monitoring of progress. These activities will generate habitat improvements beyond those documented in the pre-existing habitat baseline.

Quantitative success criteria for plant survival, species richness, and percentage cover targeted for the first seven years following site restoration are included in the HRP and results of monitoring for these criteria will be included in future annual reports. As part of implementation of the HRP, a comprehensive adaptive management plan will be implemented that will focus on managing the active restoration sites. The adaptive management plan will utilize a wide range of qualitative and quantitative monitoring data to evaluate site conditions and determine the need for additional actions. A variety of corrective actions associated with plant mortality, erosion, exotic invasion, and other potential issues have been identified for use in the adaptive management process.

The first year results for much of the restoration site will be reported in the 2013 Annual Natural Resource Monitoring, Mitigation, and Management Report.

9.0 CONCLUSION

A total of 87.5 acres (35.4 ha) of habitat area in the FEG, IAR, and Parker Flats MRAs was affected during the reporting period by munitions response activities, primarily as a result of vegetation cutting/clearing and small- and large-scale excavations. Biological monitoring of

sensitive resources on site, including HMP species and sensitive habitats, provided valuable information for ongoing site management and adaptive modifications to work procedures. Results from 31 vegetation transects, 59 herbaceous species quadrats, and 59 HMP annual plots provided the ESCA RP Team with valuable baseline and post-activity data to guide in ongoing site management.

Vegetation and herbaceous transects were installed by the ESCA RP Team in the FEG MRA, IAR MRA, and Parker Flats MRA between 2008 and 2012 in order to document native shrub cover prior to munitions response activities. Vegetation recovery will be monitored over the next five years in these areas.

Recovery of native vegetation after vegetation cutting has been rapid in central maritime chaparral and central coastal scrub vegetation, often reaching greater than 90% cover within three years of disturbance. In the Parker Flats MRA, native shrubs exhibited 91% cover during 2012 follow-up monitoring after vegetation cutting in 2009. In general, stump-sprouting dominant shrubs such as chamise, shaggy-bark manzanita, and brittleleaf manzanita exhibit robust recovery after vegetation cutting.

Since shrubs that lack the ability to sprout back after disturbance are slower to recolonize a site after vegetation cutting, a new program of manzanita retention was developed by the ESCA RP Team to ensure the ongoing presence of seed-producing mature manzanita individuals in the FEG MRA. A total of 505 Toro manzanitas averaging 19 Toro manzanitas per acre have been retained on a total of 26.6 acres (10.8 ha) in the FEG MRA during 2012; any observed Hooker's manzanitas were retained as well. Vegetation recovery following excavation is slower, as is recovery from clearance for ingress/egress routes.

HMP annual species tend to fluctuate in population size and location through time. Although most HMP annual species declined in numbers immediately after disturbance resulting from munitions response activities, population numbers were also lower during 2012 sampling in reference plots placed in the IAR MRA, perhaps a result of sporadic rainfall during the previous fall and winter. HMP annual species tend to be absent or present in low numbers immediately after excavations of any size. In the few grid cells where Monterey spineflower appeared after small-scale excavation in the North Range 44 SCA and South Range 44/Central Area SCAs/NCAs, average density of Monterey spineflower was similar to pre-disturbance conditions. In Range 47 SCA Subarea C, Monterey gilia tolerated vegetation cutting and was observed in two grids at higher densities than prior to vegetation cutting. Similarly, seaside bird's beak was present in eight grid cells after vegetation cutting in the North Range 44 SCA and South Range 44/Central Area SCAs/NCAs, where it had not been reported prior to disturbance. Additional data in coming years will foster additional insights into the response of these HMP annual species to different disturbance types, providing valuable guidance on methods for reducing impacts to sensitive species during munitions response activities.

Habitat restoration implementation in Range 47 SCA in the IAR MRA commenced in December 2012 after soil backfilling was complete; restoration planning has been the focus of seed collection, plant propagation, and planning efforts by the ESCA RP Team throughout

the reporting period. The first year results for much of the restoration site will be reported in the 2013 Annual Natural Resource Monitoring, Mitigation, and Management Report.

10.0 REFERENCES

- Baldwin, B. G., Goldman, D. H., Keil, D. J., Patterson, R., Rosatti, T. J., and Wilken, D. H. (eds.). 2012. The Jepson manual. Vascular plants of California. (2nd ed.). Univ. Calif. Press, Berkeley, CA. xxii+1568 pp. January.
- Burleson Consulting Inc. (Burleson). 2006. Wetlands Monitoring and Restoration Plan for Munitions and Contaminated Soil Remedial Activities at Former Fort Ord. (Fort Ord Administrative Record No. BW-2453)
- _____. 2009. Protocol for Conducting Vegetation Monitoring in Compliance with the Installation-Wide Multispecies Habitat Management Plan at Former Fort Ord. March. Site Specific Restoration Plan Historic Areas 18, 19, 22, 23, 27, 27A, 29, 33, 36, 39/40, and 43. Former Fort Ord, California. (Fort Ord Administrative Record No. BW-2454A)
- California Department of Fish and Game (CDFG). 2003. Interim Guidance on Site Assessment and Field Surveys for Determining Presence or a Negative Finding of the California Tiger Salamander. Sacramento, California.
- _____. 2010. List of Vegetation Alliances and Associations. Vegetation Classification and Mapping Program. Sacramento, CA. September.
- _____. 2012. Natural Diversity Data Base (CNDDDB) RareFind Version 4. Sacramento, California.
- California Invasive Plant Council. 2006. California Invasive Plant Inventory. 39 pp.
- California Native Plant Society (CNPS). 2012. Inventory of Rare and Endangered Plants (online edition). Rare Plant Scientific Advisory Committee. California Native Plant Society. Sacramento, CA. www.cnps.org/inventory
- Environmental Services Cooperative Agreement Remediation Program Team (ESCA RP Team). 2009. 2008 Annual Natural Resource Monitoring, Mitigation, and Management Report, Former Fort Ord, Monterey County, California. 12 June. (Fort Ord Administrative Record No. ESCA-0160)
- _____. 2010a. 2009 Annual Natural Resource Monitoring, Mitigation, and Management Report, Former Fort Ord, Monterey County, California. 5 February. (Fort Ord Administrative Record No. ESCA-0248)
- _____. 2010b. ESCA Weed Management Plan, Former Fort Ord, Monterey County, California.

- _____. 2011a. 2010 Annual Natural Resource Monitoring, Mitigation, and Management Report, Former Fort Ord, Monterey County, California, 29 March. (Fort Ord Administrative Record No. ESCA-0253.1)
- _____. 2011b. Final Phase II Interim Action Work Plan, Interim Action Ranges Munitions Response Area, Former Fort Ord, Monterey County, California. May 24. (Fort Ord Administrative Record No. ESCA-0252B)
- _____. 2012a. 2011 Annual Natural Resource Monitoring, Mitigation, and Management Report, Former Fort Ord, Monterey County, California, 29 March. (Fort Ord Administrative Record No. ESCA-0258)
- _____. 2012b. Phase II Interim Action Work Plan Addendum Habitat Restoration Plan, Interim Action Ranges Munitions Response Area, Former Fort Ord, Monterey County, California. August 2012. (Fort Ord Administrative Record No. ESCA-0261)
- _____. 2012c. ESCA RP Weed Management Plan for Future East Garrison MRA / Vicinity of Aquatic Features AF-66 and AF-67 in northeast Future East Garrison. 13 February 2012.
- _____. 2012d. ESCA RP Weed Management Plan for Interim Action Range MRA. 06 January 2012.
- _____. 2012e. ESCA RP Weed Management Plan for Seaside MRA. Blue Line Road. 09 April 2012.
- Flora of North America Editorial Committee, eds. 1993+. Flora of North America North of Mexico. 12+ vols. New York and Oxford. Vol. 1, 1993; vol. 2, 1993; vol. 3, 1997; vol. 4, 2003; vol. 5, 2005; vol. 19, 2006; vol. 20, 2006; vol. 21, 2006; vol. 22, 2000; vol. 23, 2002; vol. 25, 2003; vol. 26, 20.
- Holland, R.F. 1986. Preliminary descriptions of the terrestrial natural communities of California. Nongame-Heritage Program, The Resources Agency, California Department of Fish and Game. Sacramento, California. iii + 156 pp.
- Holland, V.L. and David J. Keil. 1995. California vegetation. Kendall-Hunt Publishing Company. Dubuque, Iowa. 516 pp.
- Hunt, Lawrence E. 1993. Origin, Maintenance and Land Use of Aeolian Sand Dunes of the Santa Maria Basin, California. Prepared for The Nature Conservancy, San Luis Obispo, California.
- Jones & Stokes Associates, Inc. (Jones & Stokes). 1995. Protocol for Conducting Vegetation Sampling at Fort Ord in Compliance with the Installation-Wide Multispecies Habitat Management Plan. Prepared for U.S. Army Corps of Engineers. Sacramento, California. (Fort Ord Administrative Record No. OE-0205)

- MACTEC Engineering and Consulting, Inc. (MACTEC). 2006. Final Track 2 Munitions Response Remedial Investigation / Feasibility Study, Parker Flats Munitions Response Area, Former Fort Ord, California. August 31. (Fort Ord Administrative Record No. OE-0523N)
- Natural Resources Conservation Service (NRCS). 2012. United States Department of Agriculture. Web Soil Survey. <http://websoilsurvey.nrcs.usda.gov/>.
- Parsons. 2005. Final 2005 Annual Biological Monitoring Report, Ranges 43-48. Prepared for U.S. Army Corps of Engineers. Sacramento, California.
- Sawyer, John O., Todd Keeler-Wolf, and Julie M. Evens. 2009. Manual of California Vegetation. California Native Plant Society. Sacramento, California. 1300 pp.
- Shaw Environmental, Inc. (Shaw) 2009. Final Habitat Restoration Plan, Site 39 Inland Ranges, Former Fort Ord, California. Prepared by Shaw Environmental, Inc. and Denise Duffy & Associates, Inc. 30 September. (Fort Ord Administrative Record No. BW-2450G)
- U.S. Army Corps of Engineers (USACE) (with Technical Assistance from Jones & Stokes Associates). 1992. Flora and Fauna Baseline Study of Fort Ord, California. Sacramento District. Sacramento, California. (Fort Ord Administrative Record No. BW-1938)
- USACE. 1997. Installation-Wide Multispecies Habitat Management Plan for Former Fort Ord, CA, U.S. Army Corps of Engineers, Sacramento District. April. (Fort Ord Administrative Record No. BW-1787)
- U.S. Department of the Army (Army). 2002. Record of Decision, Interim Action for Ordnance and Explosives at Ranges 43-48, Range 30A, and Site OE-16, Former Fort Ord, California. September 20. (Fort Ord Administrative Record No. OE-0414)
- _____. 2008. Record of Decision, Parker Flats Munitions Response Area, Track 2 Munitions Response Site, Former Fort Ord, California. June 24. (Fort Ord Administrative Record No. OE-0661)
- _____. 2009a. Protocol for Conducting Vegetation Monitoring in Compliance with the Installation-Wide Multispecies Habitat Plan at Former Fort Ord. March. (Fort Ord Administrative Record No. BW-2454A)
- _____. 2009b. Biological Assessment of Army Actions that May Affect Listed Species at the Former Fort Ord, California. 01 June. (Fort Ord Administrative Record No. BW-2501)
- U.S. Fish and Wildlife Service (USFWS). 1999. Biological and Conference Opinion on the Closure and Reuse of Fort Ord, Monterey County, California (1-8-99-F/C-39R). 30 March. (Fort Ord Administrative Record No. BW-2232A)

- _____. 2002. Biological Opinion on the Closure and Reuse of Fort Ord, Monterey County, California, as it affects Monterey Spineflower Critical Habitat (1-8-01-F-70R). 22 October. (Fort Ord Administrative Record No. BW-2233)
- _____. 2005. Cleanup and Reuse of Former Fort Ord, Monterey County, California as it affects California Tiger Salamander and Critical Habitat for Costa Contra Goldfields (1-8-04-F-25R). 14 March. (Fort Ord Administrative Record No. BW-2334)
- Zander Associates (Zander). 2002. Assessment East Garrison – Parker Flats Land Use Modifications, Fort Ord, California. May 1. (Fort Ord Administrative Record No. BW-2180)

[this page was intentionally left blank]

Table 1-1
Approximate Areas Affected by Field Activities Conducted by ESCA RP from
October 16, 2011 through October 15, 2012
ESCA RP 2012 Annual Natural Resources Report

Munitions Response Area	Total Habitat Acres	Munitions Response Activity	Habitat Acres Affected	Total Habitat Acres Affected
Future East Garrison	177.5	Maintenance/ Staging	<1	65
		Vegetation Cutting	65	
		Munitions Response Activity	44.6	
		Soil Excavation	0.7	
		Soil Stockpiling	<1	
Interim Action Ranges SCAs/NCAs	206	Maintenance/ Staging	<1	22.4
		Vegetation Cutting	2.5	
		Munitions Response Activity	22.4	
		Soil Excavation	12.5	
		Soil Stockpiling	0	
Parker Flats Phase II	166	Maintenance/ Staging	<1	<1
		Vegetation Cutting	0	
		Munitions Response Activity	<1	
		Soil Excavation	0	
		Soil Stockpiling	0	

Table 1-2
Vegetation Monitoring Activities in Habitat Parcels of MRAs 2008 - 2012
ESCA RP 2012 Annual Natural Resources Report

Munitions Response Area	Monitoring Activity	2008	2009	2010	2011	2012	Baseline Totals	Follow-up Totals	Survey Totals
		Number of surveys per Year							
Future East Garrison	Vegetation transects (50 meters)	-	-	-	39 *	4*	43	0	43
	HMP annual plots (25 m ² or larger)	-	-	5*		5	5	5	10
	Toro manzanita surveys (acres)	-	-	-	-	29	-	-	29
Interim Action Ranges-Army Remediation Areas	Vegetation transects (50 meters)	30	-	20	-	-	0	50	50
	Supplemental herbaceous quadrats (1/4 m ²)	12	-	-	-	-	-	-	12
	HMP annual plots (25 m ² or larger)	63	-	63	-	-	0	126	126
Interim Action Ranges-ESCA Remediation Areas (SCAs/NCAs)	Vegetation transects (50 meters)	-	-	17*	2*	16	19	16	35
	Supplemental herbaceous quadrats (1/4 m ²)	-	-	-	6	53	-	-	59
	HMP annual plots (25 m ² or larger)	-	-	187*	-	44	187	44	231
Parker Flats Phase II	Vegetation transects (50 meters)	11*	-	-	-	11	11	11	22
	Supplemental herbaceous quadrats (1/4 m ²)	-	-	-	-	6	-	-	6
	HMP annual plots (25 m ² or larger)	10*	-	-	10	10	10	20	30
County North	HMP annual plots (25 m ² or larger)	-	15*	-	-	-	15	0	15
Total 50-meter vegetation transects		41	-	37	41	31	73	77	150
Total herbaceous quadrats		12	-	-	6	59	0	0	77
Total HMP annual plots		73	15	255	10	59	217	195	412
Total acres of Toro manzanita surveys		-	-	-	-	29	-	-	29

* Baseline Monitoring

**Table 2-1
HMP Species Occurrence within Habitat Parcels of MRAs
ESCA RP 2012 Annual Natural Resources Report**

Scientific Name	Common Name	Current Regulatory Status	Habitat	Recorded as Present or Habitat Present in MRAs ¹	Observed by ESCA RP
Animals					
Amphibians					
<i>Ambystoma californiense</i>	California tiger salamander	Federally Endangered/ California Threatened	Open woodlands and grasslands, ponds and vernal pools from Sonoma to Santa Barbara Counties, inland to portions of the Sierra Nevada.	CN, FEG, IAR, LS	2010-2011 FEG
<i>Rana draytonii</i>	California red-legged frog	Federally Threatened/ California Species of Concern	Coldwater ponds or river pools with emergent and submergent vegetation, often with riparian vegetation at margins from Humboldt to San Diego Counties and in portions of the Sierra Nevada.	CN, IAR, LS	None
Birds					
<i>Charadrius nivosus nivosus</i>	western snowy plover	Federally Threatened/ California Species of Concern	Flat sandy beach above the high tide level from Washington to Baja California.	None	None
Invertebrates					
<i>Euphilotes enoptes smithi</i>	Smith's blue butterfly	Federally Endangered	Coastal sand dunes and ravines associated with coast and seacliff buckwheat in Monterey, Santa Cruz, and San Mateo Counties.	None	None
<i>Linderiella occidentalis</i>	California linderiella	Not listed	Vernal pools and ponds from Lake to Riverside Counties and in the Great Central Valley.	CN, IAR, LS	2010-2011 FEG
Mammals					
<i>Sorex ornatus salarius</i>	Monterey ornate shrew	California Species of Concern	Riparian, woodland, and upland communities where there is thick duff or downed logs. Endemic to Monterey region.	CN, CSUMB, FEG, IAR, MOUT, PF	None
Reptiles					
<i>Anniella pulchra nigra</i>	California black legless lizard	California Species of Concern	Various coastal plant communities where loose sandy soil and abundant invertebrate populations are available. Presently found in Monterey County and possibly extirpated from Santa Cruz and San Luis Obispo Counties.	CN, CSUMB, DRO/M, IAR, PF, SEA	2009, 2010 PF, 2012 IAR
Plants					
Annuals					
<i>Chorizanthe pungens</i> var. <i>pungens</i>	Monterey spineflower	Federally Threatened/ CNPS 1B.2	Sandy soils in coastal strand, coastal scrub, maritime chaparral, and disturbed sites in grassland, below 450 meters elevation. Endemic to Monterey and Santa Cruz Counties.	CN, CSUMB, DRO/M, FEG, IAR, MOUT, PF, SEA	2009 CN, 2010-2012 FEG, 2008-2012 IAR, 2008-2012 PF, 2012 SEA
<i>Chorizanthe robusta</i> var. <i>robusta</i>	robust spineflower	Federally Endangered/ CNPS 1B.1	Coastal strand, coastal scrub areas below 300 meters elevation from Marin to Monterey Counties.	None	None

<i>Cordylanthus rigidus</i> ssp. <i>littoralis</i>	seaside bird's beak	California Endangered/CNPS 1B.1	Coastal dunes, coastal scrub, and maritime chaparral, below 425 meters; root parasite, dependent on nearby host plant. Endemic to Monterey and Santa Barbara Counties.	DRO/M, FEG, IAR, PF, SEA	2008-2012 IAR
<i>Gilia tenuiflora</i> ssp. <i>arenaria</i>	Monterey (sand) gilia	Federally Endangered/California Threatened/CNPS 1B.2	Open sandy soils in coastal dunes and maritime chaparral. Endemic to Monterey and Santa Cruz Counties.	CN, FEG, IAR, MOUT, PF, SEA	2008-2012 IAR, 2010-2012 FEG, 2010 SEA
Herbaceous Perennials					
<i>Erysimum ammophilum</i>	coast wallflower	CNPS 1B.2	Coastal dunes below 60 meters in San Mateo, Santa Cruz, Monterey, Santa Barbara, and San Diego Counties and on Santa Rosa Island.	IAR, SEA	None
<i>Piperia yadoni</i>	Yadon's piperia	Federally Endangered/CNPS 1B.1	Sandy soil or sandstone coastal shrubland, Monterey pine forest and maritime chaparral below 510 meters. Restricted to Monterey region.	None	None
Shrubs					
<i>Arctostaphylos hookeri</i> ssp. <i>hookeri</i>	Hooker's manzanita	CNPS 1B.2	Sandy soils, sandy shales, sandstone outcrops, chaparral, below 536 meters elevation. Endemic to Monterey and Santa Cruz Counties.	FEG, IAR, LS, MOUT, PF	2012 FEG, 2012 PF
<i>Arctostaphylos montereyensis</i>	Toro manzanita	CNPS 1B.2	Chaparral in sandy soils below 730 meters elevation, especially on Aromas formation sandstone. Endemic to Monterey County.	FEG, IAR, LS, MOUT, PF, SEA	2010-2012 FEG, 2008-2012 PF
<i>Arctostaphylos pumila</i>	sandmat manzanita	CNPS 1B.2	Sandy soils, hills, chaparral, woodland, coniferous forest below 205 meters elevation. Endemic to Monterey County.	CN, DRO/M, FEG, IAR, LS, PF, SEA	2008-2012 IAR, 2008-2012 SEA
<i>Ceanothus rigidus</i>	Monterey ceanothus	CNPS 4.2	Sandy hills, flats, chaparral, close-coned-pine forest below 550 meters elevation. Restricted to Monterey County; historic collections in Santa Cruz County.	DRO/M, FEG, IAR, LS, MOUT, PF, SEA	2010-2012 FEG, 2008-2012 IAR
<i>Ericameria fasciculata</i>	Eastwood's ericameria	CNPS 1B.1	Sandy soils, chaparral, closed-cone pine forest, northern coastal scrub, elevation 29-275 meters. Endemic to Monterey County.	DRO/M, FEG, IAR, MOUT, PF, SEA	2010-2012 FEG, 2008-2012 IAR

Notes:

1. Occurrence records from 1992 Fort Ord Baseline Flora and Fauna

* habitat parcel present

CN = County North*

CNPS = California Native Plant Society

CSUMB = California State University Monterey Bay Off-Campus

DRO/M = Del Rey Oaks/ Monterey*

FEG = Future East Garrison*

IAR = Interim Action Ranges*

LS = Laguna Seca Parking

MOUT = Military Operations in Urban Terrain Site*

PF = Parker Flats*

SEA = Seaside*

Table 3-1
Future East Garrison
Grenade Range Aquatic Features Observed Plant Species
ESCA RP 2012 Annual Natural Resources Report

Scientific Name	Common Name	Wetland Indicator Status ¹	AF66A	AF66B	AF67-EX1	AF67-EX2	AF67-EX3	AF67-EX4	AF67 Meadow	AF68AB	AF68C	AF69	AF10-1	AF09-1	AF09-1B	AF09-2
<i>Agrostis exarata</i>	spike bentgrass	FACW												x		x
<i>Aira caryophylla</i> *	common silver-hair grass	FACU														
<i>Alopecurus saccatus</i>	Pacific foxtail	OBL												x		
<i>Avena fatua</i> *	wild oat	NL	x													
<i>Baccharis pilularis var consanguinea</i>	coyote bush	NL				x	x	x		x				x		
<i>Bromus diandrus</i> *	ripgut brome	NL	x	x												
<i>Bromus hordeaceus</i> *	soft chess	NL	x													
<i>Bromus madritensis ssp. Rubens</i> *	red brome	NL							x							
<i>Carex brevicaulis</i>	short-stem sedge	NL													x	
<i>Centaurium davyi</i>	Davy's centaury	FAC							x							
<i>Chlorogalum pomeridianum var. pomeridianum</i>	soap plant/amole	NL	x													
<i>Cistus creticus</i> *	rock-rose	NL	x	x												
<i>Cotula coronopifolia</i> *	brass buttons	OBL							x							
<i>Cyperus eragrostis</i>	tall flatsedge	FACW	x									x				
<i>Eleocharis acicularis var. aciculari</i>	slender spikerush	OBL												x	x	
<i>Eleocharis bella</i>	beautiful spikerush	FACW	x											x		x
<i>Eleocharis macrostachya</i>	common spikerush	OBL	x	x	x	x	x	x	x			x		x		x
<i>Euthamia occidentalis</i>	western goldenrod	FACW												x		
<i>Festuca perenne</i> *	annual wildrye	NL									x					
<i>Geranium dissectum</i>	cut-leaved geranium	NL	x	x					x	x	x			x		
<i>Heteromeles arbutifolia</i>	toyon	NL								x						
<i>Hordeum marinum ssp. gussoneanum</i>	Mediterranean barley	FAC							x							
<i>Juncus bufonius var. occidentalis</i>	toad rush	FACW								x	x			x	x	x
<i>Juncus occidentalis</i>	western rush	FACW								x	x			x	x	x
<i>Juncus phaeocephalus var. phaeocephalus</i>	brown-headed rush	FACW	x	x	x	x	x	x	x	x	x			x		x
<i>Luzula comosa</i>	Pacific wood rush	FAC			x	x	x	x	x							
<i>Lythrum hyssopifolia</i> *	hyssop-leaved loosestrife	OBL	x											x		

Scientific Name	Common Name	Wetland Indicator Status ¹	AF66A	AF66B	AF67-EX1	AF67-EX2	AF67-EX3	AF67-EX4	AF67 Meadow	AF68AB	AF68C	AF69	AF10-1	AF09-1	AF09-1B	AF09-2
<i>Melilotus indicus</i> *	yellow sweet-clover	FACU	x	x					x							
<i>Plantago coronopus</i> *	cut-leaved plantain	FACW	x	x		x	x	x	x		x	x		x		x
<i>Pogogyne serpylloides</i>	thymeleaf mesamint	FACW							x							
<i>Polypogon monspeliensis</i> *	rabbitsfoot grass	FACW			x											
<i>Psilocarphus brevissimus</i> <i>var. brevissimus</i>	woolly marbles	FACW												x	x	
<i>Quercus agrifolia</i>	coast live oak	NL	x		x	x	x	x		x						x
<i>Rubus ursinus</i>	California blackberry	FACU	x											x		
<i>Rumex crispus</i> *	Curly dock	FAC	x	x	x	x	x	x	x	x	x	x				
<i>Rumex salicifolius</i>	willow dock	FACW														
<i>Salix lasiolepis</i>	arroyo willow	FACW	x	x	x	x	x	x	x	x	x	x		x		
<i>Sisyrinchium bellum</i>	blue-eyed grass	FACW	x													
<i>Sonchus asper</i> ssp. <i>asper</i> *	prickly sow-thistle	FACU												x		
<i>Toxicodendron diversilobum</i>	poison-oak	NL								x						
<i>Tribolium obliterum</i> *	cape grass	NL	x											x		
<i>Trifolium hirtum</i> *	rose clover	NL			x	x	x	x								
<i>Typha latifolia</i>	broadleaf cattail	OBL														x
<i>Vicia</i> sp.	vetch										x					

Notes:

1. United States Army Corps of Engineers. 2012. National Wetland Plant List. Arid West. Available online at: https://wetland_plants.usace.army.mil/. May2012

OBL= Obligate wetland species, occurs almost always in wetlands (99% of time or more)

FACW = Facultative wetland species, usually occurs in wetlands (66 to 99% of time)

FAC = Facultative species, equally likely to occur in wetlands or nonwetlands (33 to 66% of time)

FACU = Facultative upland species, found in wetlands 1 to 33% of the time, but usually found in upland habitats

NL = No listing

Table 7-1
Future East Garrison MRA
Central Maritime Chaparral Transects 2011 Baseline Data
ESCA RP 2012 Annual Natural Resources Report

Baseline Vegetative Cover by Species in Central Maritime Chaparral (Thirty-nine 50-meter Transects)				
Scientific Name	Common Name	Percent Cover		Frequency
		Mean Percent Cover	Standard Deviation	
<i>Arctostaphylos crustacea</i> ssp. <i>crustacea</i>	brittleleaf manzanita	45.78%	32.3%	89.7%
<i>Adenostoma fasciculatum</i>	chamise	27.41%	22.4%	100.0%
<i>Arctostaphylos montereyensis</i>	Toro (Monterey) manzanita	14.38%	19.8%	64.1%
<i>Salvia mellifera</i>	black sage	7.17%	15.5%	56.4%
<i>Baccharis pilularis</i> ssp. <i>consanguinea</i>	coyote brush	2.18%	4.1%	48.7%
<i>Mimulus aurantiacus</i>	sticky monkeyflower	2.13%	4.1%	59.0%
<i>Garrya elliptica</i>	coast silk tassel	1.50%	3.9%	28.2%
<i>Ceanothus rigidus</i>	Monterey ceanothus	1.49%	2.2%	48.7%
<i>Frangula [Rhamnus] californica</i>	coffeeberry	1.27%	3.5%	20.5%
<i>Heteromeles arbutifolia</i>	toyon	1.04%	2.7%	17.9%
<i>Quercus agrifolia</i>	coast live oak	0.73%	3.5%	12.8%
<i>Ericameria ericoides</i>	mock-heather	0.68%	3.9%	5.1%
<i>Toxicodendron diversilobum</i>	poison-oak	0.40%	1.4%	10.3%
<i>Ceanothus thyrsiflorus</i>	blue blossom	0.29%	1.8%	5.1%
<i>Artemisia californica</i>	California sagebrush	0.26%	1.4%	5.1%
<i>Ribes malvaceum</i>	chaparral currant	0.12%	0.6%	5.1%
<i>Croton californicus</i>	croton	0.06%	0.3%	5.1%
<i>Acmipson glaber [Lotus scoparius]</i>	deerweed	0.06%	0.4%	2.6%
<i>Lepechinia calycina</i>	pitcher sage	0.04%	0.3%	2.6%
<i>Ericameria fasciculata</i>	Eastwood's ericameria	0.03%	0.2%	2.6%
<i>Eriophyllum confertiflorum</i>	golden yarrow	0.02%	0.1%	5.1%

Baseline Vegetative Cover by Species in Central Maritime Chaparral (Thirty-nine 50-meter Transects)				
Scientific Name		Percent Cover		Frequency
		Mean Percent Cover	Standard Deviation	
Common Name				
<i>Ceanothus dentatus</i>	dwarf ceanothus	0.02%	0.1%	2.6%
<i>Helianthemum scoparium</i>	rush-rose	0.01%	0.0%	5.1%
Total Shrub and Subshrub Cover		107.01%		
Herbaceous Cover Between Shrubs and Subshrubs		2.00%	4.4%	51.3%
Target Weed Cover Total (<i>Carpobrotus edulis</i>)		0.42%	2.7%	2.6%
Total Vegetated Cover		109.43%		
Cover of Bare Ground		7.06%	10.7%	84.6%

Note:**HMP Species in Bold**

Table 7-2
Future East Garrison MRA
Oak Woodland Transects 2012 Baseline Data
ESCA RP 2012 Annual Natural Resources Report

Baseline Vegetative Cover by Species in Oak Woodland in Future East Garrison (Two 50-meter Transects)				
		Percent Cover		Frequency
		Mean Percent Cover	Standard Deviation	
Scientific Name	Common Name			
<i>Quercus agrifolia</i>	coast live oak (tree canopy)	35.00%	0.2%	100.0%
<i>Rubus ursinus</i>	California blackberry	12.10%	0.1%	100.0%
<i>Arctostaphylos crustacea</i> ssp. <i>crustacea</i>	brittleleaf manzanita	11.26%	0.1%	100.0%
<i>Mimulus aurantiacus</i>	sticky monkeyflower	3.53%	0.0%	100.0%
<i>Baccharis pilularis</i> ssp. <i>consanguinea</i>	coyote brush	2.68%	0.0%	100.0%
<i>Frangula [Rhamnus] californica</i>	coffeeberry	2.60%	0.0%	100.0%
<i>Quercus agrifolia</i>	coast live oak (shrub layer)	2.19%	0.0%	50.0%
<i>Acmipson glaber [Lotus scoparius]</i>	deerweed	2.07%	0.0%	100.0%
<i>Toxicodendron diversilobum</i>	poison-oak	1.82%	0.0%	100.0%
<i>Adenostoma fasciculatum</i>	chamise	1.08%	0.0%	50.0%
Total Shrub and Subshrub Cover		39.33%	--	--
Total Tree Canopy Cover		35.00%	--	--
Herbaceous Cover Between Shrubs and Subshrubs		5.44%	0.0%	100.0%
Target Weed Cover Total		0.00%	--	0.0%
Total Vegetated Cover		79.77%	--	--
Cover of Bare Ground		61.77%	0.2%	100.0%

Table 7-3
Future East Garrison MRA
Grenade Range Transects 2012 Baseline Data
ESCA RP 2012 Annual Natural Resources Report

Baseline Vegetative Cover by Species in Mostly Unvegetated Mineral Soil Area in Grenade Range in Future East Garrison (Two 50-meter Transects)				
Scientific Name		Percent Cover		Frequency
		Mean Percent Cover	Standard Deviation	
Scientific Name	Common Name	Mean Percent Cover	Standard Deviation	Frequency
<i>Arctostaphylos montereyensis</i>	Toro (Monterey) manzanita	1.67%	0.0%	100.0%
<i>Acemipson glaber [Lotus scoparius]</i>	deerweed	1.37%	0.0%	100.0%
<i>Mimulus aurantiacus</i>	sticky monkeyflower	0.28%	0.0%	50.0%
<i>Baccharis pilularis ssp. consanguinea</i>	coyote brush	0.10%	0.0%	50.0%
Total Shrub and Subshrub Cover		3.42%		
Herbaceous Cover Between Shrubs and Subshrubs		2.12%	0.0%	50.0%
Target Weed Cover Total		0.00%	-	0.0%
Total Vegetated Cover		5.54%		
Cover of Bare Ground		94.56%	0.1%	100.0%

Note:**HMP Species in Bold**

Table 7-4
Interim Action Ranges MRA
Central Maritime Chaparral 2010-2012 Baseline and Post-activity
Cover and Frequency of Shrub Species in Nine 50-meter Transects
ESCA RP 2012 Annual Natural Resources Report

Scientific Name	Common Name	Baseline Data 2010 - 2011				Post-activity Data 2012			
		Percent Cover			Frequency	Percent Cover			Frequency
		Mean Cover	Standard Deviation	Relative Cover		Mean Cover	Standard Deviation	Relative Cover	
<i>Arctostaphylos tomentosa</i> ssp. <i>tomentosa</i>	shaggy-bark manzanita, woolly leaf manzanita	29.3%	15.6%	31.0%	100%	15.6%	0.12%	47.9%	100.0%
<i>Ceanothus dentatus</i>	dwarf ceanothus	20.2%	16.0%	21.4%	90%	0.0%	0.00%	0.0%	
<i>Ceanothus rigidus</i>	Monterey ceanothus	13.5%	9.3%	14.3%	97%	0.5%	0.01%	1.5%	50.0%
<i>Adenostoma fasciculatum</i>	chamise	9.0%	6.9%	9.5%	90%	3.5%	0.02%	10.7%	100.0%
<i>Helianthemum scoparium</i>	rush-rose	8.1%	9.1%	8.6%	86%	1.5%	0.04%	4.5%	40.0%
<i>Salvia mellifera</i>	black sage	5.3%	7.2%	5.6%	69%	1.5%	0.02%	4.7%	80.0%
<i>Arctostaphylos pumila</i>	sandmat manzanita	1.6%	2.0%	1.7%	66%	1.3%	0.01%	4.0%	80.0%
<i>Ericameria ericoides</i>	mock-heather	1.5%	5.6%	1.6%	24%	0.3%	0.01%	1.0%	10.0%
<i>Eriophyllum confertiflorum</i>	golden-yarrow	1.5%	2.2%	1.6%	66%	0.2%	0.01%	0.7%	40.0%
<i>Acmispon glaber</i> [<i>Lotus scoparius</i>]	deerweed	1.4%	0.0%	1.5%	0%	2.5%	0.03%	7.5%	90.0%
<i>Horkelia cuneata</i> ssp. <i>cuneata</i>	coast horkelia	1.3%	2.3%	1.4%	52%	0.0%	0.00%	0.0%	
<i>Baccharis pilularis</i> ssp. <i>consanguinea</i>	coyote bush	0.7%	1.8%	0.7%	24%	0.0%	0.00%	0.1%	10.0%
<i>Mimulus aurantiacus</i>	sticky monkeyflower	0.5%	0.9%	0.5%	28%	0.0%	0.00%	0.1%	10.0%

Scientific Name	Common Name	Baseline Data 2010 - 2011				Post-activity Data 2012			
		Percent Cover			Frequency	Percent Cover			Frequency
		Mean Cover	Standard Deviation	Relative Cover		Mean Cover	Standard Deviation	Relative Cover	
<i>Lepechinia calycina</i>	pitcher sage	0.4%	1.4%	0.4%	21%	0.3%	0.01%	0.8%	20.0%
<i>Ericameria fasciculata</i>	Eastwood's ericameria	0.2%	0.5%	0.2%	17%	0.0%	0.00%	0.1%	10.0%
<i>Garrya elliptica</i>	coast silk tassel	0.0%	0.0%	0.0%	0%	0.3%	0.01%	1.0%	20.0%
<i>Symphoricarpos mollis</i>	creeping snowberry	0.0%	0.0%	0.0%	0%	0.1%	0.00%	0.3%	10.0%
<i>Toxicodendron diversilobum</i>	poison-oak	0.0%	0.0%	0.0%	0%	0.1%	0.00%	0.2%	30.0%
Total Mean Percent Shrub and Subshrub Cover		94.5%	5.2%	100.0%		27.7%	0.03%	85.1%	
Herbaceous Plants Between Shrubs and Subshrubs		0.0%	0.0%	0.0%	90.0%	3.5%	5.26%	10.8%	90.0%
Target Weed Total (<i>Carpobrotus edulis</i>)	ice plant	0.0%	0.0%	0.0%	60.0%	1.3%	2.70%	4.1%	60.0%
Total Mean Percent Vegetative Cover		94.5%	--	--	--	32.6%	--	--	--
Total Mean Percent Bare Ground		19.3%	9.3%	--	100.0%	68.6%	13.43%	--	100.0%

Note:**HMP Species in Bold**

Table 7-5
Interim Action Ranges MRA
Central Maritime Chaparral 2012 Cover and Frequency of Plant Species
after Vegetation Cutting in 11 Herbaceous Quadrats
ESCA RP 2012 Annual Natural Resources Report

Scientific name	Common name	Percent Cover			Frequency
		Mean Percent Cover	Standard Deviation	Relative Percent Cover	
Shrub and Subshrubs Species					
<i>Arctostaphylos tomentosa</i> ssp. <i>tomentosa</i>	shaggy-bark manzanita, woolly leaf manzanita	0.45%	1.11%	0.21%	18.18%
<i>Adenostema faciculatum</i>	chamise	0.36%	1.21%	0.16%	9.09%
<i>Croton californicus</i>	California croton	0.36%	1.21%	0.16%	9.09%
<i>Acmispon glaber</i> [<i>Lotus scoparius</i>]	deerweed	0.10%	0.15%	0.05%	45.45%
<i>Salvia milifera</i>	black sage	0.09%	0.27%	0.04%	18.18%
<i>Arctostaphylos pumila</i>	sand mat manzanita	0.09%	0.30%	0.04%	9.09%
<i>Helianthemum scoparium</i>	rush-rose	0.02%	0.05%	0.01%	18.18%
<i>Eriophyllum confertiflorum</i>	golden-yarrow	0.02%	0.05%	0.01%	18.18%
<i>Symphoricarpus mollis</i>	creeping snowberry	0.01%	0.05%	0.01%	9.09%
Herbaceous Species					
<i>Cryptantha micromeres</i>	small-flowered cryptantha	0.12%	0.27%	0.05%	36.36%
<i>Festuca myuros</i> *	rattail fescue	0.10%	0.30%	0.05%	18.18%
<i>Festuca octoflora</i>	sixweeks fescue	0.09%	0.14%	0.04%	45.45%
<i>Chorizanthe pungens</i> var. <i>pungens</i>	Monterey spineflower	0.09%	0.30%	0.04%	9.09%
<i>Deinandra corymbosa</i>	coastal tarweed	0.09%	0.30%	0.04%	9.09%
<i>Acmispon strigosus</i>	strigose lotus	0.06%	0.09%	0.03%	36.36%
<i>Erodium cicutarium</i> *	red-stemmed filaree	0.05%	0.09%	0.02%	27.27%
<i>Chorizanthe diffusa</i>	diffuse spineflower	0.01%	0.04%	0.01%	9.09%

<i>Horkelia cuneata</i> ssp. <i>cuneata</i>	wedge-leaved horkelia	0.01%	0.04%	0.01%	9.09%
<i>Hypochaeris glabra</i> *	smooth cat's ear	0.01%	0.04%	0.01%	9.09%
<i>Aira caryophyllea</i> *	silver hairgrass	0.01%	0.03%	0.004%	9.09%
<i>Gallium</i> sp.	bedstraw	0.01%	0.03%	0.004%	9.09%
<i>Carex globosa</i>	round-fruited sedge	0.00%	0.02%	0.002%	9.09%
Unidentified species	-	0.01%	0.04%	0.01%	9.09%
Total Vegetative Cover		2.20%			
Total Native Vegetative Cover		2.02%			
Total Mean Non-native Cover		0.18%			
Bare ground		97.80%			

Notes:

*non-native species

Bold is HMP species

Table 7-6
Interim Action Ranges MRA
Central Maritime Chaparral 2012 Cover and Frequency
of Plant Species after Small-scale Excavations in Five 50-meter Transects
ESCA RP 2012 Annual Natural Resources Report

Scientific Name	Common Name	Baseline Data 2010 - 2011				Post-activity Data 2012			
		Percent Cover			Frequency	Percent Cover			Frequency
		Mean Cover	Standard Deviation	Relative Cover		Mean Cover	Standard Deviation	Relative Cover	
<i>Acmispon glaber</i> [<i>Lotus scoparius</i>]	deerweed	0.0%	0.0%	0.0%	0.0%	1.3%	1.0%	17.3%	83.3%
<i>Helianthemum scoparium</i>	rush-rose	8.1%	9.1%	9.7%	86.2%	0.8%	0.9%	11.2%	100.0%
<i>Salvia mellifera</i>	black sage	5.3%	7.2%	6.3%	69.0%	0.1%	0.2%	1.0%	33.3%
<i>Eriophyllum confertiflorum</i>	golden-yarrow	1.5%	2.2%	1.7%	65.5%	0.1%	0.1%	0.9%	83.3%
<i>Arctostaphylos tomentosa</i> ssp. <i>tomentosa</i>	shaggy-bark manzanita, woollyleaf manzanita	29.3%	15.6%	35.0%	100.0%	0.0%	0.0%	0.4%	66.7%
<i>Ceanothus rigidus</i>	Monterey ceanothus	13.5%	9.3%	16.1%	96.6%	0.0%	0.0%	0.1%	16.7%
<i>Ceanothus dentatus</i>	dwarf ceanothus	20.2%	16.0%	24.1%	89.7%	0.0%	0.0%	0.1%	16.7%
<i>Symphoricarpos mollis</i>	creeping snowberry	5.3%	7.2%	6.3%	69.0%	0.0%	0.0%	0.1%	16.7%
<i>Baccharis pilularis</i> ssp. <i>consanguinea</i>	coyote bush	0.7%	1.8%	0.8%	24.1%	0.0%	0.0%	0.0%	16.7%
Total Mean Percent Shrub and Subshrub Cover		83.9%	10.0%	--		2.3%	0.5%	31.2%	
Herbaceous Plants Between Shrubs and Subshrubs		0.0%		0.0%		5.1%	4.0%	68.8%	100.0%
Target Weed Total		0.0%		0.0%		0.0%	0.0%	0.0%	0.0%
Total Mean Percent Vegetative Cover		83.9%				7.5%			
Total Mean Percent Bare Ground		0.0%				92.5%	3.8%		100.0%

Note:
HMP Species in Bold

Table 7-7
Interim Action Ranges MRA
Central Maritime Chaparral - 2012 Cover and Frequency of Plant Species
After Small-scale Excavations in 36 Herbaceous Quadrats
ESCA RP 2012 Annual Natural Resources Report

Scientific name	Common name	Percent Cover			Frequency
		Mean Percent Cover	Standard Deviation	Relative Percent Cover	
Shrub and Subshrub Species					
<i>Helianthemum scoparium</i>	rush-rose	0.1%	0.3%	0.1%	41.7%
<i>Acmispon glaber</i> [<i>Lotus scoparius</i>]	deerweed	0.1%	0.2%	0.1%	33.3%
<i>Arctostaphylos tomentosa</i>	shaggy-bark manzanita, woolly leaf manzanita	0.0%	0.1%	0.0%	13.9%
<i>Salvia milifera</i>	black sage	0.0%	0.2%	0.0%	8.3%
<i>Eriophyllum confertiflorum</i>	golden yarrow	0.0%	0.1%	0.0%	5.6%
<i>Ceanothus rigidus</i>	Monterey ceanothus	0.0%	0.3%	0.0%	2.8%
Herbaceous Species					
<i>Horkelia cuneata</i> ssp. <i>cuneata</i>	wedge-leaved horkelia	0.6%	0.0%	0.4%	5.6%
<i>Erodium cicutarium</i> *	red-stemmed filaree	0.1%	0.0%	0.1%	22.2%
<i>Festuca octoflora</i>	sixweeks fescue	0.1%	0.0%	0.1%	47.2%
<i>Cryptantha micromeres</i>	small flowered cryptantha	0.1%	0.0%	0.0%	25.0%
<i>Navarretia atractyloides</i>	holly leaf navarretia	0.1%	0.0%	0.0%	16.7%
<i>Hypochaeris glabra</i> *	smooth cat's ear	0.1%	0.0%	0.0%	22.2%
<i>Acmispon strigosus</i>	strigose lotus	0.0%	0.0%	0.0%	22.2%
<i>Chorizanthe diffusa</i>	diffuse spineflower	0.0%	0.0%	0.0%	25.0%
<i>Logfia gallica</i> *	narrowleaf cottonrose	0.0%	0.0%	0.0%	16.7%

<i>Camissonia micrantha</i>	miniature suncup	0.0%	0.0%	0.0%	5.6%
<i>Pseudognaphalium sp.</i>	cudweed	0.0%	0.0%	0.0%	5.6%
<i>Hypochaeris radicata</i> *	hairy cat's ear	0.0%	--	0.0%	2.8%
<i>Carex sp.</i>	carex	0.0%	0.0%	0.0%	5.6%
<i>Chorizanthe pungens var pungens</i>	Monterey Spineflower	0.0%	0.0%	0.0%	5.6%
<i>Crassula connata</i>	pigmy weed	0.0%	0.0%	0.0%	8.3%
<i>Cryptantha sp.</i>	cryptantha	0.0%	0.0%	0.0%	8.3%
<i>Calandrinia ciliata</i>	red maids	0.0%	0.0%	0.0%	5.6%
<i>Centaurea melitensis</i> *	Maltese star thistle	0.0%	0.0%	0.0%	5.6%
<i>Logfia sp.</i> *	cottonrose	0.0%	--	0.0%	2.8%
<i>Monardella c.f. undulata</i>	curly-leaved monardella	0.0%	--	0.0%	2.8%
<i>Portulaca oleracea</i> *	common purslane	0.0%	--	0.0%	2.8%
Total Mean Percent Vegetative Cover		1.6%			
Total Mean Percent Native Vegetative Cover		1.3%			
Total Mean Percent Non-native Cover		0.3%			
Total Mean Percent Bare ground		98.4%			

Notes:

*non-native species

Bold is HMP species

Table 7-8
Interim Action Ranges MRA
Grassland 2012 Cover and Frequency of Plant Species
after Vegetation Cutting in 6 Herbaceous Quadrats
ESCA RP 2012 Annual Natural Resources Report

Scientific name	Common name	Percent Cover			Frequency
		Mean Percent Cover	Standard Deviation	Relative Percent Cover	
<i>Deinandra corymbosa</i>	coastal tarweed	1.8%	2.2%	0.2%	83.3%
<i>Festuca myuros</i> *	rattail fescue	1.6%	2.8%	0.2%	100.0%
<i>Hypochaeris glabra</i> *	smooth cat's-ear	1.5%	2.8%	0.2%	83.3%
<i>Chorizanthe pungens</i> var <i>pungens</i>	Monterey spineflower	1.2%	2.0%	0.1%	50.0%
<i>Avena barbata</i> *	slender oat	0.8%	0.7%	0.1%	66.7%
<i>Centaurea melitensis</i> *	totalote	0.5%	0.8%	0.1%	66.7%
<i>Bromus hordeaceus</i> *	soft chess	0.4%	0.6%	0.0%	33.3%
<i>Lupinus nanus</i>	sky lupine	0.3%	0.7%	0.0%	33.3%
<i>Erigeron canadensis</i>	horseweed	0.3%	0.7%	0.0%	50.0%
<i>Cryptantha</i> sp.	cryptantha	0.3%	0.7%	0.0%	33.3%
<i>Dichelostemma capitatum</i>	bluedicks	0.3%	0.7%	0.0%	33.3%
<i>Layia platyglossa</i>	common tidytips	0.2%	0.6%	0.0%	16.7%
<i>Erodium cicutarium</i> *	red-stemmed filaree	0.1%	0.1%	0.0%	16.7%
<i>Bromus diandrus</i> *	ripgut brome	0.0%	0.1%	0.0%	33.3%
<i>Eschscholzia californica</i>	California poppy	0.0%	0.1%	0.0%	16.7%
<i>Cryptantha micromeres</i>	small-flowered cryptantha	0.0%	0.0%	0.0%	16.7%
<i>Navarretia intertexta</i>	needle-leaved navarretia	0.0%	0.0%	0.0%	16.7%
Total Mean Vegetative Cover		9.4%			
Total Mean Native Vegetative Cover		4.5%			
Total Mean Non-native Cover		4.9%			
Total Mean Bare ground		90.6%			

Notes:

*non-native species

Bold is HMP species

Table 7-9
Parker Flats MRA
Central Maritime Chaparral 2008-2012 Baseline and Post-activity
Cover and Frequency of Shrub Species in Eight 50-meter Transects
ESCA RP 2012 Annual Natural Resources Report

Scientific Name	Common Name	Baseline Data - 2008			Frequency	Post-Activity Data 2012			Frequency
		Mean Cover	Standard Deviation	Relative Cover		Mean Cover	Standard Deviation	Relative Cover	
<i>Arctostaphylos tomentosa</i> ssp. <i>tomentosa</i>	shaggy-bark manzanita, woollyleaf manzanita	56.7%	22.8%	51.4%	100.0%	39.1%	24.6%	43.1%	100.0%
<i>Adenostoma fasciculatum</i>	chamise	37.2%	30.5%	33.7%	87.5%	37.4%	25.2%	41.2%	87.5%
<i>Salvia mellifera</i>	black sage	6.2%	8.6%	5.6%	75.0%	3.7%	7.2%	4.1%	62.5%
<i>Acmispon glaber</i>	deerweed	0.0%	0.0%	0.0%	0.0%	2.7%	2.4%	2.9%	75.0%
<i>Baccharis pilularis</i> ssp. <i>consanguinea</i>	coyote bush	1.2%	2.2%	1.0%	37.5%	1.7%	3.5%	1.9%	62.5%
<i>Toxicodendron diversilobum</i>	poison-oak	0.9%	1.7%	0.8%	25.0%	1.3%	3.5%	1.4%	25.0%
<i>Mimulus aurantiacus</i>	sticky monkeyflower	0.0%	0.0%	0.0%	0.0%	1.0%	1.6%	1.1%	37.5%
<i>Heteromeles arbutifolia</i>	toyon	0.6%	1.2%	0.5%	25.0%	0.9%	2.5%	1.0%	12.5%
<i>Ribes speciosum</i>	fuchsia-flowered gooseberry	0.1%	0.3%	0.1%	12.5%	0.5%	1.4%	0.6%	25.0%
<i>Arctostaphylos crustacea</i> ssp. <i>crustacea</i>	brittle-leaf manzanita	0.0%	0.0%	0.0%	0.0%	0.3%	0.9%	0.4%	12.5%
<i>Ceanothus thyrsiflorus</i>	blueblossom	0.7%	2.1%	0.7%	12.5%	0.2%	0.7%	0.3%	12.5%
<i>Eriophyllum confertiflorum</i>	golden-yarrow	0.0%	0.0%	0.0%	0.0%	0.2%	0.4%	0.2%	25.0%
<i>Quercus agrifolia</i>	coast live oak	0.9%	2.5%	0.8%	12.5%	0.1%	0.1%	0.1%	25.0%
<i>Arctostaphylos montereyensis</i>	Toro manzanita	3.5%	6.9%	3.2%	25.0%	0.0%	0.0%	0.0%	0.0%
<i>Ribes malvaceum</i>	chaparral currant	0.0%	0.0%	0.0%	0.0%	0.02%	0.07%	0.0%	12.5%
Total Shrub and Subshrub Cover		107.9%	16.6%	--		89.1%	74.1%	--	
Herbaceous Cover Between Shrubs and Subshrubs		2.5%	7.0%	2.2%	12.5%	1.6%	1.6%	1.7%	25.0%
Total Vegetative Cover		110.3%	--	--		90.7%	--	--	

Cover of Bare Ground	4.2%	4.7%	--	75.0%	20.4%	6.6%	--	100.0%
----------------------	------	------	----	-------	-------	------	----	--------

Note:
HMP Species in Bold

Table 7-10
Parker Flats MRA
Central Coastal Scrub 2012 Cover and Frequency of Shrub Species
after Vegetation Cutting in Three 50-meter Transects
ESCA RP 2012 Annual Natural Resources Report

Scientific Name	Common Name	Baseline Data -2008				Post-Activity Data 2012			
		Percent Cover			Frequency	Percent Cover			Frequency
		Mean Cover	Standard Deviation	Relative Cover		Mean Cover	Standard Deviation	Relative Cover	
<i>Mimulus aurantiacus</i>	sticky monkeyflower	7.5%	3.3%	9.5%	100.0%	14.4%	13.2%	16.3%	100.0%
<i>Baccharis pilularis</i> ssp. <i>consanguinea</i>	coyote bush	14.2%	12.5%	18.1%	100.0%	13.6%	7.5%	15.5%	100.0%
<i>Acmispon glaber</i> [<i>Lotus scoparius</i>]	deerweed	0.0%	0.0%	0.0%	0.0%	13.5%	7.7%	15.4%	100.0%
<i>Eriodictyon californicum</i>	yerba santa	5.1%	3.9%	6.5%	100.0%	6.9%	4.5%	7.9%	100.0%
<i>Salvia mellifera</i>	black sage	33.0%	11.6%	42.2%	100.0%	3.4%	4.1%	3.9%	100.0%
<i>Quercus agrifolia</i>	coast live oak	2.2%	3.1%	2.8%	66.7%	3.4%	3.1%	3.9%	66.7%
<i>Toxicodendron diversilobum</i>	poison-oak	7.1%	9.1%	9.1%	100.0%	3.1%	1.9%	3.5%	100.0%
<i>Eriophyllum confertiflorum</i>	golden-yarrow	0.0%	0.0%	0.0%	0.0%	1.1%	1.6%	1.3%	66.7%
<i>Artemisia californica</i>	California sagebrush	6.9%	11.9%	8.8%	33.3%	0.8%	1.3%	0.9%	33.3%
<i>Ribes speciosum</i>	fuchsia-flowered gooseberry	0.9%	1.5%	1.1%	33.3%	0.1%	0.1%	0.1%	33.3%
<i>Lepechinia calycina</i>	pitcher sage	0.0%	0.0%	0.0%	0.0%	0.1%	0.1%	0.1%	33.3%
<i>Arctostaphylos tomentosa</i> ssp. <i>tomentosa</i>	shaggy-bark manzanita, woollyleaf manzanita	1.3%	2.2%	1.6%	33.3%	0.0%	0.0%	0.0%	0.0%
Total Shrub and Subshrub Cover		78.1%				60.4%			
Herbaceous Cover Between Shrubs and Subshrubs		0.2%	0.2%		66.7%	27.4%	19.6%		100.0%
Total Vegetated Cover		78.3%				87.8%			
Cover of Bare Ground		30.8%	14.0%		100.0%	21.6%	8.1%		100.0%

Table 7-11
Parker Flats MRA
Central Coastal Scrub 2012 Cover and Frequency of Plant Species
after Vegetation Cutting in 6 Herbaceous Quadrats
ESCA RP 2012 Annual Natural Resources Report

Scientific name	Common name	Percent Cover			Frequency
		Mean Cover (%)	Standard Deviation	Relative Cover (%)	
Tree species					
<i>Quercus agrifolia</i>	coast live oak	0.0%	-	0.0%	17.0%
Shrub and Subshrub species					
<i>Acmispon glaber</i> [<i>Lotus scoparius</i>]	deerweed	0.0%	0.1%	0.0%	33.0%
<i>Baccharis pilularis</i> ssp. <i>consanguinea</i>	coyote bush	0.0%	-	0.0%	17.0%
<i>Artemisia californica</i>	California sagebrush	0.0%	-	0.0%	17.0%
<i>Toxicodendron divesilobum</i>	poison-oak	0.0%	-	0.0%	17.0%
<i>Eriodictyon californicum</i>	yerba santa	0.0%	-	0.0%	17.0%
<i>Mimulus aurantiacus</i>	bush monkeyflower	0.0%	-	0.0%	17.0%
Herbaceous Species					
<i>Hypochaeris glabra</i> *	smooth cat's ear	0.0%	0.0%	32.1%	83.0%
<i>Aira caryophyllea</i> *	silver hairgrass	0.0%	0.7%	18.1%	1.3%
<i>Festuca myuros</i> *	rattail fescue	0.0%	0.0%	15.5%	83.0%
<i>Stipa pulchra</i>	purple needgrass	0.0%	-	8.4%	17.0%
<i>Silene gallica</i> *	windmill pink	0.0%	0.0%	4.8%	50.0%

<i>Galium aparine</i>	bedstraw	0.0%	0.0%	4.7%	50.0%
<i>Erodium cicutarium</i> *	red-stemmed filaree	0.0%	0.0%	4.2%	33.0%
<i>Bromus hordeaceus</i> *	soft chess	0.0%	-	2.8%	17.0%
<i>Bromus madritensis</i> subsp. <i>rubens</i> *	red brome	0.0%	-	2.8%	17.0%
<i>Bromus diandrus</i> *	ripgut brome	0.0%	-	2.1%	17.0%
<i>Anagallis arvensis</i> *	scarlet pimpernel	0.0%	0.3%	1.9%	0.2%
<i>Dichelostemma capitatum</i>	bluedicks	0.0%	-	0.6%	17.0%
<i>Logfia gallica</i> *	narrowleaf cottonrose	0.0%	-	0.6%	17.0%
<i>Trifolium angustifolium</i> *	narrowleaf crimson clover	0.0%	-	0.6%	17.0%
unknown grass	grass	0.0%	-	2.1%	17.0%
Total Vegetative Cover		0.0%			
Total Native Vegetative Cover		0.0%			
Total Mean Non-native Cover		0.0%			
Cover of Bare ground		100.0%	3.1%		100.0%

Note:

* non-native species

Table 7-12
Future East Garrison MRA
2010 - 2012 HMP Annual Species Abundance
ESCA RP 2012 Annual Natural Resources Report

Mean Number of Individuals per Plot								
Scientific Name	Common Name	2010 Baseline	Standard Deviation	Number of Plots Surveyed	2012 Post- activity	Standard Deviation	Number of Plots Surveyed	Change in Mean # of Individuals Post-activity
<i>Chorizanthe pungens</i> var. <i>pungens</i>	Monterey spineflower	118.00	+/-149.91	2	55.00	+/-52.33	2	-63
<i>Gilia tenuiflora</i> ssp. <i>arenaria</i>	Monterey gilia	30.00	+/-28.05	3	5.00	+/-6.24	3	-25

Table 7-13
Future East Garrison MRA
2012 Toro Manzanita Density Survey
ESCA RP 2012 Annual Natural Resources Report

Habitat Parcel	Toro Manzanita Density (1992 Baseline*)	Toro Manzanita Retention Survey Area (acres)	Total Number of Protected Toro Manzanita Plants per Area	Mean Number of Protected Toro Manzanita Plants per Acre
West - E11b.6.1	High	11.3	339	30.1
East - E11b.7.1.1	High	5.3	111	21.0
	Medium	10.1	55	5.5
Totals		26.6	505	19.0

Note:

*Flora and Fauna Baseline Study (Jones & Stokes 1992): High density = hundreds to over thousands of plants per acre.
Medium density = tens to hundreds of plants per acre.

Table 7-14
Interim Action Ranges MRA
2010 - 2012 HMP Annual Species Abundance
ESCA RP 2012 Annual Natural Resources Report

		Mean Number of Individuals per Plot per Activity Type						
		2010 Baseline	Standard Deviation	Number of Plots Surveyed	2012 Post- activity	Standard Deviation	Number of Plots Surveyed	Change in Mean # of Individuals Post-activity
Scientific Name	Common Name	Ingress/Egress						
<i>Chorizanthe pungens</i> var. <i>pungens</i>	Monterey spineflower	158.10	+/-265.5	40	25.89	+/-33.25	9	-132.21
<i>Gilia tenuiflora</i> ssp. <i>arenaria</i>	Monterey gilia	3.21	+/-7.29	39	0.50	+/-1	4	-2.71
<i>Cordylanthus rigidus</i> ssp. <i>littoralis</i>	Seaside birds-beak	30.73	+/-63.5	31	27	NA	1	-3.73
		Small Scale Excavation						
<i>Chorizanthe pungens</i> var. <i>pungens</i>	Monterey spineflower	89.00	+/- 142.57	41	32.17	+/- 47.00	6	-56.83
<i>Gilia tenuiflora</i> ssp. <i>arenaria</i>	Monterey gilia	23.52	+/- 59.65	35	3.5	+/- 0.71	4	-20.02
<i>Cordylanthus rigidus</i> ssp. <i>littoralis</i>	Seaside birds-beak	3.63	+/- 14.36	63	--	--	--	NA
		Vegetation Cutting						
<i>Chorizanthe pungens</i> var. <i>pungens</i>	Monterey spineflower	89.00	+/- 142.57	41	13.33	+/- 7.76	6	-75.67
<i>Gilia tenuiflora</i> ssp. <i>arenaria</i>	Monterey gilia	23.52	+/- 59.65	35	4.13	+/- 4.26	8	-19.39
<i>Cordylanthus rigidus</i> ssp. <i>littoralis</i>	Seaside birds-beak	3.63	+/- 14.36	63	5.38	+/- 5.13	8	1.75

Table 7-15
Interim Action Ranges MRA
2008 - 2012 HMP Annual Species Reference Plots
ESCA RP 2012 Annual Natural Resources Report

Scientific name	Common Name	17 Reference Plots (25 m ²)					
		Number of Individuals					
		2008		2010		2012	
<i>Gilia tenuiflora</i> ssp. <i>arenaria</i>	Monterey gilia	2		12		0	
		4		14		0	
		5		15		1	
		--		1		0	
		--		1		0	
		Mean Number	Standard Deviation	Mean Number	Standard Deviation	Mean Number	Standard Deviation
5 Reference Plots		3.67	+/-1.53	8.60	+/-7.02	0.20	+/-0.45
<i>Chorizanthe pungens</i> var. <i>pungens</i>	Monterey spineflower	--		606		160	
		--		389		36	
		--		6		0	
		--		77		6	
		--		1361		47	
		--		253		2	
		--		228		3	
7 Reference Plots		--	--	417.14	+/-460.94	36.29	+/-57.64
<i>Cordylanthus rigidus</i> ssp. <i>littoralis</i>	Seaside bird's beak	112		201		0	
		141		390		3	
		--		90		0	
		--		70		11	
		--		53		0	
5 Reference Plots		126.50	+/-20.51	160.80	+/-140.56	2.80	+/-4.76

Table 7-16
Interim Action Ranges MRA
2010-2012 Baseline and Post-activity Monterey Spineflower Presence
2012 ESCA RP Annual Natural Resources Report

Location	ESCA RP Baseline Surveys 2010				ESCA RP Follow-up Surveys 2012				
	Number of Grid Cells Surveyed	Number of Grid Cells with Monterey Spineflower Present	Proportion of Surveyed Grid Cells with Monterey Spineflower	Estimated Density per Grid Cell	Munitions Investigation Remediation Activity Category	Number of Grid Cells Surveyed	Number of Grid Cells with Monterey Spineflower Present	Proportion of Surveyed Grid Cells with Monterey Spineflower	Estimated Density per Grid Cell
IAR-Wide Ingress/Egress Corridors	38	28	73.7%	198.3	Ingress/Egress Corridors	9	7	77.8%	33.3
Central Maritime Chaparral in North Range 44 SCA and South Range44/Central Area SCAs/NCAs	37	30	81.1%	100.6	Small scale excavation	2	2	100.0%	91.5
					Vegetation cutting	4	4	100.0%	17.5
Central Maritime Chaparral in Range 47 SCA - Subarea A	1	1	100.0%	20.0	Large scale excavation	--	--	--	--
Central Maritime Chaparral in Range 47 SCA - Subarea B	1	1	100.0%	10.0	Large scale excavation	--	--	--	--
Central Maritime Chaparral in Range 47 SCA - Subarea C	1	1	100.0%	5.0	Vegetation cutting	2	2	100.0%	2.5
Grassland in South Range44/Central Area SCAs/NCAs	1	1	100.0%	606.0	Small scale excavation	1	1	100.0%	107.0
Total for all Activities	79	62	78.5%	15.2		18	16	88.9%	15.7

Table 7-17
Interim Action Ranges MRA
2010-2012 Baseline and Post-activity Monterey Gilia Presence
2012 ESCA RP Annual Natural Resources Report

Location	ESCA RP Baseline Surveys 2010				ESCA RP Follow-up Surveys 2012				
	Number of Grid Cells Surveyed	Number of Grid Cells with Monterey Gilia Present	Proportion of Surveyed Grid Cells with Monterey Gilia	Estimated Density per Grid Cell	Munitions Investigation Remediation Activity Category	Number of Grid Cells Surveyed	Number of Grid Cells with Monterey Gilia Present	Proportion of Surveyed Grid Cells with Monterey Gilia	Estimated Density per Grid Cell
IAR-Wide Ingress/Egress Corridors	34	16	47.1%	10.8	Ingress/Egress Corridors	5	2	40.0%	0.4
Central Maritime Chaparral in North Range 44 SCA and South Range44/Central Area SCAs/NCAs	27	17	63.0%	51.6	Small scale excavation	2	2	100.0%	6.0
					Vegetation cutting	9	9	100.0%	8.6
Central Maritime Chaparral in Range 47 SCA - Subarea A	1	0	0.0%	0.0	Large scale excavation	--	--	--	--
Central Maritime Chaparral in Range 47 SCA - Subarea B	1	0	0.0%	0.0	Large scale excavation	--	--	--	--
Central Maritime Chaparral in Range 47 SCA - Subarea C	1	1	100.0%	1.0	Vegetation cutting	2	2	100.0%	6.0
Grassland in South Range44/Central Area SCAs/NCAs	1	0	0.0%	0.0	Small scale excavation	1	1	100.0%	1.0

Table 7-18
Interim Action Ranges MRA
2010 - 2012 Baseline and Post-Activity Seaside Bird's Beak Presence
2012 ESCA RP Annual Natural Resources Report

Location	ESCA RP Baseline Surveys 2010				ESCA RP Follow-up Surveys 2012				
	Number of Grid cells surveyed	Number of Grid cells with Seaside Bird's Beak Present	Proportion of Surveyed Grid Cells with Seaside Bird's Beak	Estimated density per grid cell	Munitions Investigation Remediation Activity Category	Number of Grid cells surveyed	Number of Grid cells with Seaside Bird's Beak	Proportion of Surveyed Grid Cells with Seaside Bird's Beak	Estimated density per grid cell
IAR-Wide Ingress/Egress Corridors	29	10	34.5%	108.0	Ingress/Egress Corridors	1	1	100.0%	27.0
Central Maritime Chaparral in North Range 44 SCA and South Range44/Central Area SCAs/NCAs	12	0	0.0%	0	Small scale excavation	--	--	--	--
					Vegetation cutting	8	6	75.0%	7.2
Central Maritime Chaparral in Range 47 SCA - Subarea A	1	0	0.0%	0.0	Large scale excavation	--	--	--	--
Central Maritime Chaparral in Range 47 SCA - Subarea B	5	0	0.0%	0.0	Large scale excavation	--	--	--	--
Central Maritime Chaparral in Range 47 SCA - Subarea C	14	0	0.0%	0.0	Vegetation cutting	--	--	--	--
Grassland in South Range44/Central Area SCAs/NCAs	--	--	--	--	Small scale excavation	--	--	--	--
Total for all Activities	61	10	16.4%	10.8		9	7	77.8%	4.9

Table 7-19
Parker Flats MRA
2008-2012 HMP Annual Species Abundance
ESCA RP Annual Natural Resources Report

		Mean Number of Individuals per Plot						
Scientific Name	Common Name	2008 Baseline	Standard Deviation	Number of Plots Surveyed	2011 Post-activity	Standard Deviation	Number of Plots Surveyed	Change in Mean # of Individuals Post-activity
<i>Chorizanthe pungens</i> var. <i>pungens</i>	Monterey spineflower	Vegetation Cutting						
		136.90	+/- 151.7	10	40.70	+/- 75.65	10	-96
		Woody Debris Removal						
		136.90	+/- 151.7	10	57.10	+/- 123.55	10	-80

Table 8-1
Munitions Response Activity Types during 2012 Reporting Period
ESCA RP 2012 Annual Natural Resources Report

Activity Type	Estimated Area (acres)	Restoration Strategy	Planned Actions
Ingress/egress routes - Activity A	5.5	Monitoring only	- monitor
Above-ground vegetation cutting prior to target-specific excavation ("mag and dig") - Activity B	12.3	Monitoring only	- separate/replace topsoil/subsoil in specified sequence
All vegetation removed (above and below ground). Small-scale soil excavation/screening (less than 1 acre or no more than 100 feet wide) - Activity C	2.9	Passive (seeding)	<ul style="list-style-type: none"> - separate/replace topsoil/subsoil in specified sequence - recontour to match original - control erosion as needed - seed - monitor
All vegetation removed (above and below ground). Large scale soil screening (more than 1 acre or more than 100 feet wide) - Activity D	13.4	Active (seeding and container planting)	<ul style="list-style-type: none"> - separate/replace topsoil/subsoil in specified sequence - recontour to match original - control erosion as needed - seed - container plantings - monitor
Totals	34.1		

T:\Projects\ALLMRAs\Habitat_Monitoring\2012_Annual_Natural_Resource_Report\2012_12_18_Fort_Ord_Location_Map.mxd - 2/16/2013 @ 8:23:25 PM

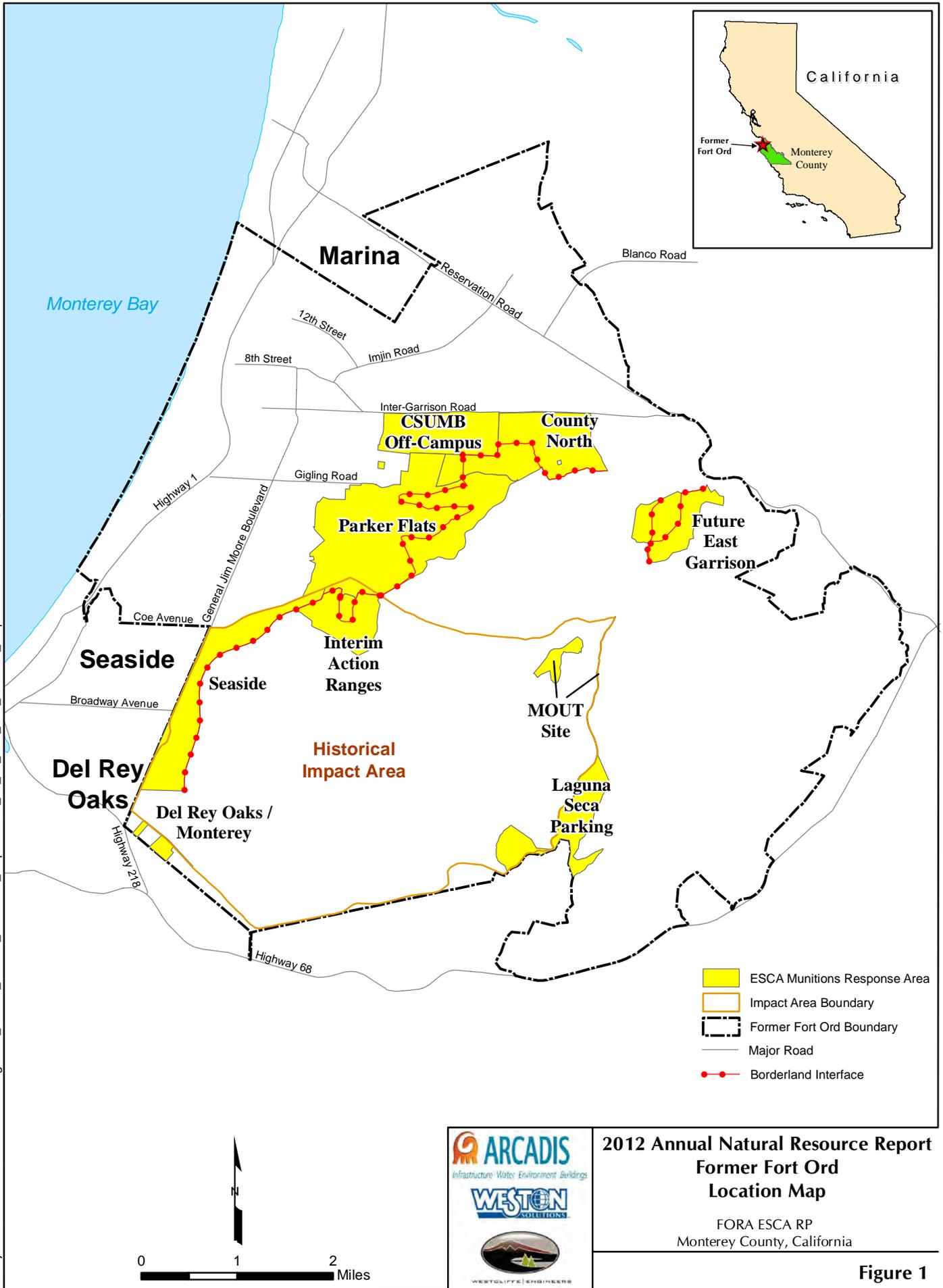
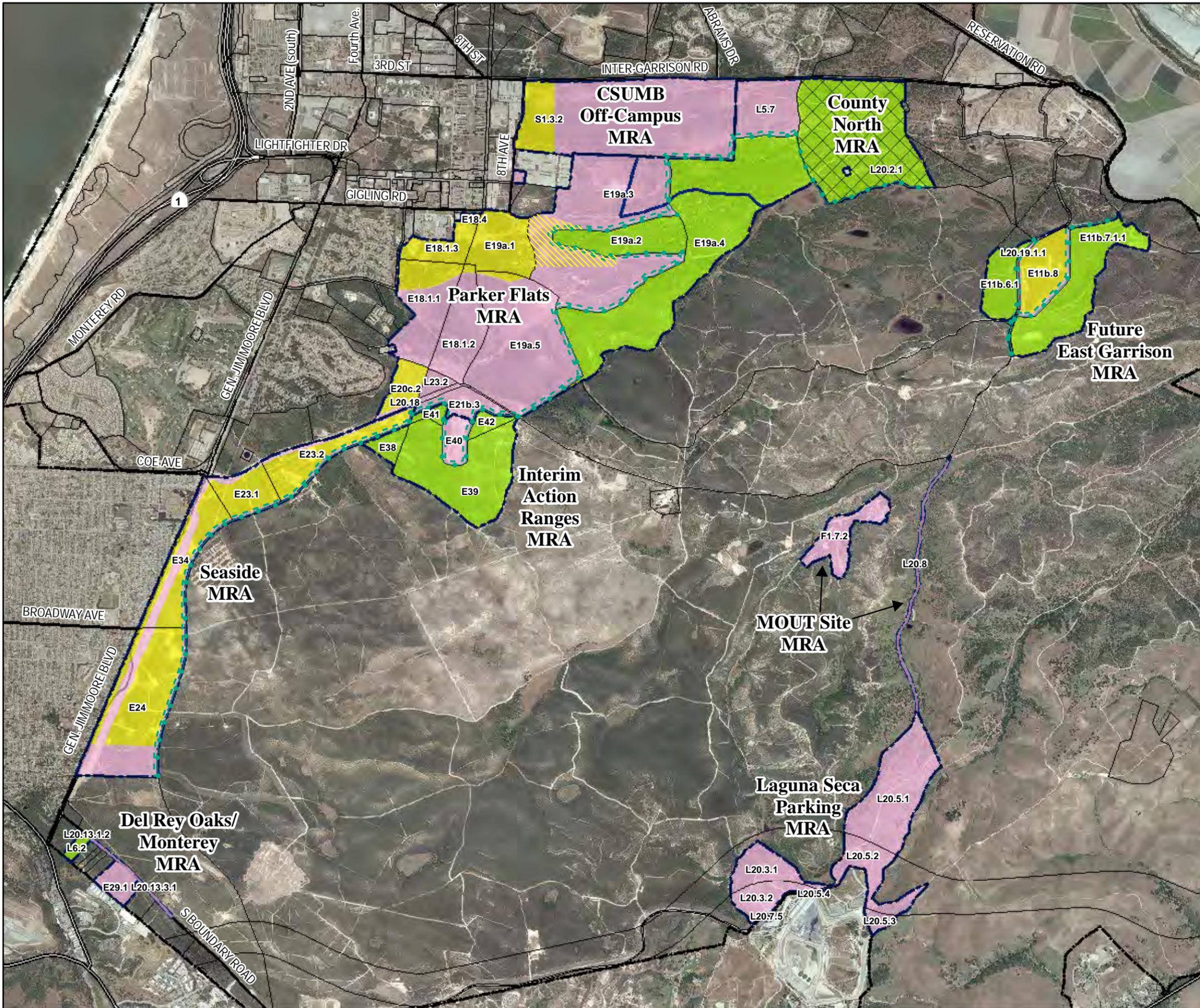


Figure 1

T:\Projects\ALLMRAs\Habitat Monitoring\2012_Annual_Natural_Resource_Report\2012_12_18_ALLMRA_ESCA_Property_Proposed_Future_Land_Use.mxd - 2/16/2013 @ 8:09:29 PM



Legend

- Munitions Response Area
- Major Road
- Borderland Interface
- 100-Foot Buffer from Borderland Interface
- E11b.8 USACE Parcel
- Former Fort Ord Boundary

Proposed Future Land Use

- Residential
- Non-Residential
- Mixed Use
- Habitat Reserve
- Habitat Corridor

Former Fort Ord Location Map

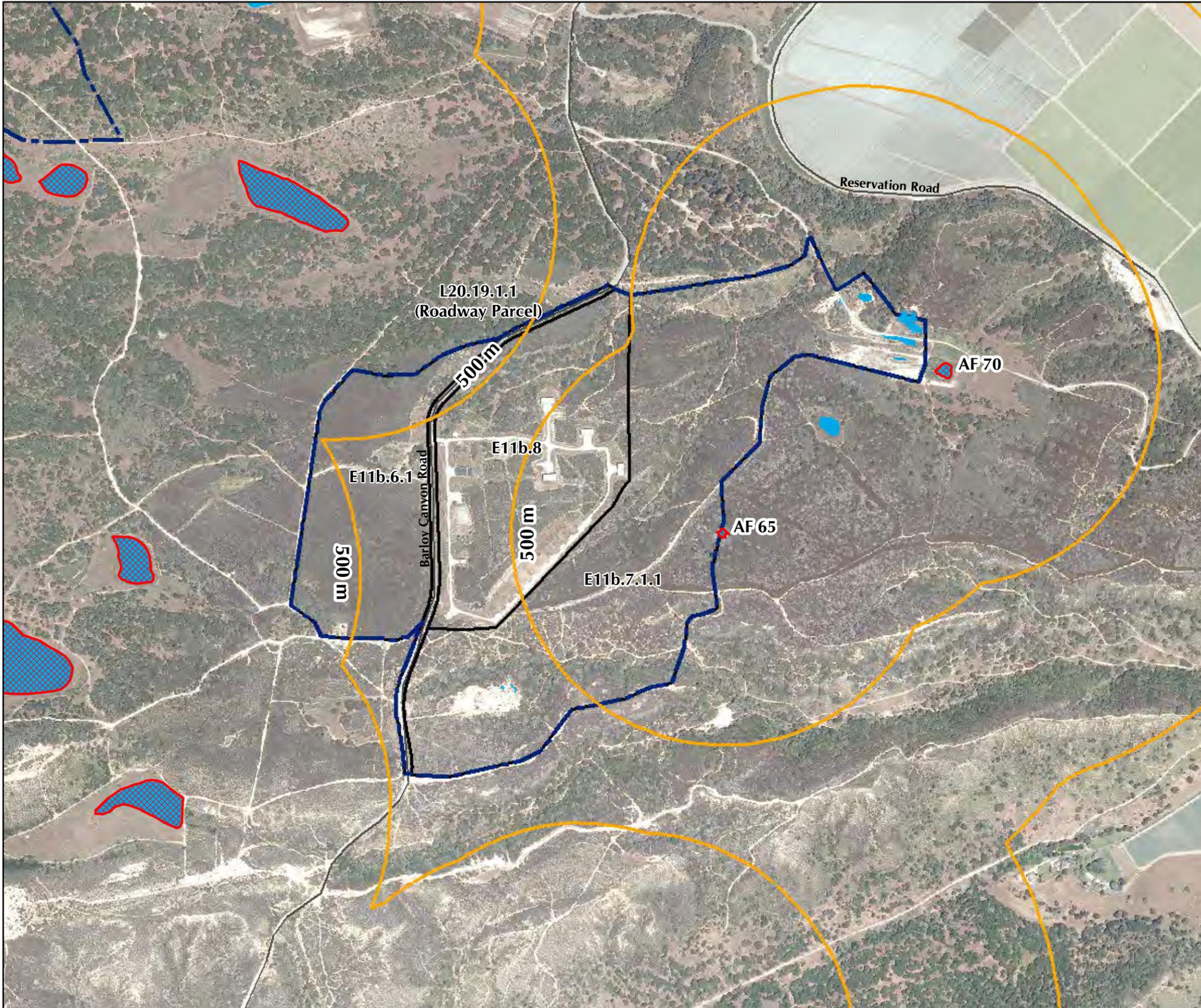
2010 Aerial Shown

2012 Annual Natural Resource Report
ESCA Property
Proposed Future Land Use

FORA ESCA RP
 Monterey County, California

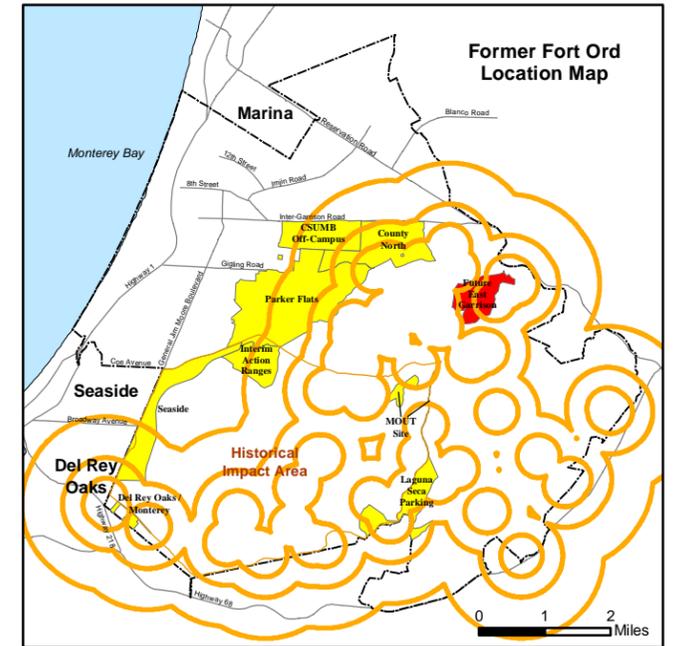
Figure 2

T:\Projects\ALL\MRA\Habitat Monitoring\2012_Annual_Natural_Resource_Report\2012_12_30_Future_East_Garrison_MRA.mxd - 2/16/2013 @ 8:23:26 PM



Legend

-  Munitions Response Area
-  California Tiger Salamander (CTS) Buffer
-  Major Road
-  Aquatic Features
-  Aquatic Feature with Documented CTS Presence (Prior to ESCA RP 2010-2011 Aquatic Survey)
-  USACE Parcel



**2012 Annual Natural Resource Report
Future East Garrison MRA**

FORA ESCA RP
Monterey County, California

Figure 3

T:\Projects\ALLMRAs\Habitat Monitoring\2012_Annual_Natural_Resource_Report\2012_12_18_IAR_MRA.mxd - 2/16/2013 @ 8:45:13 PM



Legend

- Munitions Response Area
- USACE Parcel
- Structure
- Borderland Interface

Former Fort Ord Location Map

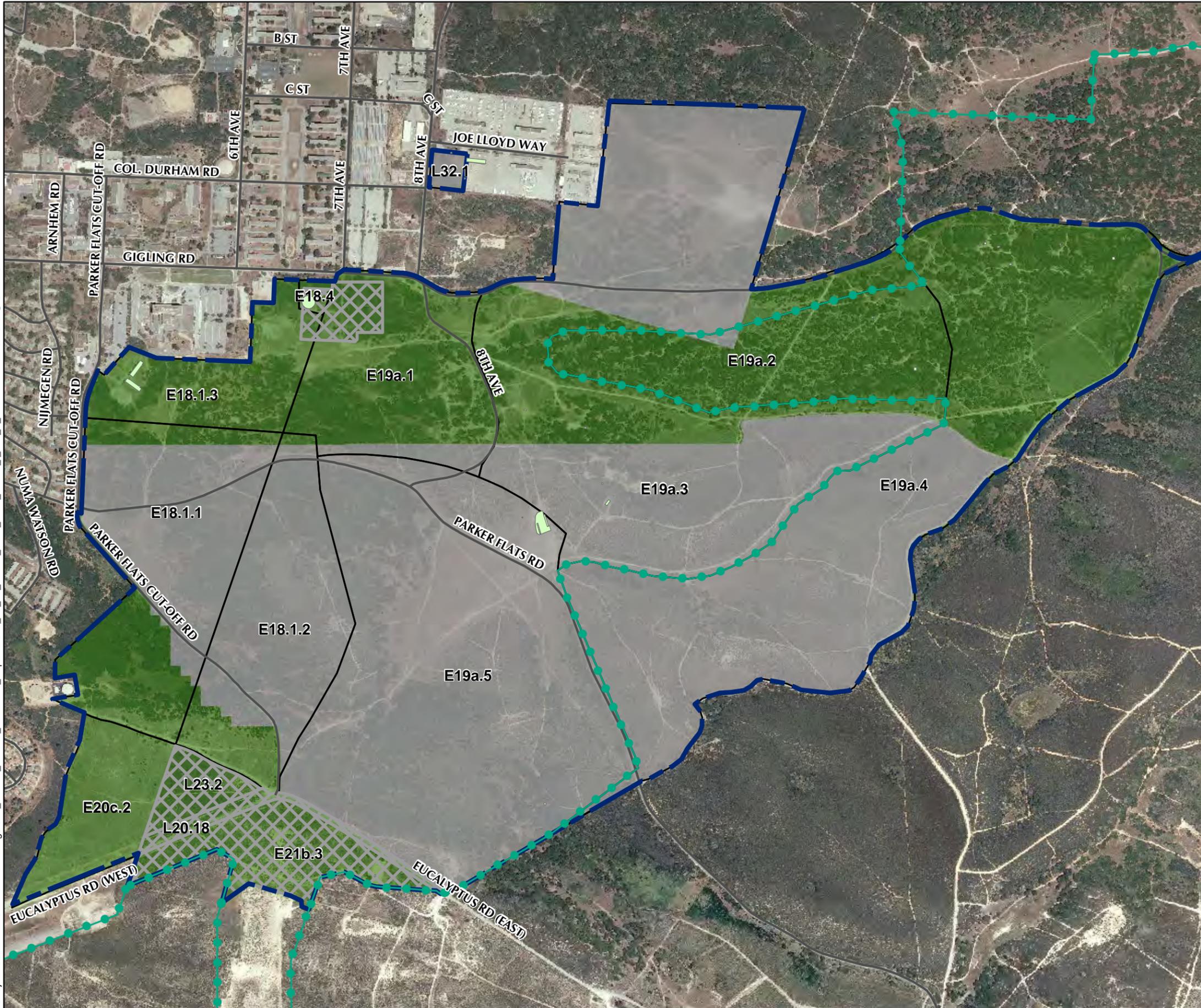
2010 Aerial Shown

2012 Annual Natural Resource Report
Interim Action Ranges MRA

FORA ESCA RP
Monterey County, California

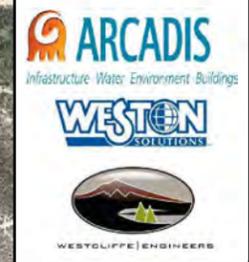
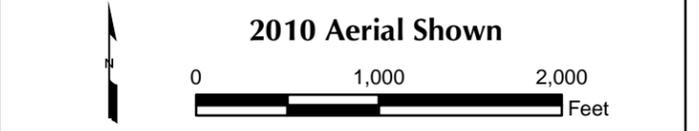
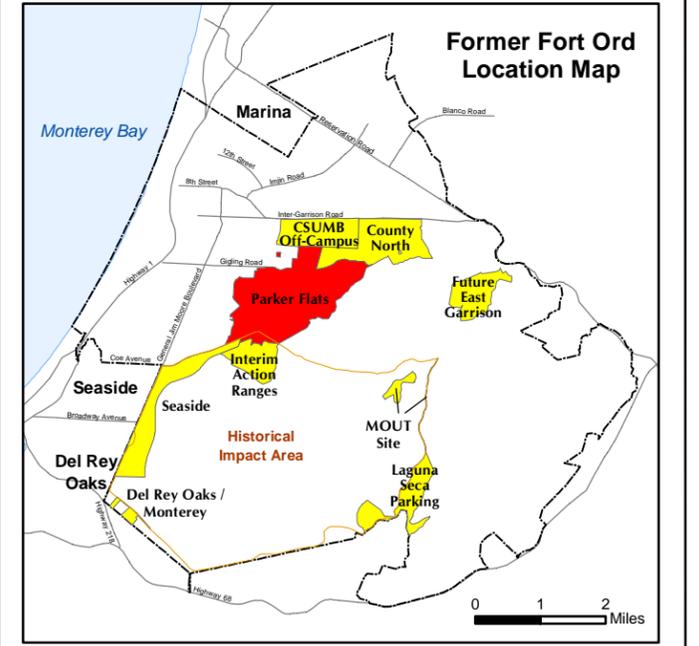
Figure 4

T:\Projects\ALL MRAs\Habitat Monitoring\2012_Annual_Natural_Resource_Report\2012_12_18_Parker_Flats_MRA_Phase_I_and_II_Areas.mxd - 2/16/2013 @ 8:45:10 PM



Legend

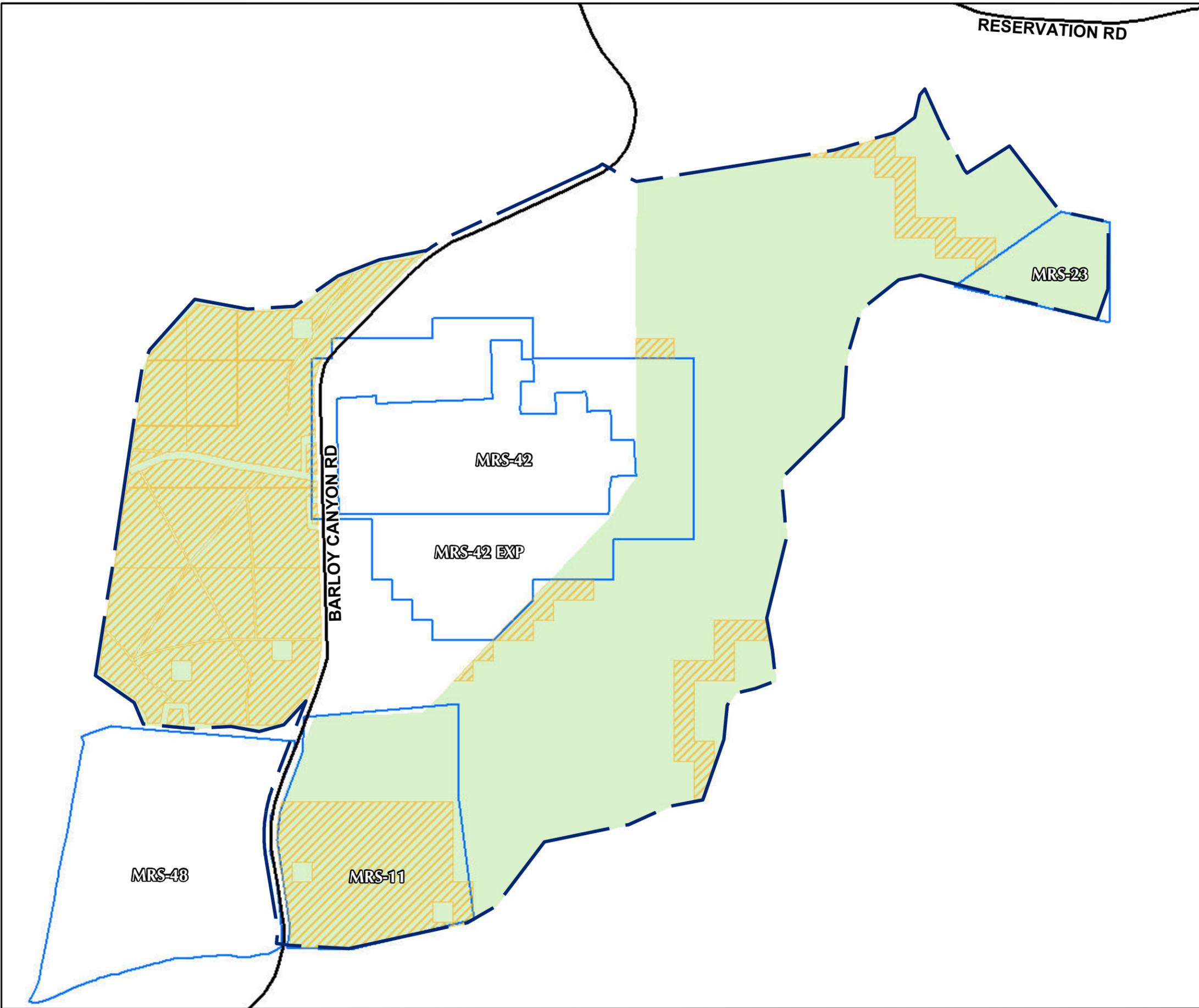
-  Munitions Response Area
-  Major Road
-  USACE Parcel
-  Phase I Remedial Investigation Area
-  Phase II Remedial Investigation Area
-  Phase II Remedial Investigation Area (Army Completed)
-  Structure
-  Borderland Interface



2012 Annual Natural Resource Report
Parker Flats MRA
 FORA ESCA RP
 Monterey County, California

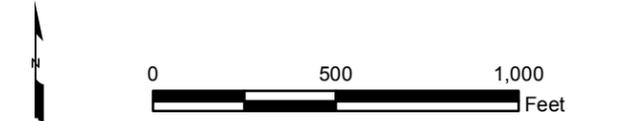
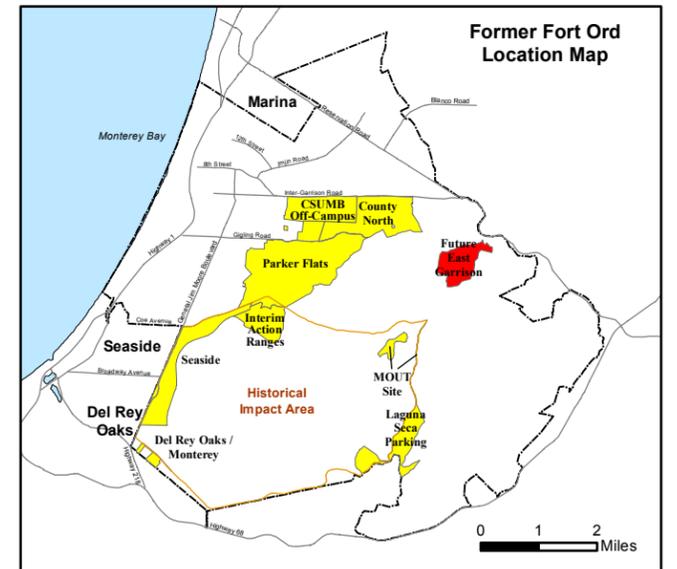
Figure 5

T:\Projects\ALLMRA\Habitat Monitoring\2012_Annual_Natural_Resource_Report\2012_12_18_FEG_Munitions_Response_Activities.mxd - 2/16/2013 @ 8:50:37 PM



Legend

-  Area of Munitions Response Activities During 2012 Reporting Period
-  Habitat Reserve
-  Munitions Response Area
-  Munitions Response Site
-  Major Road

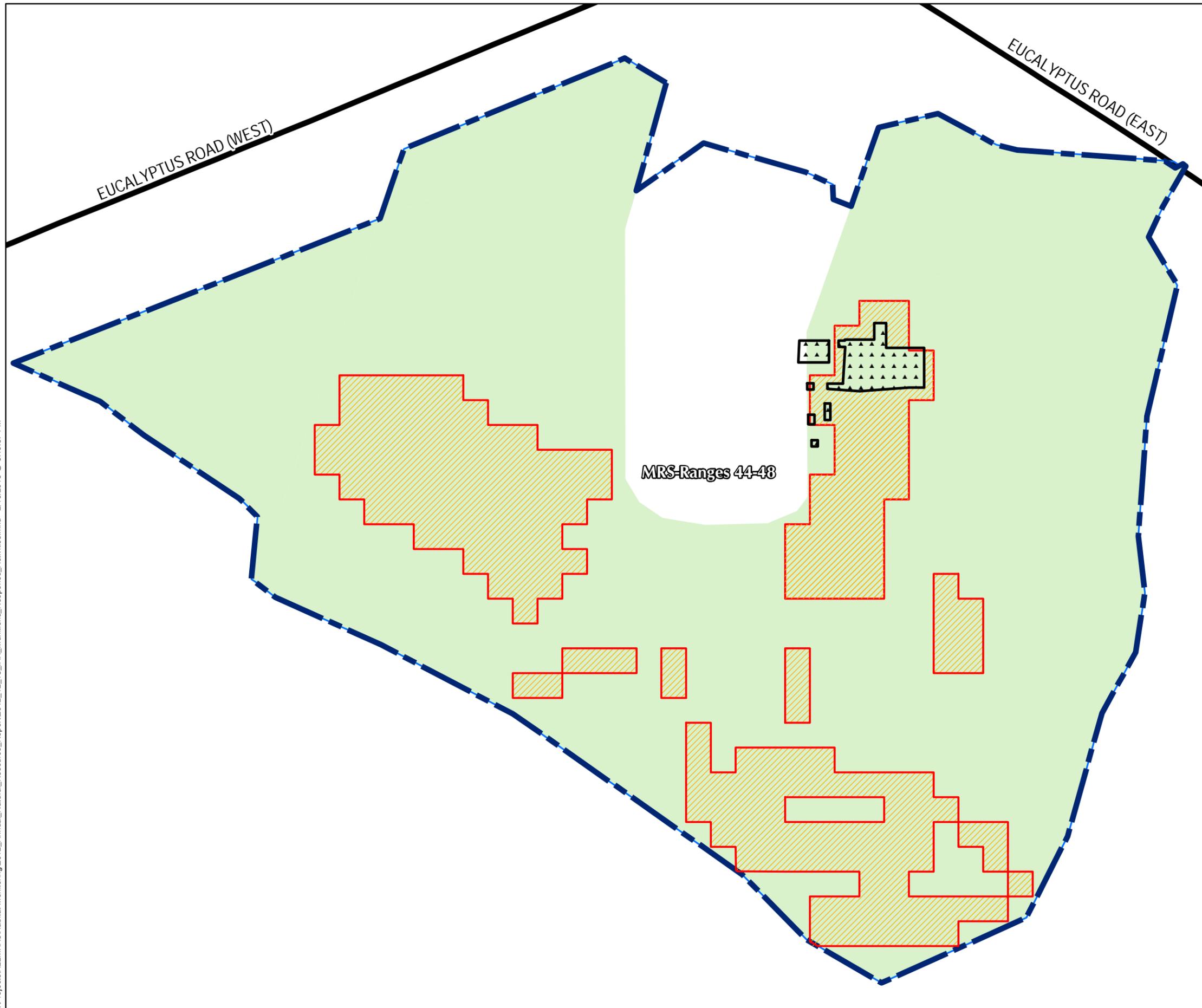


**2012 Annual Natural Resource Report
Future East Garrison MRA
Munitions Response Activities**

FORA ESCA RP
Monterey County, California

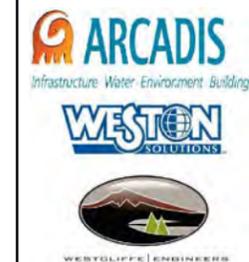
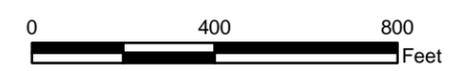
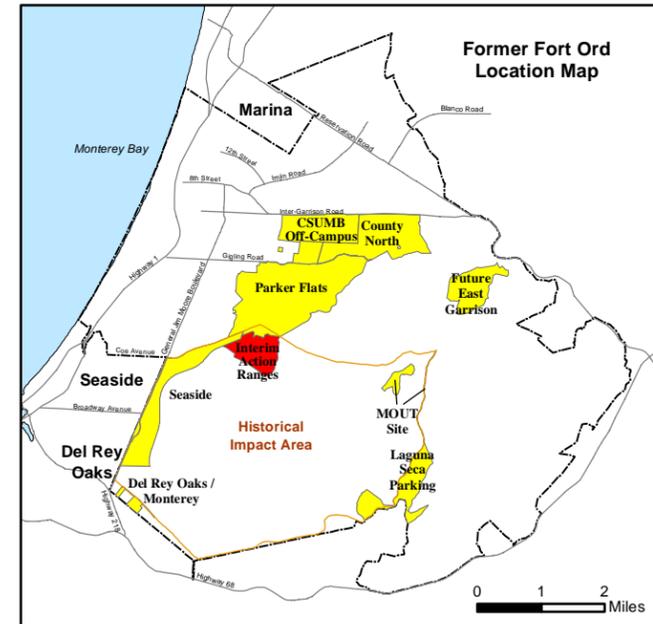
Figure 6

T:\Projects\ALLMRA\Habitat Monitoring\2012_Annual_Natural_Resource_Report\2012_12_18_AR_Munitions_Response_Activities.mxd - 2/16/2013 @ 8:49:57 PM



Legend

-  Area of Munitions Response Activities During 2012 Reporting Period
-  HA-44 Remediation Area (U.S. Army Action)
-  Habitat Reserve
-  Special Case and Non-Completed Areas (Work Areas)
-  Munitions Response Area
-  Munitions Response Site
-  Major Road

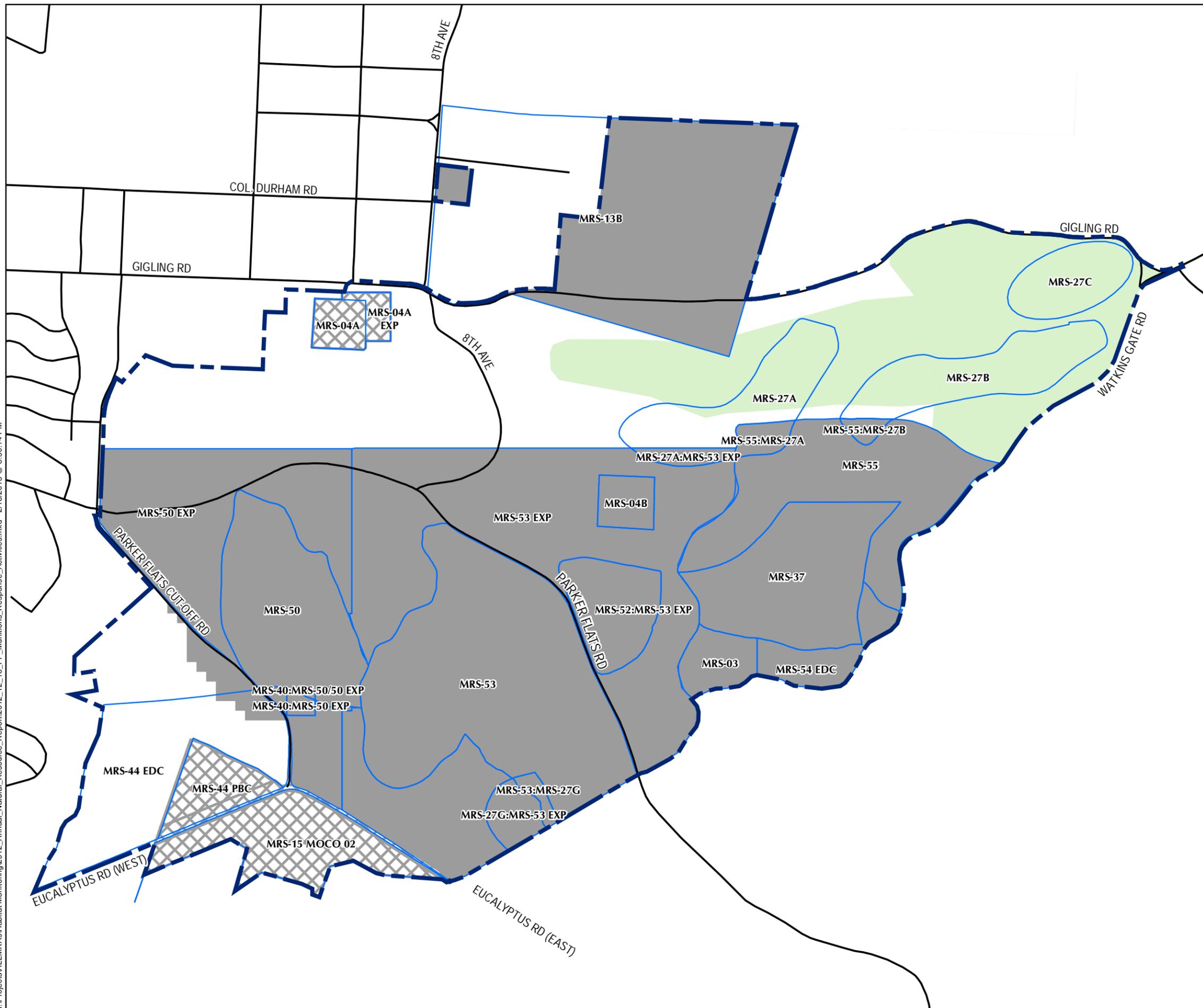


**2012 Annual Natural Resource Report
Interim Action Ranges MRA
Munitions Response Activities**

FORA ESCA RP
Monterey County, California

Figure 7

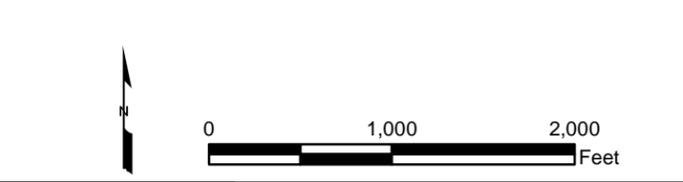
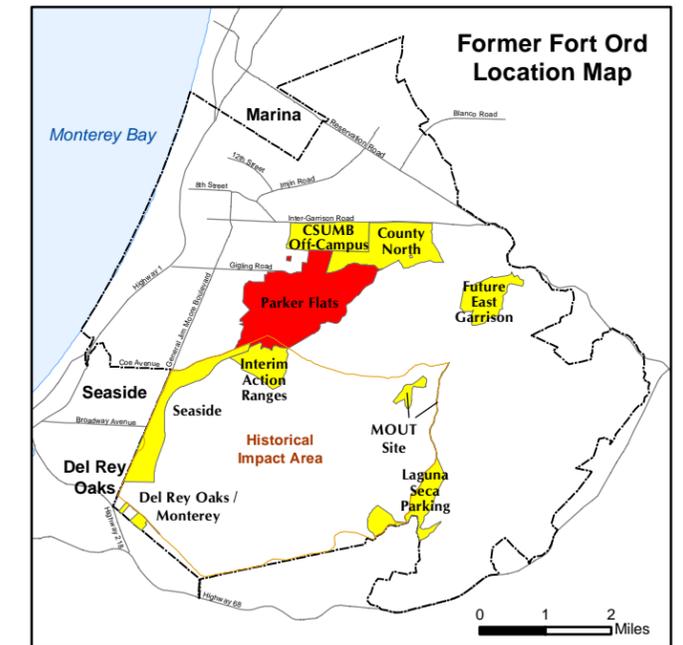
T:\Projects\ALLMRAs\Habitat Monitoring\2012_Annual_Natural_Resource_Report\2012_12_18_PF_Munitions_Response_Activities.mxd - 2/16/2013 @ 8:50:14 PM



Legend

- Phase II ESCA Future Land Use - Habitat Reserve
- Phase II Area (Army Completed)
- Parker Flats Phase I Area
- Munitions Response Area
- Munitions Response Site
- Major Road

Note: Less than 1 acre of Munitions Response Activities occurred in the Phase II Area during the 2012 Reporting Period





Infrastructure. Water. Environment. Buildings.

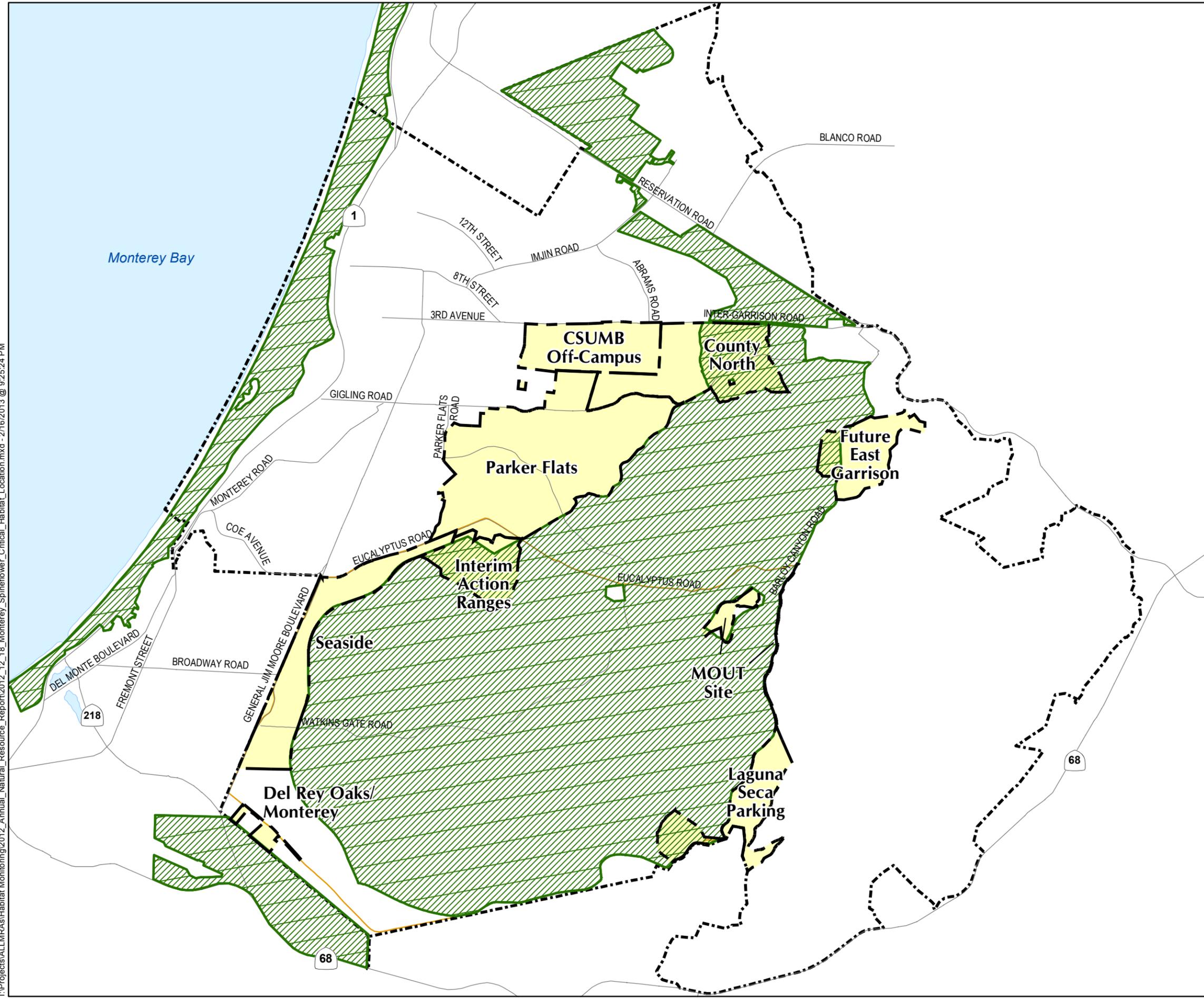



2012 Annual Natural Resource Report
Parker Flats MRA
Munitions Response Activities

FORA ESCA RP
 Monterey County, California

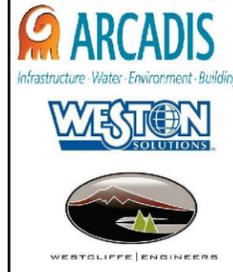
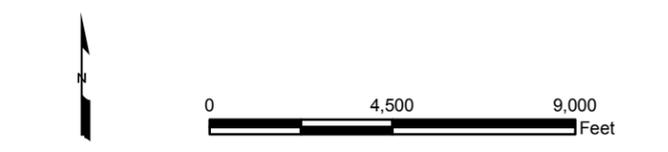
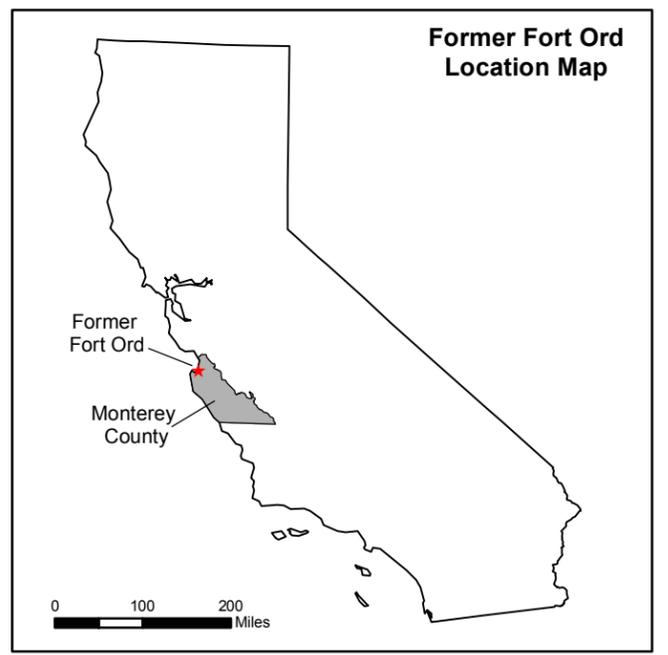
Figure 8

T:\Projects\ALLMRAs\Habitat Monitoring\2012_Annual_Natural_Resource_Report\2012_12_18_Monterey_Spineflower_Critical_Habitat_Location.mxd - 2/16/2013 @ 9:25:24 PM



Legend

-  Major Roads
-  Former Fort Ord Boundary
-  Impact Area Boundary
-  U.S. Fish and Wildlife Designated Monterey Spineflower Critical Habitat
-  ESCA Munitions Response Areas

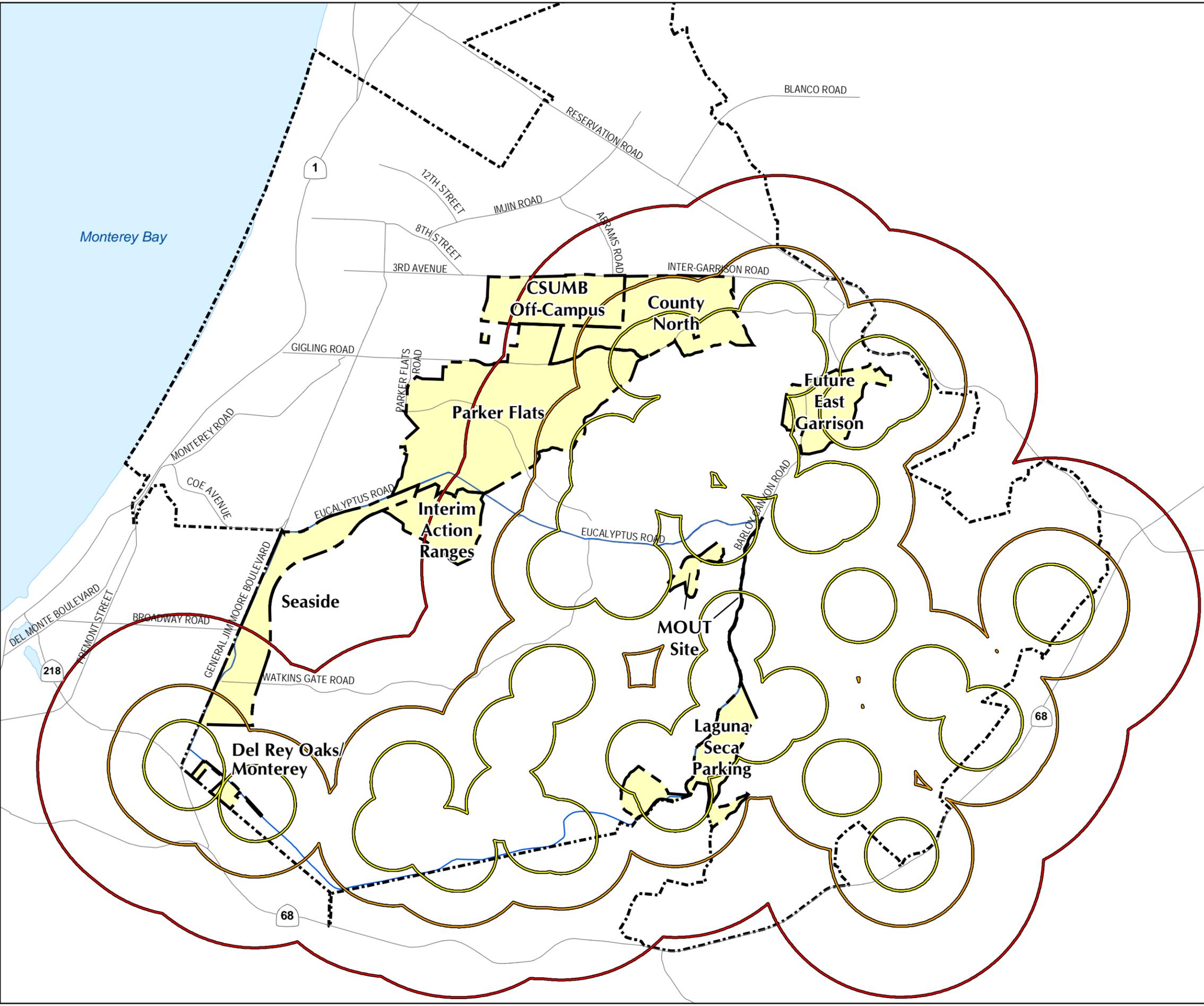


2012 Annual Natural Resource Report
Former Fort Ord
Monterey Spineflower
Critical Habitat Location

FORA ESCA RP
 Monterey County, California

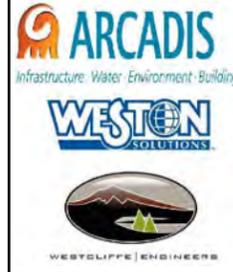
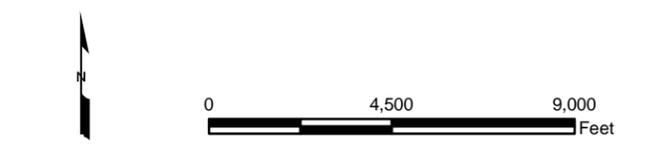
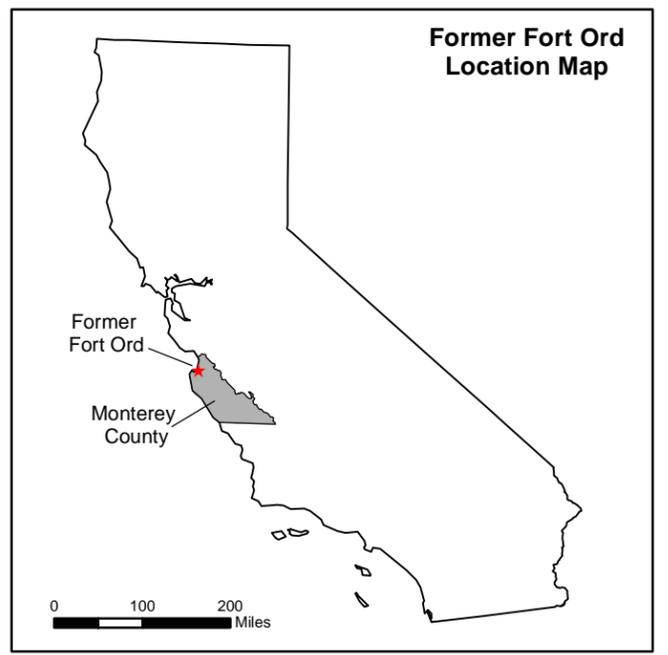
Figure 9

T:\Projects\ALLMRAs\Habitat Monitoring\2012_Annual_Natural_Resource_Report\2012_12_18_CTS_Potential_Habitat_Zones.mxd - 2/16/2013 @ 9:25:24 PM



Legend

- Major Roads
- Former Fort Ord Boundary
- Impact Area Boundary
- ESCA Munitions Response Areas
- U.S. Fish and Wildlife Designated California Tiger Salamander Habitat Zones**
- 500 M
- 1 KM
- 2 KM

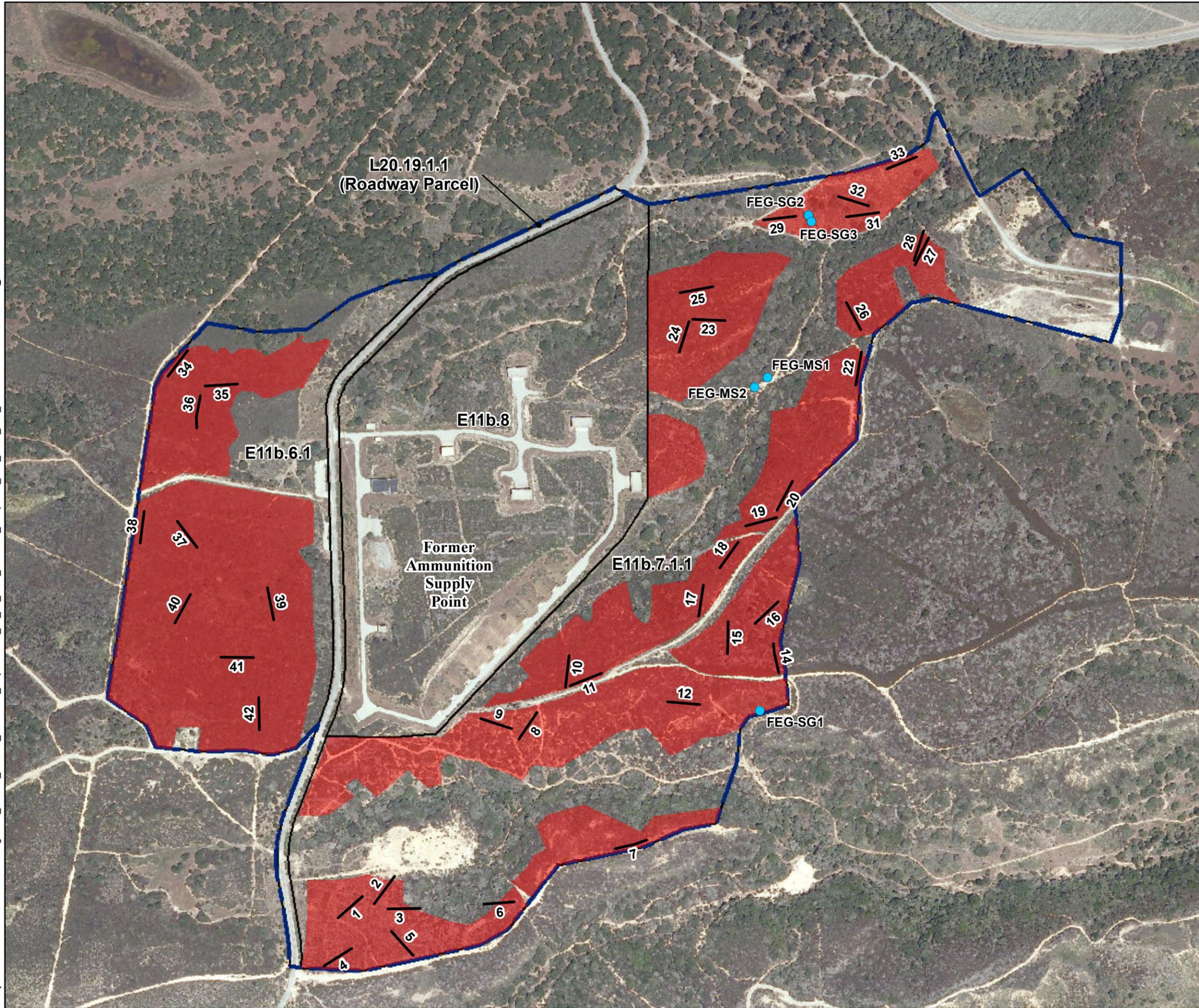


2012 Annual Natural Resource Report
Former Fort Ord
California Tiger Salamander
Potential Habitat Zones

FORA ESCA RP
 Monterey County, California

Figure 10

T:\Projects\ALLMRA\Habitat Monitoring\2012_Annual_Natural_Resource_Report\2012_12_30_FEG_Maritime_Chaparral_with_Plots_and_Transsects.mxd - 2/16/2013 @ 9:27:50 PM



Legend

- Identified Maritime Chaparral Area
- 24 Vegetation Monitoring Transect
- FEG-SG2 HMP Annual Species Monitoring Plot
- Munitions Response Area
- E11b.8 USACE Parcel

Former Fort Ord Location Map

2010 Aerial Shown

0 500 1,000 Feet

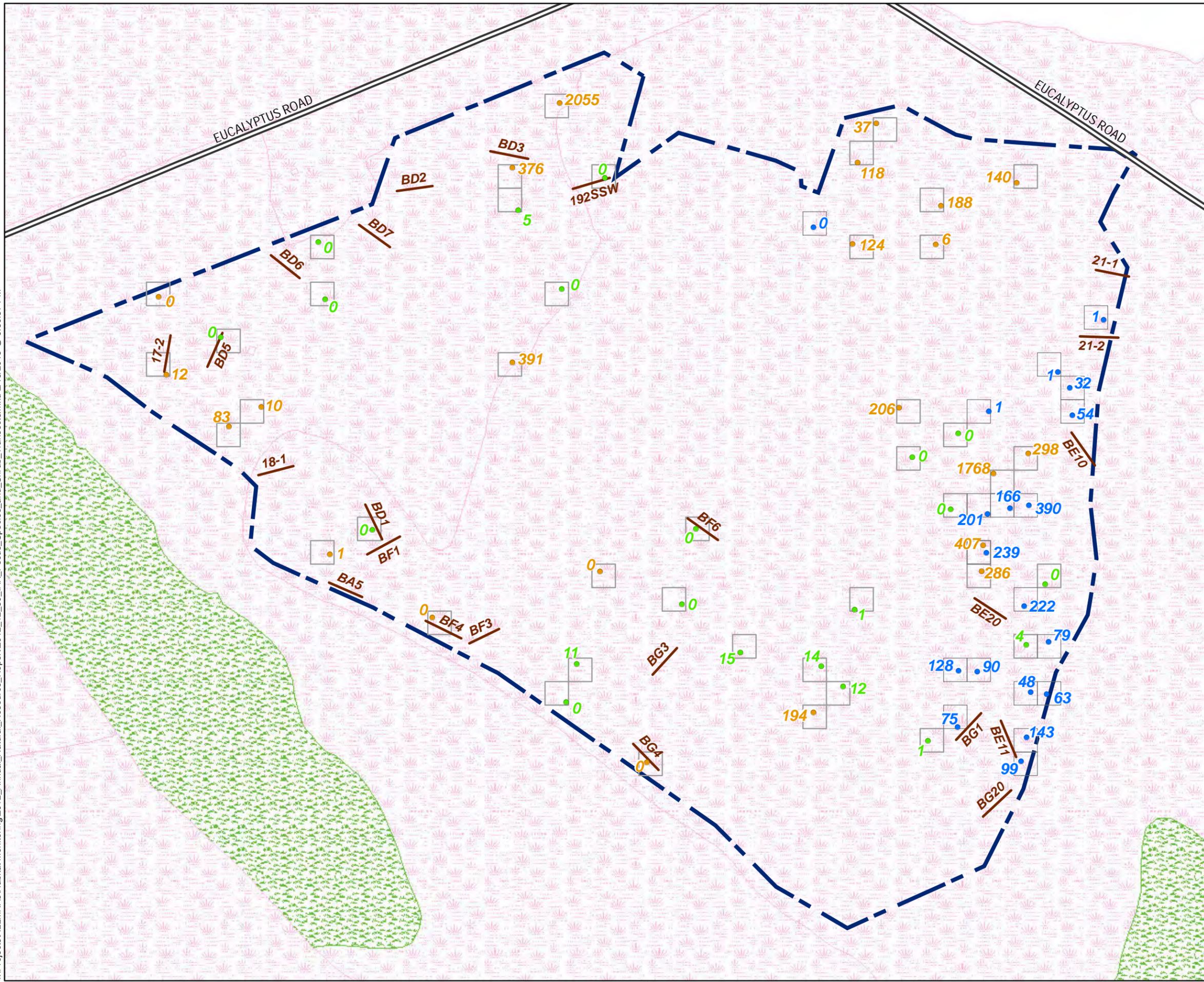
Infrastructure · Water · Environment · Buildings

2012 Annual Natural Resource Report
Future East Garrison MRA
Maritime Chaparral Areas and
Habitat Monitoring Transects

FORA ESCA RP
 Monterey County, California

Figure 11

T:\Projects\ALLMRAs\Habitat Monitoring\2012_Annual_Natural_Resource_Report\2012_12_30_IAR_Focus_Species_and_Shrub_Transects.mxd 2/16/2013 @ 9:30:37 PM



Legend

- 5 Sand Gilia Plot Location and Count
- 83 Monterey Spineflower Plot Location and Count
- 102 Seaside Bird's - Beak Plot Location and Count
- == Major Road
- BF3** 2010 Transect
- 100-foot Grid Boundary
- ▬ MRA Boundary

Vegetation Types

- Grassland
- Maritime Chaparral
- Inland Coast Live Oak Woodland

Source: Flora and Fauna Baseline Study of Fort Ord, California, Jones and Stokes Association Inc., December 1992.



Sand Gilia



Monterey Spineflower



Seaside Bird's - Beak

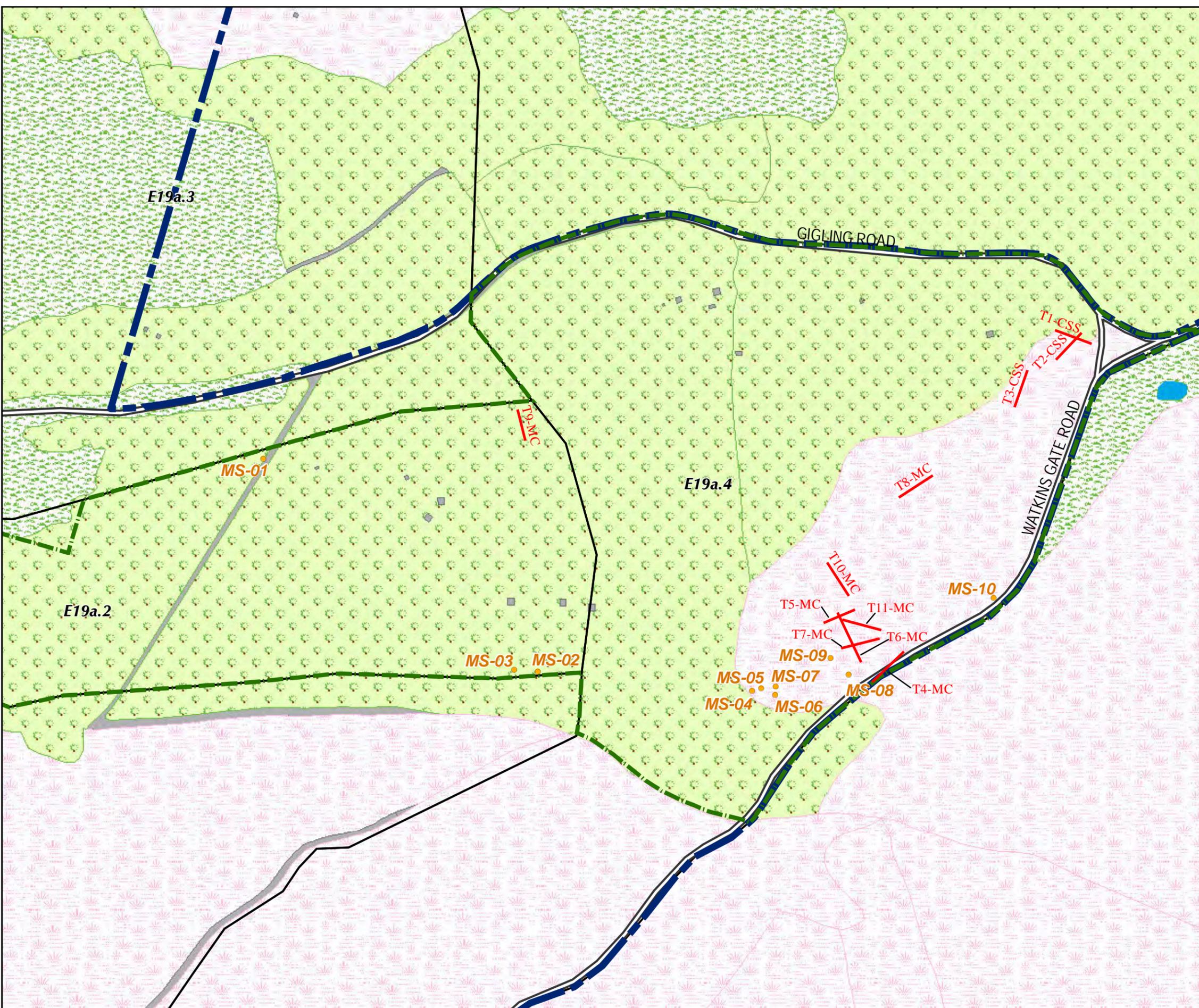


2012 Annual Natural Resource Report
Interim Action Ranges MRA
2010-2011 HMP Annual Species
Plot Locations and Habitat
Monitoring Transects

FORA ESCA RP
 Monterey County, California

Figure 12

T:\Projects\ALL MRAs\Habitat Monitoring\2012_Annual_Natural_Resource_Report\2012_12_30_PF_Monitoring_Locations.mxd 2/16/2013 @ 9:30:59 PM



Legend

- **MS-"X"** Spineflower Plot Location and Code
- **T9-MC** Survey Transects
(MC = Maritime Chaparral
CSS = Coastal Sage Scrub)
- Phase II Habitat Area
- Munitions Response Area
- E19a.4 USACE Parcel
- Major Road

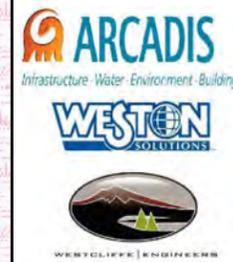
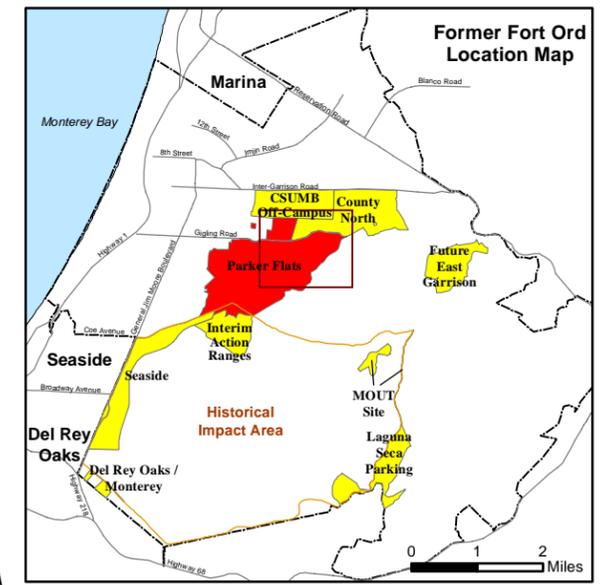
Vegetation Type

- Grassland*
- Maritime Chaparral*
- Coastal Coast Live Oak Woodland*
- Aquatic Feature*
- Developed / Disturbed

*Source: Flora and Fauna Baseline Study of Fort Ord, California, Jones and Stokes Association Inc., December 1992.



Monterey Spineflower



**2012 Annual Natural Resource Report
Parker Flats MRA Phase II Habitat Area
Monitoring Locations Established
in 2008 Baseline Survey**

FORA ESCA RP
Monterey County, California

Figure 13